Western Power Distribution

Common Network Asset Indices Methodology (CNAIM)

Secondary Deliverables Rebasing

Version 2.0 (Jan 2017)

WESTERN POWER DISTRIBUTION

Serving the Midlands, South West and Wales

Document Revision History Table:

Document Version	Date	Comment
1.0	Dec 2016	Initial document to support rebasing spreadsheets submitted to Ofgem
2.0	Jan 2017	Revised test results aligning the test 1 approach with methodology adopted by Ofgem (i.e. selecting maximum risk removal at HI category level not asset register level). Amendments to intervention volumes to meet test 2 in line with instructions from Ofgem. Incorporating revised calibration values for towers and oil filled cables.

Table of contents

1 Introduction

1.1 As part of submitting business plan forecasts for the RIIO-ED1 period, DNOs were required to provide activity volumes for asset replacement and asset refurbishment. Asset replacement volumes were specified as asset disposals and asset additions. Asset refurbishment volumes were specified as activities such as tower painting.

1.2 In most asset register categories there was a like-for-like relationship for asset replacement activity, where assets were shown as replaced by the same asset type. There were a limited number of exceptions: oil and gas filled cables were replaced by non-pressurised cables and a proportion of HV distribution switches were replaced by ring main units.

1.3 In order to demonstrate the benefits of asset replacement and asset refurbishment interventions, Ofgem required DNOs to specify the change in network risk that resulted from the activities for those assets where it was possible to provide measures.

1.4 The risk was derived from an assessment of the probability of failure and the consequence of failure of an asset. Each asset was allocated to one of five Health Index (HI) bands (representing the probability of failure) and one of four Criticality Index (C) bands (representing the consequence of failure). This assessment was carried out for the start of RIIO-ED1, the mid-point of RIIO-ED1 and the end of RIIO-ED1, assuming that no interventions were carried out. This showed that, without intervention, the probability of failure and HI ranking increases over time. This provided the total asset risk at the end of RIIO-ED1 without intervention.

1.5 The impact of asset replacement and asset refurbishment activities was overlaid onto the HI and C matrices. Asset replacement generally led to a high HI value asset being replaced by a new asset (HI1) and asset refurbishment led to a reduction in HI value, but did not necessarily lead to 'as new' conditions. The resultant was a lower overall total asset risk.

1.6 The difference between the risk value without intervention and the risk value with intervention was deemed to be the Network Asset Secondary Deliverable.

1.7 All these initial assessments, submitted as part of RIIO-ED1 business plans, were carried out by DNOs, using their own Network Asset Indices Methodologies.

1.8 A new RIIO-ED1 licence obligation SLC 51 required DNOs to work together to develop a Common Network Asset Indices Methodology (CNAIM). Upon development of CNAIM, DNOs were required to rebase the Network Asset Secondary Deliverables using the CNAIM methodology. Ofgem approved CNAIM on 1 February 2016 and set a deadline of 30 December 2016 for completion of the rebasing exercise.

1.9 On 6 December 2016, Ofgem published the rebasing requirements which specified that a number of different data files should be submitted by 30 December 2016. The files are:

- The Network Asset Workbook (NAW) Excel file (one per DNO group)
- The Secondary Deliverables Monetised Risk Excel file (one per DNO group)
- A separate file of asset additions and disposals
- This document as the supporting commentary

1.10 Ofgem also elected to postpone the submission of Annex D Secondary Deliverables for 2015/16, which is normally required to be reported under SLC 46 by 31 July each year. This was to ensure that the submission of deliverables was also based upon CNAIM. The associated files which are required to be submitted by 30 December 2016 are:

- RIGs Annex D - The 2015/16 Secondary Deliverable reporting pack(one per licensee)
- The 2015/16 Secondary Deliverables supporting commentary (one per DNO group)

1.11 Following the initial submission of the rebased data, both Ofgem and DNOs identified that the calibration factors for Towers and Cables (Oil) should be revisited. The six DNO groups have determined the necessary calibration changes to the Common Network Asset Indices Methodology and WPD has implemented these changes into a resubmission of the rebased data provided on 1 February 2017.

1.12 This document provides the commentary on how WPD has carried out the rebasing of Network Asset Secondary Deliverables to provide equally as challenging targets.

2 Scope

2.1 The rebasing of Network Asset Secondary Deliverables is a distribution license requirement. Charge Restriction Licence Condition CRC 5D paragraphs 5D.17 and 5D.18 state:

> *Rebasing and modification in accordance with the Common Network Asset Indices Methodology*
>
> *5D.17 Within 26 weeks from the date of implementation or modification of the Common Network Asset Indices Methodology, or any later date to which the Authority consents, the licensee must develop and submit for approval to the Authority a revised set of Network Asset Secondary Deliverables ("Rebased Network Asset Secondary Deliverables") in accordance with the Common Network Asset Indices Methodology, which are trued up to take account of actual data up to and including 31 March 2015.*
>
> *5D.18 The Rebased Network Asset Secondary Deliverables must:*
>
> *(a) be consistent with the Common Network Asset Indices Methodology;*
>
> *(b) remain equally as challenging as those set out in the Network Assets Workbook that was applicable at 1 April 2015, as calculated using the values for Average Probability of Asset Failure and Average Consequence of Asset Failure applied at that time adjusted for any modification to RIGs or Common Network Asset Indices;*
>
> *(c) be in the same format as the Network Assets Workbook; and*
>
> *(d) be based on actual rather than forecast data up to and including 31 March 2015.*

2.2 Standard Licence Condition 51 required that all licensees work together to develop CNAIM and submit it for approval to the regulator by 1 July 2015. The licensees established a working group in October 2014 and over the following months developed a methodology that covers 25 different asset categories. The draft version of CNAIM was submitted for approval on 1 July 2015. After reviewing the methodology document, Ofgem consulted on their minded-to position and concluded on 23 October 2015 that a number of additional details were required. These were addressed and an updated version of the methodology was submitted on 15 December 2015. Ofgem approved this version of the methodology on 1 February 2016, directing the licensees to address two minor issues by 1 August 2016; consequently a revised version of CNAIM was submitted on 27 July 2016. As part of the review of the methodology, licensees uncovered a small number of corrections that needed to be implemented. Standard license condition 51 requires that licensee proposed changes to CNAIM require a consultation process. This consultation process was conducted during September 2016 with no objections to the proposed changes. Ofgem gave notification to approve the changes on 21 October 2016.

2.3 Since the approval of the methodology on 1 February 2016 required additional changes to be made, Ofgem extended the time period for licensees to carry out the rebasing required under licence condition CRC 5D. A deadline of 30 December 2016 was provided for both the rebasing exercise and the submission of RIGs Annex D for 2015/16.

2.4 The rebasing requires a number of considerations including:

- The reference point for asset population volumes;
- Establishing a dataset for processing through CNAIM models;
- Selection of interventions that align to the volumes proposed in business plan submissions in June 2013; and
- Ensuring that the selected interventions lead to rebased targets that are equally as challenging as the original secondary deliverables.

2.5 RIIO-ED1 business plans were developed based on data in 2012/13. These included forecast activity volumes for the last two years of DPCR5 and the original Network Asset Secondary Deliverables for RIIO-ED1 reflected the forecast DPCR5 activity. Since the actual delivery of activities in the last two years of DPCR5 could be different to the forecast activity, Ofgem included a requirement within licence condition CRC 5D (para 5D.18 d) that the rebased Secondary Deliverables should be based upon actual outcomes to 31 March 2015 (the end of DPCR5). The volume of assets included in the rebased Secondary Deliverables should therefore reconcile with the asset register volumes reported for the end of DPCR5.

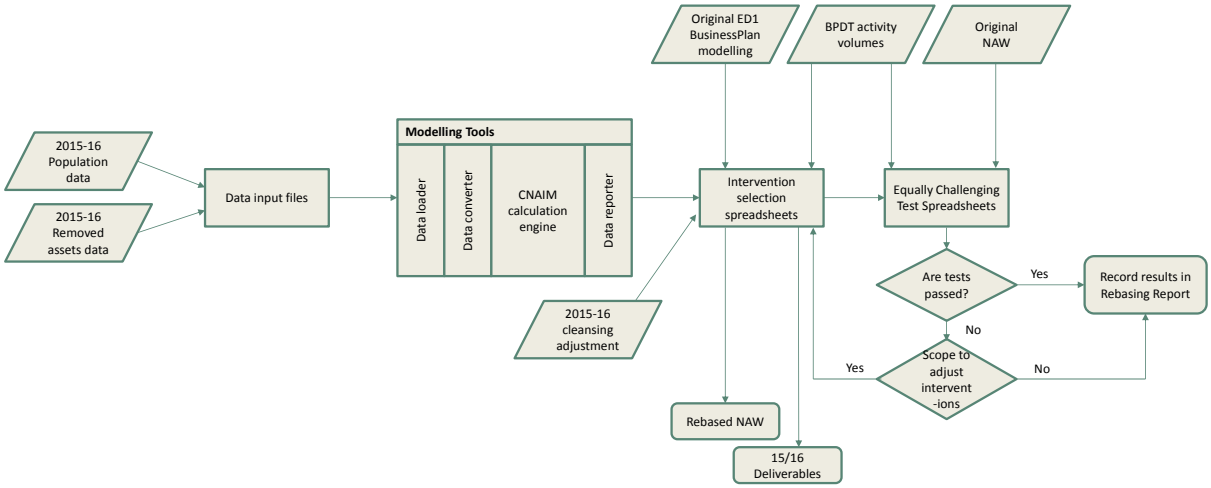
2.6 The development of CNAIM has continued during the first year of RIIO-ED1, receiving approval on 1 February 2016. This means that the methodology and associated data requirements were not in place at the start of RIIO-ED1. Since the data requirements for CNAIM became clearer at the end of the first year of RIIO-ED1, it is more convenient to use data at that point in time, rather than use data from the end of DPCR5 and supplement it with missing data required for CNAIM. The establishment of the WPD dataset is therefore based upon the assets that were in commission at the end of March 2016 (the end of the first year of RIIO-ED1) with adjustments for asset disposals and data cleansing during 2015/16 to align to the asset volumes at the end of DPCR5.

2.7 Once condition and criticality data is processed through the CNAIM models to determine the forecast health and consequence of failure of assets at the end of RIIO-ED1 without intervention, there is a requirement to overlay the effect of carrying out the asset replacement and refurbishment activities that provide a secondary deliverable benefit. The selection of the assets which are intervened upon ultimately leads to the Network Assets Secondary Deliverables targets. In order to ensure that the rebasing process does not introduce any relaxation of targets or lead to any additional challenges for licensees, Ofgem introduced a licence condition clause in CRC 5D (para 5D.18 b) to ensure that the rebased secondary deliverables are equally as challenging as the original secondary deliverables.

2.8 At the time of establishing the licence conditions the tests for equally as challenging were undefined. Recognising that an assessment methodology was required, Ofgem established a working group in September 2016 to define the rebasing requirements and assessment methodology. The working group was open to all interested parties, with supplier British Gas attending most meetings, giving an independent challenge to the processes being developed. DNOs worked with Ofgem to define three tests that would be used to assess equally as challenging and these were published in a methodology document on 6 December 2016.

2.9 This document describes the processes followed by WPD to establish datasets for processing through CNAIM, how interventions have been selected and the results of the equally challenging test.

3 Process



3.1 The diagram above gives an overview of the processes used to derive the Rebased Network Assets Workbook (NAW) and secondary deliverables for 2015/16.

3.2 The starting point for data for CNAIM is the data available for assets in commission at the end of March 2016 (2015/16 data). This date corresponds to the end of the first year of RIIO-ED1. This date is selected because the data that CNAIM requires can be extracted as part of the routine extraction for other regulatory reporting requirements. It avoids having to supplement 2014/15 data (for the whole population) with additional data elements required for CNAIM.

3.3 The 2015/16 data is combined with data for the assets removed from the network in 2015/16 to provide a data volume that reconciles with the asset register volumes in 2014/15. In some cases data cleansing adjustments have occurred and these are resolved later in the process.

3.4 The two data sources are combined into data input files for each separate CNAIM model. For example there is one input file for 132kV transformers and a separate file for EHV transformers. In some instances (e.g. poles) the volume of assets cause data input files sizes to be unmanageable and therefore these are subdivided into licence specific data input files.

3.5 These data files contain the WPD condition and criticality data for each asset. The form of the data is the same as that dictated by WPD policy and systems. At this stage the data is yet to be converted into a CNAIM input format.

3.6 The data input files are processed through modelling tools developed for WPD by EA Technology. The modelling tools have four distinct elements:

- Data loader
- Data converter
- CNAIM model
- Data reporter

3.7 The data loader is a process front-end that allocates asset categories and licences areas to specific CNAIM models.

3.8 The data converter takes the WPD condition and criticality data and translates it into a format that CNAIM recognises through a set of user definable rules.

3.9 The converted data is processed through the CNAIM calculation engine which is based upon the calculations, ageing curves, caps and collars defined within CNAIM. This derives the current and future health and consequence of failure scores for each asset.

3.10 The output of CNAIM is comma separated variable file, which is converted to a more useable Excel file by a Data Reporter tool.

3.11 The CNAIM output for the end of RIIO-ED1 is used to populate the health and criticality risk matrix for the end of RIIO-ED1 without intervention.

3.12 In order for the population to fully reconcile with 2014/15 asset volumes, an adjustment is made (where necessary) to cater for any data cleansing removals in 2015/16.

3.13 Interventions are applied to the asset population in bespoke intervention selection spreadsheets. The process of selecting interventions considers previous modelling used for the Original NAW and the volumes of interventions included within the Business Plans Data Templates (BPDT) submitted as part of RIIO-ED1 Business Plan data.

3.14 The resultant intervention profiles and asset population profiles are linked to test spreadsheets where the three equally as challenging tests are assessed. These use the Original NAW and BPDT data as reference data within the tests. If the initial selection of interventions leads to a test being failed, the interventions are reviewed to determine whether adjustments can be applied to pass the tests. In some cases, the options for adjustments are exhausted and tests cannot be passed. These failed tests are captured in section 7 of this report which contains hyperlinks to explanations of the reasons for not being able to pass the tests within the appendix.

3.15 Having carried out the necessary iterations to pass the equally as challenging tests the intervention spreadsheets are linked to the reporting templates required for both the rebasing exercise and 15/16 secondary deliverables.

4 Dataset establishment

4.1 One of the licence condition requirements is that the starting point of the rebasing calculations takes account of actual data (not forecast data) up to the end of DPCR5. This means that asset volumes need to reconcile with the asset register volumes reported in the 2014/15 regulatory submissions.

4.2 CNAIM has predefined inputs, some of which may not have been previously collected by licensees or, if collected, not used by licensees in their own methodologies. Standard Licence Condition 51 requires licensees to produce Information Gathering Plans stating which CNAIM data points will be used and whether these require additional data to be collected. In some cases licensees will have this data readily available in systems, in others new data collection processes will need to be established. DNOs' Information Gathering Plans were approved by Ofgem on 19 December 2016.

4.3 Since CNAIM was not approved until 1 February 2016, licensees would not have extracted the additional data as part of their own Network Asset Indices Methodologies. This means that data used prior to February 2016 would have to be supplemented with additional condition and criticality data for CNAIM processes.

4.4 The Ofgem methodology document allows two options for the starting point for data sets:

- Use 2014/15 data and supplement it with the latest condition data;
- Use the latest 2015/16 data adjusting volumes for asset removals and data cleansing in 2015/16 and adjusting for deterioration during 2015/16.

4.5 WPD has elected to use the latest 2015/16 data and adjust for removals and data cleansing in 2015/16.

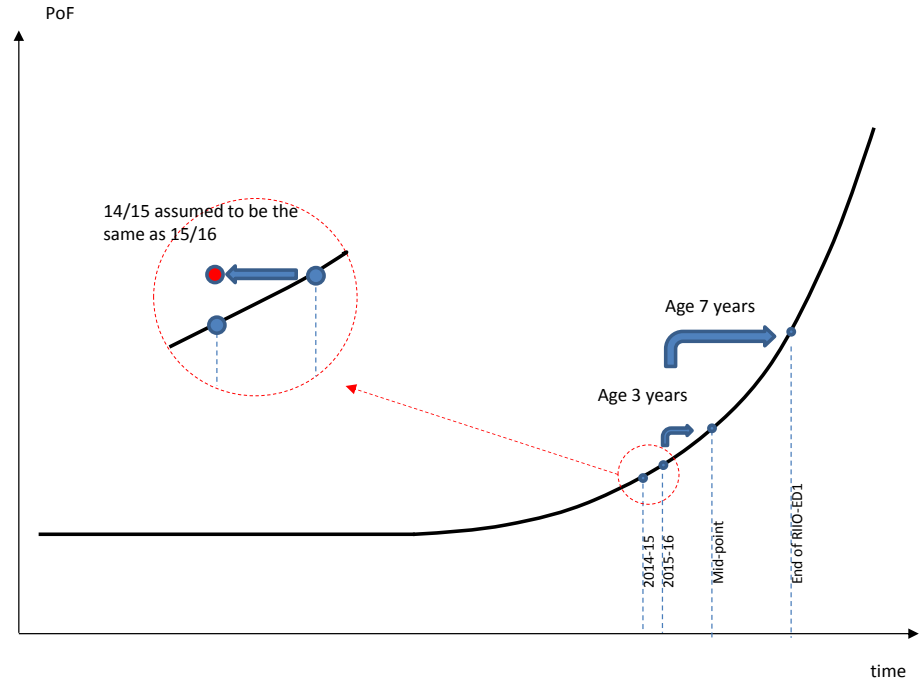
Assets that were on the network at 31 March 2016

4.6 Condition and criticality data has been obtained from asset registers and local records for assets that were in commission on 31 March 2016 (2015/16 data). This is in a format that can be loaded into modelling tools and converted into data input for CNAIM.

4.7 2015/16 data is viewed as providing the best and most current view of the condition of the assets.

4.8 One of the options discussed at the working group was to reverse age the 2015/16 position by one year to derive a 2014/15 position. This process was identified to have issues due to the way caps and collars work within CNAIM. Using a reverse aged position (with potential errors) to forecast forward was therefore dismissed as an option. Since 2015/16 data provides a known position, WPD has used this to determine future positions.

4.9 The diagram below shows how the 2015/16 data is used. The RIIO-ED1 midpoint is determined by ageing the data by 3 years and the end of RIIO-ED1 is determined by ageing the data by 7 years.



4.10 In order to determine the 2014/15 position it is assumed that the 2015/16 data is representative of the 31 March 2015 position. There is no reverse ageing of 2015/16 data or use of 2014/15 age data with more current condition data.

4.11 This approach means the condition data for 2014/15 is assumed to be the same as 2015/16. As a consequence of this assumption, no deterioration is being reported in the Annex D submission for secondary deliverables for 2015/16.

Assets that were removed from the network during 2015/16

4.12 Assets that were removed from the network during 2015/16 do not exist in the asset volumes reported for 31 March 2016. It is therefore necessary to add them back in to enable the population volume to reconcile with values in 2014/15.

4.13 In some cases data is retained for decommissioned assets, but for others there may be data that is missing to satisfy the data requirements CNAIM and therefore a hybrid of data sources is used to provide the best view of the condition of the assets prior to removal. The sources of condition data include:

- Data extracts that were made for DPCR5 reporting with data elements based upon WPD CBRM model requirements;
- Additional data extracts of CNAIM relevant condition data available in systems for decommissioned assets;
- Local records of condition data for decommissioned assets.

4.14 Criticality data is obtained from a combination of data already extracted for previous CBRM models within WPD and data for the current assets in the location of the decommissioned assets (assuming that there has not been network reconfiguration).

4.15 The most recent data for data elements is used to populate the CNAIM data input requirements.

4.16 The derived data for condition and criticality is assumed to be representative of the position at 31 March 2016. It is assumed that this also represents the condition and criticality at 31 March 2015 (i.e. the data is not reverse aged to obtain the 31 March 2015 position).

4.17 The data is aged 3 years to obtain the RIIO-ED1 midpoint and aged 7 years to derive the position at the end of RIIO-ED1 without intervention.

Assets subject to data cleansing in 2015/16

4.18 In order to fully reconcile volumes to the 2014/15 reported volumes, the assets subject to data cleansing in 2015/16 are considered.

4.19 Data cleansing additions are included in the asset population at end of March 2016, so the main requirement to is to deal with data cleansing removals during 2015/16 (which need to be added back to reconcile with the 2014/15 population).

4.20 Adjustments have been applied to the output from the CNAIM models to account for data cleansing removals. Such assets have been allocated the average consequence of failure for the criticality band C2 so that there is no effect on the overall average consequence of failure.

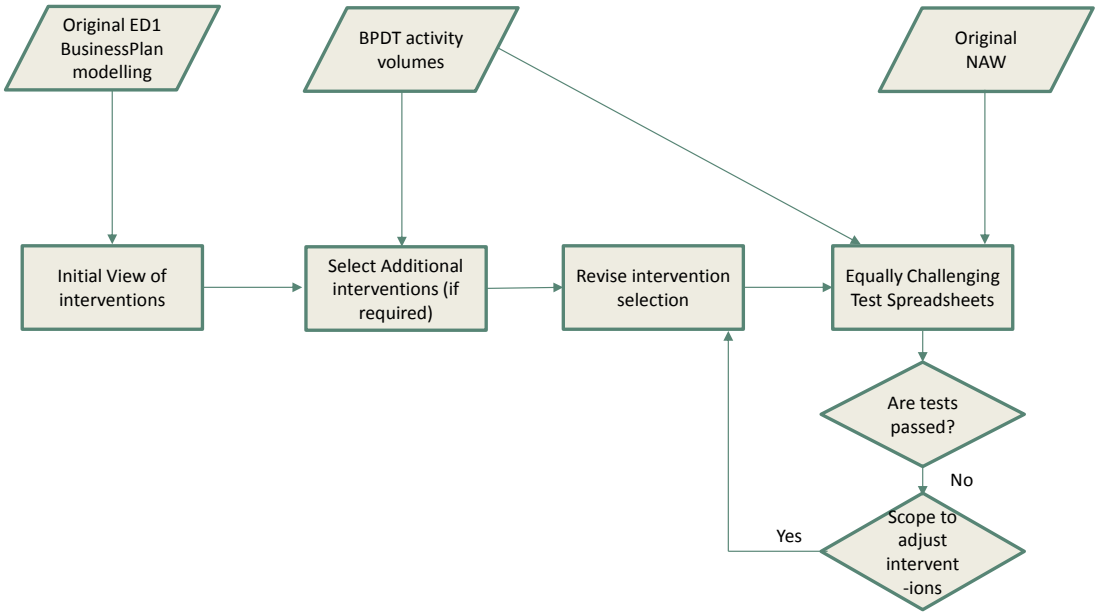
5 Intervention methodology

5.1 The primary sources of the volume of interventions for WPD are the Business Plan Data Templates (BPDT) submitted for each of the WPD licence area as part of the business plan submissions made in June 2013.

5.2 Since the WPD RIIO-ED1 Business Plan was fast tracked, there have been no adjustments made to the volumes proposed in the plan as a consequence of price control benchmarking.

5.3 The volumes of removals and disposals in the BPDTs were used to determine the movements in the Health Index tables within the BPDTs, which were converted, by Ofgem, to the Network Asset Workbooks (NAW). The volumes in the Original NAW, reconcile with the BPDT and are therefore also used for reference.

5.4 WPD's RIIO-ED1 Business Plan describes the approach taken to develop an optimised intervention plan. In many cases this assessed individual assets to determine whether they passed a removal trigger. This meant that there was an identified list of assets that made up the intervention plan. It should be noted that this list also included the forecast volumes of interventions for the last two years of DPCR5. Actual replacements in the last two years of DPCR5 were different to forecast and therefore whilst the list of assets provide a starting point for intervention selection during the rebasing process, other assets have had to be selected to ensure that intervention volumes remain the same as those in BPDTs.



5.5 The process diagram above provides an outline of the intervention selection process used by WPD for rebasing the NAW.

5.6 Where available, asset specific modelling used for developing the RIIO-ED1 business plan has been used to select those assets that still remain on the network at the start of RIIO-ED1.

5.7 Additional/fewer assets are selected to align the volumes of interventions to the asset additions and disposals specified in the BPDTs. This is carried out at an asset register level.

5.8 The resultant interventions at a HI category level are assessed against the equally as challenging tests and if the tests are failed the asset populations are examined to determine whether there are any adjustments that can be made to the intervention plan to pass the test.

5.9 Different assets are selected and the resultant interventions are re-assessed against the tests. This process is repeated until either the tests are passed or there is no further scope to pass a test.

5.10 This process has been repeated for all asset replacement activities that were originally specified as having a Network Asset Secondary Deliverable measure. The relevant HI categories and associated asset register categories are shown in the table below:

Health Index Asset Category	Asset Register Category from BPDT	Asset Register Category from RIIO ED1 Cost & Volume Regulatory Reporting Pack
LV OHL Support	LV Poles	LV Poles
LV Switchgear (at S/S)	LV Circuit Breaker	LV Circuit Breaker
	LV Pillar (ID)	LV Pillar (ID)
	LV Pillar (OD at Substation)	LV Pillar (OD at Substation)
	LV Board (WM)	LV Board (WM)
LV UGB & LV Pillars (OD not at Substation)	LV UGB & LV Pillars (OD not at Substation)	LV UGB
		LV Pillars (OD not at Substation)
HV OHL Support – Poles	6.6/11kV Poles	6.6/11kV Poles
HV Switchgear (GM) – Primary	6.6/11kV CB (GM) Primary	6.6/11kV CB (GM) Primary
HV Switchgear (GM) - Distribution	6.6/11kV CB (GM) Secondary	6.6/11kV CB (GM) Secondary
	6.6/11kV Switch (GM)	6.6/11kV Switch (GM)
	6.6/11kV RMU	6.6/11kV RMU
HV Transformer (GM)	6.6/11kV Transformer (GM)	6.6/11kV Transformer (GM)
EHV OHL Support - Poles	33kV Pole	33kV Pole
	66kV Pole	66kV Pole
EHV OHL Conductor (Tower Lines)	33kV OHL (Tower line) Conductor	33kV OHL (Tower line) Conductor
	66kV OHL Conductor	66kV OHL (Tower Line) Conductor
EHV OHL Support - Towers	33kV Tower	33kV Tower
	66kV Tower	66kV Tower
EHV OHL Fittings	33kV Fittings	33kV Fittings
	66kV Fittings	66kV Fittings
EHV UG Cable (Oil)	33kV UG Cable (Oil)	33kV UG Cable (Oil)
	66kV UG Cable (Oil)	66kV UG Cable (Oil)
EHV UG Cable (Gas)	33kV UG Cable (Gas)	33kV UG Cable (Gas)
	66kV UG Cable (Gas)	66kV UG Cable (Gas)
EHV Switchgear (GM)	33kV CB (Air Insulated Busbars)(ID) (GM)	33kV CB (Air Insulated Busbars)(ID) (GM)
	33kV CB (Air Insulated Busbars)(OD) (GM)	33kV CB (Air Insulated Busbars)(OD) (GM)
	33kV CB (Gas Insulated Busbars)(ID) (GM)	33kV CB (Gas Insulated Busbars)(ID) (GM)
	33kV CB (Gas Insulated Busbars)(OD) (GM)	33kV CB (Gas Insulated Busbars)(OD) (GM)
	33kV Switch (GM)	33kV Switch (GM)
	33kV RMU	33kV RMU
	66kV CB (Air Insulated Busbars)(ID) (GM)	66kV CB (Air Insulated Busbars)(ID) (GM)
	66kV CB (Air Insulated Busbars)(OD) (GM)	66kV CB (Air Insulated Busbars)(OD) (GM)

	66kV CB (Gas Insulated Busbars)(ID) (GM)	66kV CB (Gas Insulated Busbars)(ID) (GM)
	66kV CB (Gas Insulated Busbars)(OD) (GM)	66kV CB (Gas Insulated Busbars)(OD) (GM)
EHV Transformer	33kV Transformer (GM)	33kV Transformer (GM)
	66kV Transformer	66kV Transformer
132kV OHL Conductor (Tower Lines)	132kV OHL (Tower Line) Conductor	132kV OHL (Tower Line) Conductor
132kV OHL Support - Tower	132kV Tower	132kV Tower
132kV OHL Fittings	132kV Fittings	132kV Fittings
132kV UG Cable (Oil)	132kV UG Cable (Oil)	132kV UG Cable (Oil)
132kV UG Cable (Gas)	132kV UG Cable (Gas)	132kV UG Cable (Gas)
132kV CBs	132kV CB (Air Insulated Busbars)(ID) (GM)	132kV CB (Air Insulated Busbars)(ID) (GM)
	132kV CB (Air Insulated Busbars)(OD) (GM)	132kV CB (Air Insulated Busbars)(OD) (GM)
	132kV CB (Gas Insulated Busbars)(ID) (GM)	132kV CB (Gas Insulated Busbars)(ID) (GM)
	132kV CB (Gas Insulated Busbars)(OD) (GM)	132kV CB (Gas Insulated Busbars)(OD) (GM)
132kV Transformer	132kV Transformer	132kV Transformer

Hybrid HI Categories (LV switchgear)

5.11 Within the RIIO-ED1 Business Plan, WPD proposed a different combination of asset register categories for switchgear at LV compared to the 'standard' categories. This was to make the HI categories align to asset register categories and be more representative of the function performed by assets. These asset categroires were incorporated into WPD's Secondary Deliverables for RIIO-ED1.

5.12 In the BPDT the following asset register categories were specified:

- LV Circuit Breaker
- LV Pillar (ID)
- LV Pillar (OD at Substation)
- LV Board (WM)
- LV UGB & LV Pillars (OD not at Substation)

5.13 The 'standard' HI categories were:

- LV Switchgear and Other
- LV UGB

5.14 To create the 'standard' HI categories would require the subdivision of the asset register category of 'LV UGB & LV Pillars (OD not at substation)' to allocate the LV UGB part to the LV UGB HI category and the LV Pillars (OD not at substation) to the LV Switchgear and Other HI category.

5.15 LV Pillars (OD not at substations) perform a similar function to LV UGB and therefore it is more logical to keep LV UGB and LV Pillars (OD not at substations) within the same HI category. WPD therefore created two hybrid HI categories of LV UGB & LV Pillars (not at substation) and LV switchgear (at s/s).

Disaggregated HI Categories (Tower Fittings and Conductor)

5.16 The standard HI categories in the BPDT combined Tower Fittings and OHL Conductor (Tower Lines). Since the units of measure for Tower Fittings are counts of items and the units of measure for OHL Conductor are km, combining these into a single category is illogical. WPD therefore submitted separate measures within the BPDT, which were incorporated into WPD's Secondary Deliverables for RIIO-ED1.

5.17 It should be noted that the rebasing working group agreed that separating these categories should be adopted by all licensees.

5.18 WPD's rebased NAW continues to have these categories separated and therefore comparison against the Original NAW is straightforward for WPD.

Variation of Probability of Failure (Pof) Values

5.19 The calculation of Probability of Failure (PoF) values is specified within CNAIM and the majority of the PoF values are common for all licensees, but there are some HI categories where variances are allowed.

5.20 The generic exceptions are EHV Switchgear and LV Switchgear and Other, where a weighted average is used. This is because the CNAIM working group agreed that there was a material difference in PoF for the Asset register categories which make up these HI categories.

5.21 Since WPD uses a hybrid of the LV switchgear categories, the variation is extended to the WPD specific LV Switchgear (at S/S) and LV UGB & LV Pillars (OD not at Substation) HI categories.

5.22 The following tables show the PoF values used by WPD where there are no 'common' values or where the mix of asset register categories within HI categories is different.

Average PoF Values used for LV Switchgear (at S/S)					
DNO	**HI1**	**HI2**	**HI3**	**HI4**	**HI5**
WMID	0.143%	0.213%	0.377%	0.610%	1.431%
EMID	0.137%	0.203%	0.360%	0.582%	1.366%
SWALES	0.132%	0.197%	0.348%	0.564%	1.322%
SWEST	0.138%	0.205%	0.362%	0.587%	1.377%

Average PoF Values used for LV UGB & LV Pillars (not at substations)					
DNO	**HI1**	**HI2**	**HI3**	**HI4**	**HI5**
WMID	0.219%	0.327%	0.578%	0.936%	2.195%
EMID	0.219%	0.327%	0.578%	0.936%	2.194%
SWALES	0.207%	0.309%	0.546%	0.884%	2.073%
SWEST	0.218%	0.324%	0.573%	0.927%	2.175%

Average PoF Values used for EHV Switchgear					
DNO	**HI1**	**HI2**	**HI3**	**HI4**	**HI5**
WMID	0.787%	1.172%	2.071%	3.355%	7.869%
EMID	0.636%	0.946%	1.673%	2.710%	6.356%
SWALES	0.697%	1.038%	1.835%	2.972%	6.972%
SWEST	0.636%	0.946%	1.673%	2.710%	6.356%

Revised Probability of Failure and Consequence of Failure Values (following initial submission)

5.23 Following the initial submission of the rebased data, both Ofgem and DNOs identified that the calibration factors for Towers and Cables (Oil) should be revisited. The six DNO groups have determined the necessary calibration changes to the Common Network Asset Indices Methodology and WPD has implemented these changes into a resubmission of the rebased data provided on 1 February 2017.

5.24 As required by Standard Licence Condition 51, changes to CNAIM require a consultation process to be carried out. Licensees will be carrying out this consultation after the resubmission of the rebased data. WPD has based its resubmission upon the revised calibration values that are going to be consulted upon, on the assumption that the consultation will conclude that changes to the calibration values are acceptable.

5.25 The alternative calibration values used are listed below (CNAIM v1.0 values in brackets):

- EHV Cable (Oil) and 132kV Cable (Oil) Probability of Failure k-factor reduced to 2.0944% (previously 3.7754% in CNAIM Table 21)
- EHV Tower and 132kV Tower Probability of Failure k-factor reduced to 0.0545% (previously 0.0879% in CNAIM Table 21)
- Consequence of failure, Network Performance 'Probability of a coincident fault per h' reduced to 0.050% (previously 1.000% in CNAIM Table 227)

Refurbishment

5.26 The only refurbishment activity that WPD included within the original Network Asset Secondary Deliverables was the replacement of tower steelwork.

5.27 Whilst WPD included other refurbishment activities within the BPDT, these were considered not to provide a health index benefit. This remains the case following clarification of which refurbishment activities provide a secondary deliverable benefit within RIIO-ED1 RIGs Annex A. The one exception is tower painting.

5.28 Within the rebased NAW, refurbishment is only stated against towers and is derived from both the replacement of steelwork and tower painting.

5.29 Assessment of the equally challenging tests has been carried out on steelwork alone as this is the element that is consistent with the original NAW.

Tower Refurbishment

5.30 The BPDT submissions specified volumes of activity for both tower steelwork replacement and tower painting. These are summarised below:

Tower Refurbishment	WMID	EMID	SWALES	SWEST
33kV Tower painting	208	456	56	200
66kV Tower painting	248	-	48	-
132kV Tower painting	1,080	1,824	952	1,235

33kV Tower steelwork	24	48	8	20
66kV Tower steelwork	24	-	8	-
132kV Tower steelwork	112	184	96	124

5.31 It is assumed that when steelwork is replaced on a tower, the tower is also painted. This means that the volumes of towers that are subject to painting alone is the volume of painting minus the volume of tower steelwork. For example WMID 33 Tower Painting is 208-24=184.

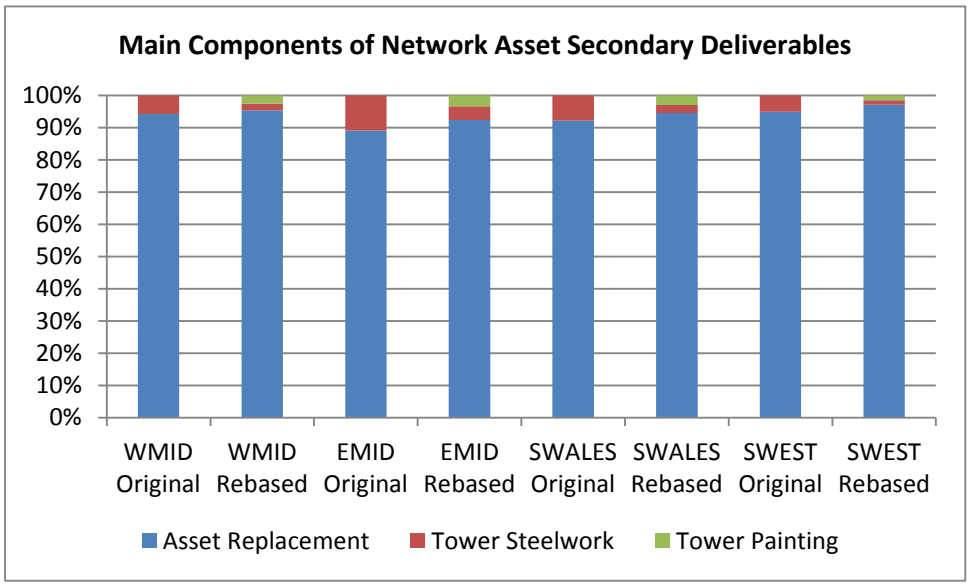
5.32 Tower steelwork interventions have been selected from towers where there is an indication of poor condition steel members. The post refurbishment condition assumes that both steelwork and paint issues are addressed.

5.33 Tower painting interventions have been selected by considering towers that will benefit from tower painting and then selecting the associated towers on the same route. This attempts to mimic the efficient working approach that would be carried out in practice, where a route would be selected for painting and all towers on that route painted.

Comparison of Target Components

5.34 The use of CNAIM parameters has amended how much each HI category contributes to the overall target.

5.35 The following chart shows that the contribution from tower steelwork refurbishment has reduced compared to the Original NAW. There is also a proportion of the target derived from tower painting, which was not included in the Original NAW targets.



5.36 The following table shows the contribution each HI category makes to the overall Network Asset Secondary Deliverables target for both the original targets based upon the BPDT and the rebased targets. This shows that the majority of the target is composed from LV Poles, HV Poles, 132kV Transformers and 132kV Cable (Oil).

Component Parts of the Original and Rebased Network Asset Secondary Deliverables								
	WMID		EMID		SWALES		SWEST	
HI Asset Category	Original	Rebased	Original	Rebased	Original	Rebased	Original	Rebased
LV OHL Support	14.1%	16.1%	10.8%	15.1%	13.2%	21.6%	15.5%	24.6%
LV Switchgear (at s/s)	2.1%	0.8%	0.8%	0.8%	1.2%	0.7%	1.0%	0.6%
LV UGB and LV Pillar OD (not at s/s)	2.7%	1.8%	1.5%	1.4%	0.5%	0.4%	0.8%	0.5%
HV Switchgear (GM) - Primary	5.0%	1.4%	5.6%	2.0%	2.3%	0.6%	5.3%	1.1%
HV Switchgear (GM) - Distribution	6.4%	3.2%	6.7%	3.7%	3.3%	1.3%	6.3%	2.9%
HV Transformer (GM)	5.0%	1.1%	6.4%	1.4%	3.5%	1.2%	5.2%	1.4%
HV OHL Support - Poles	30.1%	38.6%	23.8%	29.2%	33.8%	43.3%	24.2%	46.8%
EHV Switchgear (GM)	1.0%	0.9%	5.6%	1.9%	4.0%	2.7%	2.9%	1.8%
EHV Transformer	2.8%	3.1%	5.6%	11.5%	3.6%	5.5%	5.7%	6.0%
EHV UG Cable (Gas)					2.3%	0.0%	9.1%	0.4%
EHV UG Cable (Oil)	0.1%	0.2%					2.1%	3.0%
EHV OHL Support - Towers			0.7%	0.1%			0.3%	0.1%
EHV OHL Support - Poles	5.3%	3.4%	5.6%	2.5%	8.0%	2.8%	6.3%	3.1%
EHV OHL Fittings	3.4%	0.2%	3.1%	0.2%	1.1%	0.1%	2.0%	0.1%
EHV OHL (Tower Line) Conductor	0.0%	0.0%	0.0%	0.0%				
132kV CBs	1.8%	4.8%	2.2%	5.1%	0.4%	0.6%	0.9%	1.7%
132kV Transformer	8.2%	4.8%	6.9%	14.8%	6.5%	11.5%	4.4%	1.7%
132kV UG Cable (Gas)	1.1%	0.1%						
132kV UG Cable (Oil)	4.5%	13.5%					0.2%	0.1%
132kV OHL Support - Tower			2.8%	0.3%	8.2%	1.0%	2.4%	0.3%
132kV OHL Fittings	0.5%	1.0%	1.1%	2.0%	0.5%	0.7%	0.4%	0.5%
132kV OHL (Tower Line) Conductor	0.1%	0.3%	0.1%	0.4%	0.1%	0.6%	0.0%	0.3%
EHV Tower Refurb (steelwork)	0.8%	0.5%	0.6%	0.3%	0.3%	0.2%	0.2%	0.1%
EHV Tower Refurb (Painting)		0.2%		0.1%		0.1%		0.1%
132kV Tower Refurb (steelwork)	4.9%	1.7%	10.3%	3.9%	7.5%	2.3%	4.8%	1.3%
132kV Tower Refurb (Painting)		2.3%		3.1%		2.8%		1.3%

Mid-period Interventions

5.37 The mid-period interventions have been aligned to the volumes of activity stated in the BPDTs for the first four years of RIIO-ED1.

5.38 The selection of the assets is based upon the HI and C values at the end of RIIO-ED1 and generally represents the spread of HI and C values for the interventions at the end of RIIO-ED1.

5.39 The data provided for mid-period interventions (in the Additions and Removals file) shows the HI and C values at the mid-point (i.e. 2018/19). Some of the HI values are therefore lower than what they would be at the end of RIIO-ED1 (noting that assessment against secondary deliverables is based upon the values at the end of RIIO-ED1, not the mid-point).

6 Equally as challenging testing

6.1 As part of the requirement for the rebasing of the NAW it is essential that each DNO performs a series of tests on the output from the above process to establish if the CNAIM creates an equally as challenging output on the DNOs when compared to the original RIIO-ED1 submission. To facilitate this requirement Ofgem has published a methodology document, Network Asset Secondary Deliverables Rebasing and Assessment Methodology, following a series of meetings involving all DNOs as part of the Reliability Working Group.

6.2 This methodology document is available on the Ofgem website via this link.
https://www.ofgem.gov.uk/publications-and-updates/reliability-working-group

7 Summary of Tests

7.1 This section includes tables that provide a summary of the equally as challenging tests that have been applied to the Rebased NAW.

7.2 There are separate tables for Asset Replacement, Asset Refurbishment and High Value Projects.

7.3 Where a test is failed or where additional explanation is required there is a hyperlink included within the tables that links to the relevant part of the Appendix which provides more details.

7.4 The following table summarises the percentage and number of relevant tests that are passed for asset replacement activity:

Percentage and number of relevant tests passed (asset replacement)			
	Test 1	Test 2	Test 3
WMID	84% (16/19)	100% (19/19)	84% (16/19)
EMID	94% (17/18)	100% (18/18)	78% (14/18)
SWALES	94% (16/17)	100% (17/17)	76% (13/17)
SWEST	100% (20/20)	100% (20/20)	90% (18/20)

7.5 The test 1 approach of selecting maximum risk reduction at a HI category level causes a small number of test 1 failures where there are multiple asset register categories within the HI category. In selecting interventions for the rebasing exercise, licensees are required to keep activity volumes consistent with the BPDT at an asset register level. In doing so, even selecting the highest risk assets within the asset register category can lead to a failure. Selecting the maximum risk removal at the HI category assumes that all the highest risk assets in the HI category can be selected as interventions, but this may not be the case at the disaggregated asset register level.

7.6 In consultation with Ofgem, WPD has made some adjustments to the volumes of interventions to ensure that every test 2 is passed. There are three occasions where without an adjustment test 2 would not be passed. For EHV switchgear in SWALES and EHV Cable (Gas) in SWALES and SWEST there are insufficient volumes of assets available to meet the required volume of replacements specified in the BPDT. Additional interventions have been selected which exceed the volumes available. It is accepted that this is appropriate for rebasing the targets, but actual delivery will be derived from different asset register categories.

7.7 The use of CNAIM to restate the health and criticality bandings for assets has resulted in more assets being classified within lower HI bands. This means that in all the instances where test 3 is failed there is no scope to select any additional higher HI band assets to pass test 3.

Ofgem criteria test summary – Asset Replacement (West Midlands – WMID)

CNAIM model number and asset category	Test 1 Pass / Fail	Test 2 Pass / Fail	Test 3 Pass / Fail	Evidence
LV Network				
CM3 LV Switchgear and Other	N/A	N/A	N/A	Hybrid used
CM2 LV UGB	N/A	N/A	N/A	Hybrid used
LV Switchgear (at s/s)	Pass	Pass	Fail	WMID_LV_Switchgear_at_Substation
LV UGB and LV Pillars OD (not at s/s)	Pass	Pass	Pass	
CM1 LV OHL Support	Pass	Pass	Pass	
HV Network				
CM5 HV Switchgear (GM) - Primary	Pass	Pass	Pass	
CM6 HV Distribution Switchgear	Pass	Pass	Pass	
CM7 HV Distribution Transformers	Pass	Pass	Fail	WMID_HV_Transformer
HV UG Cable	N/A	N/A	N/A	No Model
CM4 HV OHL Support - Poles	Pass	Pass	Pass	
EHV Network				
CM16 EHV Switchgear (GM)	Fail	Pass	Pass	WMID_EHV_Switchgear_GM
CM17 EHV Transformers	Pass	Pass	Pass	
CM12 EHV UG Cable (Gas)	N/A	N/A	N/A	No planned work
CM14 EHV UG Cable (Oil)	Fail	Pass	Pass	WMID_EHV_UG_Cable_Oil
CM13 EHV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM11 EHV OHL Support - Towers	N/A	N/A	N/A	No planned work
CM8 EHV OHL Support - Poles	Pass	Pass	Pass	
CM9 EHV OHL Fittings	Fail	Pass	Pass	WMID_EHV_Fittings
CM10 EHV OHL (Tower Line) Conductor	Pass	Pass	Pass	
132kV Network				
CM24 132kV Circuit Breakers	Pass	Pass	Pass	
CM25 132kV Transformers	Pass	Pass	Pass	
CM21 132kV UG Cable (Gas)	Pass	Pass	Fail	WMID_132kV_UG_Cable_Gas
CM23 132kV UG Cable (Oil)	Pass	Pass	Pass	
CM22 132kV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM20 132kV OHL Support - Tower	N/A	N/A	N/A	No planned work
CM18 132kV OHL Fittings	Pass	Pass	Pass	
CM19 132kV OHL (Tower Line) Conductor	Pass	Pass	Pass	
Other				
CM15 Submarine Cables	N/A	N/A	N/A	Not Used

Ofgem criteria test summary – Asset Refurbishment (West Midlands – WMID)

CNAIM model number and asset category	Test 1 Pass / Fail	Test 2 Pass / Fail	Test 3 Pass / Fail	Evidence
LV Network				
CM3 LV Switchgear and Other	N/A	N/A	N/A	Hybrid used
CM2 LV UGB	N/A	N/A	N/A	Hybrid used
LV Switchgear (at s/s)	N/A	N/A	N/A	No planned work
LV UGB and LV Pillars OD (not at s/s)	N/A	N/A	N/A	No planned work
CM1 LV OHL Support	N/A	N/A	N/A	No planned work
HV Network				
CM5 HV Switchgear (GM) - Primary	N/A	N/A	N/A	No planned work
CM6 HV Distribution Switchgear	N/A	N/A	N/A	No planned work
CM7 HV Distribution Transformers	N/A	N/A	N/A	No planned work
HV UG Cable	N/A	N/A	N/A	No Model
CM4 HV OHL Support - Poles	N/A	N/A	N/A	No planned work
EHV Network				
CM16 EHV Switchgear (GM)	N/A	N/A	N/A	No planned work
CM17 EHV Transformers	N/A	N/A	N/A	No planned work
CM12 EHV UG Cable (Gas)	N/A	N/A	N/A	No planned work
CM14 EHV UG Cable (Oil)	N/A	N/A	N/A	No planned work
CM13 EHV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM11 EHV OHL Support - Towers	Pass	Pass	Pass	
CM8 EHV OHL Support - Poles	N/A	N/A	N/A	No planned work
CM9 EHV OHL Fittings	N/A	N/A	N/A	No planned work
CM10 EHV OHL (Tower Line) Conductor	N/A	N/A	N/A	No planned work
132kV Network				
CM24 132kV Circuit Breakers	N/A	N/A	N/A	No planned work
CM25 132kV Transformers	N/A	N/A	N/A	No planned work
CM21 132kV UG Cable (Gas)	N/A	N/A	N/A	No planned work
CM23 132kV UG Cable (Oil)	N/A	N/A	N/A	No planned work
CM22 132kV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM20 132kV OHL Support - Tower	Pass	Pass	Pass	
CM18 132kV OHL Fittings	N/A	N/A	N/A	No planned work
CM19 132kV OHL (Tower Line) Conductor	N/A	N/A	N/A	No planned work
Other				
CM15 Submarine Cables	N/A	N/A	N/A	Not Used

Ofgem criteria test summary – High Value Projects (HVP) (West Midlands – WMID)

CNAIM model number and asset category	Test 1 Pass / Fail	Test 2 Pass / Fail	Test 3 Pass / Fail	Evidence
LV Network				
CM3 LV Switchgear and Other	N/A	N/A	N/A	Hybrid used
CM2 LV UGB	N/A	N/A	N/A	Hybrid used
LV Switchgear (at s/s)	N/A	N/A	N/A	No HVP
LV UGB and LV Pillars OD (not at s/s)	N/A	N/A	N/A	No HVP
CM1 LV OHL Support	N/A	N/A	N/A	No HVP
HV Network				
CM5 HV Switchgear (GM) - Primary	N/A	N/A	N/A	No HVP
CM6 HV Distribution Switchgear	N/A	N/A	N/A	No HVP
CM7 HV Distribution Transformers	N/A	N/A	N/A	No HVP
HV UG Cable	N/A	N/A	N/A	No Model
CM4 HV OHL Support - Poles	N/A	N/A	N/A	No HVP
EHV Network				
CM16 EHV Switchgear (GM)	N/A	N/A	N/A	No HVP
CM17 EHV Transformers	N/A	N/A	N/A	No HVP
CM12 EHV UG Cable (Gas)	N/A	N/A	N/A	No HVP
CM14 EHV UG Cable (Oil)	N/A	N/A	N/A	No HVP
CM13 EHV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM11 EHV OHL Support - Towers	N/A	N/A	N/A	No HVP
CM8 EHV OHL Support - Poles	N/A	N/A	N/A	No HVP
CM9 EHV OHL Fittings	N/A	N/A	N/A	No HVP
CM10 EHV OHL (Tower Line) Conductor	N/A	N/A	N/A	No HVP
132kV Network				
CM24 132kV Circuit Breakers	N/A	N/A	N/A	No HVP
CM25 132kV Transformers	N/A	N/A	N/A	No HVP
CM21 132kV UG Cable (Gas)	N/A	N/A	N/A	No HVP
CM23 132kV UG Cable (Oil)	N/A	N/A	N/A	No HVP
CM22 132kV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM20 132kV OHL Support - Tower	N/A	N/A	N/A	No HVP
CM18 132kV OHL Fittings	N/A	N/A	N/A	No HVP
CM19 132kV OHL (Tower Line) Conductor	N/A	N/A	N/A	No HVP
Other				
CM15 Submarine Cables	N/A	N/A	N/A	Not Used

Ofgem criteria test summary – Asset Replacement (East Midlands – EMID)

CNAIM model number and asset category	Test 1 Pass / Fail	Test 2 Pass / Fail	Test 3 Pass / Fail	Evidence
LV Network				
CM3 LV Switchgear and Other	N/A	N/A	N/A	Hybrid used
CM2 LV UGB	N/A	N/A	N/A	Hybrid used
LV Switchgear (at s/s)	Pass	Pass	Fail	EMID_LV_Switchgear_at_Substation
LV UGB and LV Pillars OD (not at s/s)	Pass	Pass	Pass	
CM1 LV OHL Support	Pass	Pass	Pass	
HV Network				
CM5 HV Switchgear (GM) - Primary	Pass	Pass	Pass	
CM6 HV Distribution Switchgear	Pass	Pass	Fail	EMID_HV_Switchgear_GM_Distribution
CM7 HV Distribution Transformers	Pass	Pass	Fail	EMID_HV_Transformer
HV UG Cable	N/A	N/A	N/A	No Model
CM4 HV OHL Support - Poles	Pass	Pass	Pass	
EHV Network				
CM16 EHV Switchgear (GM)	Fail	Pass	Fail	EMID_EHV_Switchgear_GM
CM17 EHV Transformers	Pass	Pass	Pass	
CM12 EHV UG Cable (Gas)	N/A	N/A	N/A	No asset population
CM14 EHV UG Cable (Oil)	N/A	N/A	N/A	No planned work
CM13 EHV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM11 EHV OHL Support - Towers	Pass	Pass	Pass	
CM8 EHV OHL Support - Poles	Pass	Pass	Pass	
CM9 EHV OHL Fittings	Pass	Pass	Pass	
CM10 EHV OHL (Tower Line) Conductor	Pass	Pass	Pass	
132kV Network				
CM24 132kV Circuit Breakers	Pass	Pass	Pass	
CM25 132kV Transformers	Pass	Pass	Pass	
CM21 132kV UG Cable (Gas)	N/A	N/A	N/A	No asset population
CM23 132kV UG Cable (Oil)	N/A	N/A	N/A	No planned work
CM22 132kV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM20 132kV OHL Support - Tower	Pass	Pass	Pass	
CM18 132kV OHL Fittings	Pass	Pass	Pass	
CM19 132kV OHL (Tower Line) Conductor	Pass	Pass*	Pass	EMID_132kV_Conductor_Tower
Other				
CM15 Submarine Cables	N/A	N/A	N/A	Not Used

Pass* - There is small inconsistency in the Original NAW. Removal volumes and addition volumes are different by 0.001km. This can cause the test to be failed if assessing an exact match.

Ofgem criteria test summary – Asset Refurbishment (East Midlands – EMID)

CNAIM model number and asset category	Test 1 Pass / Fail	Test 2 Pass / Fail	Test 3 Pass / Fail	Evidence
LV Network				
CM3 LV Switchgear and Other	N/A	N/A	N/A	Hybrid used
CM2 LV UGB	N/A	N/A	N/A	Hybrid used
LV Switchgear (at s/s)	N/A	N/A	N/A	No planned work
LV UGB and LV Pillars OD (not at s/s)	N/A	N/A	N/A	No planned work
CM1 LV OHL Support	N/A	N/A	N/A	No planned work
HV Network				
CM5 HV Switchgear (GM) - Primary	N/A	N/A	N/A	No planned work
CM6 HV Distribution Switchgear	N/A	N/A	N/A	No planned work
CM7 HV Distribution Transformers	N/A	N/A	N/A	No planned work
HV UG Cable	N/A	N/A	N/A	No Model
CM4 HV OHL Support - Poles	N/A	N/A	N/A	No planned work
EHV Network				
CM16 EHV Switchgear (GM)	N/A	N/A	N/A	No planned work
CM17 EHV Transformers	N/A	N/A	N/A	No planned work
CM12 EHV UG Cable (Gas)	N/A	N/A	N/A	No asset population
CM14 EHV UG Cable (Oil)	N/A	N/A	N/A	No planned work
CM13 EHV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM11 EHV OHL Support - Towers	Pass	Pass	Pass	
CM8 EHV OHL Support - Poles	N/A	N/A	N/A	No planned work
CM9 EHV OHL Fittings	N/A	N/A	N/A	No planned work
CM10 EHV OHL (Tower Line) Conductor	N/A	N/A	N/A	No planned work
132kV Network				
CM24 132kV Circuit Breakers	N/A	N/A	N/A	No planned work
CM25 132kV Transformers	N/A	N/A	N/A	No planned work
CM21 132kV UG Cable (Gas)	N/A	N/A	N/A	No asset population
CM23 132kV UG Cable (Oil)	N/A	N/A	N/A	No planned work
CM22 132kV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM20 132kV OHL Support - Tower	Pass	Pass	Pass	
CM18 132kV OHL Fittings	N/A	N/A	N/A	No planned work
CM19 132kV OHL (Tower Line) Conductor	N/A	N/A	N/A	No planned work
Other				
CM15 Submarine Cables	N/A	N/A	N/A	Not Used

Ofgem criteria test summary – High Value Projects (HVP) (East Midlands – EMID)

CNAIM model number and asset category	Test 1 Pass / Fail	Test 2 Pass / Fail	Test 3 Pass / Fail	Evidence
LV Network				
CM3 LV Switchgear and Other	N/A	N/A	N/A	Hybrid used
CM2 LV UGB	N/A	N/A	N/A	Hybrid used
LV Switchgear (at s/s)	N/A	N/A	N/A	No HVP
LV UGB and LV Pillars OD (not at s/s)	N/A	N/A	N/A	No HVP
CM1 LV OHL Support	N/A	N/A	N/A	No HVP
HV Network				
CM5 HV Switchgear (GM) - Primary	N/A	N/A	N/A	No HVP
CM6 HV Distribution Switchgear	N/A	N/A	N/A	No HVP
CM7 HV Distribution Transformers	N/A	N/A	N/A	No HVP
HV UG Cable	N/A	N/A	N/A	No Model
CM4 HV OHL Support - Poles	N/A	N/A	N/A	No HVP
EHV Network				
CM16 EHV Switchgear (GM)	N/A	N/A	N/A	No HVP
CM17 EHV Transformers	N/A	N/A	N/A	No HVP
CM12 EHV UG Cable (Gas)	N/A	N/A	N/A	No asset population
CM14 EHV UG Cable (Oil)	N/A	N/A	N/A	No HVP
CM13 EHV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM11 EHV OHL Support - Towers	N/A	N/A	N/A	No HVP
CM8 EHV OHL Support - Poles	N/A	N/A	N/A	No HVP
CM9 EHV OHL Fittings	N/A	N/A	N/A	No HVP
CM10 EHV OHL (Tower Line) Conductor	N/A	N/A	N/A	No HVP
132kV Network				
CM24 132kV Circuit Breakers	N/A	N/A	N/A	No HVP
CM25 132kV Transformers	N/A	N/A	N/A	No HVP
CM21 132kV UG Cable (Gas)	N/A	N/A	N/A	No asset population
CM23 132kV UG Cable (Oil)	N/A	N/A	N/A	No HVP
CM22 132kV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM20 132kV OHL Support - Tower	N/A	N/A	N/A	No HVP
CM18 132kV OHL Fittings	N/A	N/A	N/A	No HVP
CM19 132kV OHL (Tower Line) Conductor	N/A	N/A	N/A	No HVP
Other				
CM15 Submarine Cables	N/A	N/A	N/A	Not Used

Ofgem criteria test summary – Asset Replacement (South Wales – SWALES)

CNAIM model number and asset category	Test 1 Pass / Fail	Test 2 Pass / Fail	Test 3 Pass / Fail	Evidence
LV Network				
CM3 LV Switchgear and Other	N/A	N/A	N/A	Hybrid used
CM2 LV UGB	N/A	N/A	N/A	Hybrid used
LV Switchgear (at s/s)	Pass	Pass	Pass	
LV UGB and LV Pillars OD (not at s/s)	Pass	Pass	Pass	
CM1 LV OHL Support	Pass	Pass	Pass	
HV Network				
CM5 HV Switchgear (GM) - Primary	Pass	Pass	Pass	
CM6 HV Distribution Switchgear	Pass	Pass	Fail	SWALES_HV_Switchgear_GM
CM7 HV Distribution Transformers	Pass	Pass	Fail	SWALES_HV_Transformer
HV UG Cable	N/A	N/A	N/A	No Model
CM4 HV OHL Support - Poles	Pass	Pass	Pass	
EHV Network				
CM16 EHV Switchgear (GM)	Fail	Pass #	Fail	SWALES_EHV_Switchgear_GM
CM17 EHV Transformers	Pass	Pass	Pass	
CM12 EHV UG Cable (Gas)	Pass	Pass #	Fail	SWALES_EHV_UG_Cable_Gas
CM14 EHV UG Cable (Oil)	N/A	N/A	N/A	No planned work
CM13 EHV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM11 EHV OHL Support - Towers	N/A	N/A	N/A	No planned work
CM8 EHV OHL Support - Poles	Pass	Pass	Pass	
CM9 EHV OHL Fittings	Pass	Pass	Pass	
CM10 EHV OHL (Tower Line) Conductor	N/A	N/A	N/A	No planned work
132kV Network				
CM24 132kV Circuit Breakers	Pass	Pass	Pass	
CM25 132kV Transformers	Pass	Pass	Pass	
CM21 132kV UG Cable (Gas)	N/A	N/A	N/A	No asset population
CM23 132kV UG Cable (Oil)	N/A	N/A	N/A	No planned work
CM22 132kV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM20 132kV OHL Support - Tower	Pass	Pass	Pass	
CM18 132kV OHL Fittings	Pass	Pass	Pass	
CM19 132kV OHL (Tower Line) Conductor	Pass	Pass*	Pass	SWALES_132kV_Conductor_Tower
Other				
CM15 Submarine Cables	N/A	N/A	N/A	Not Used

Pass* - There is small inconsistency in the Original NAW. Removal volumes and addition volumes are different by 0.001km. This can cause the test to be failed if assessing an exact match.

Pass # - The volume of assets available to be removed is lower than the interventions proposed in the BPDT. Adjustments to intervention selection volumes have been made so that intervention volumes are 'enhanced' to match the BPDT removal volumes.

Ofgem criteria test summary – Asset Refurbishment (South Wales – SWALES)

CNAIM model number and asset category	Test 1 Pass / Fail	Test 2 Pass / Fail	Test 3 Pass / Fail	Evidence
LV Network				
CM3 LV Switchgear and Other	N/A	N/A	N/A	Hybrid used
CM2 LV UGB	N/A	N/A	N/A	Hybrid used
LV Switchgear (at s/s)	N/A	N/A	N/A	No planned work
LV UGB and LV Pillars OD (not at s/s)	N/A	N/A	N/A	No planned work
CM1 LV OHL Support	N/A	N/A	N/A	No planned work
HV Network				
CM5 HV Switchgear (GM) - Primary	N/A	N/A	N/A	No planned work
CM6 HV Distribution Switchgear	N/A	N/A	N/A	No planned work
CM7 HV Distribution Transformers	N/A	N/A	N/A	No planned work
HV UG Cable	N/A	N/A	N/A	No Model
CM4 HV OHL Support - Poles	N/A	N/A	N/A	No planned work
EHV Network				
CM16 EHV Switchgear (GM)	N/A	N/A	N/A	No planned work
CM17 EHV Transformers	N/A	N/A	N/A	No planned work
CM12 EHV UG Cable (Gas)	N/A	N/A	N/A	No planned work
CM14 EHV UG Cable (Oil)	N/A	N/A	N/A	No planned work
CM13 EHV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM11 EHV OHL Support - Towers	Fail	Pass	Pass	SWALES_EHV_Tower_Steelwork
CM8 EHV OHL Support - Poles	N/A	N/A	N/A	No planned work
CM9 EHV OHL Fittings	N/A	N/A	N/A	No planned work
CM10 EHV OHL (Tower Line) Conductor	N/A	N/A	N/A	No planned work
132kV Network				
CM24 132kV Circuit Breakers	N/A	N/A	N/A	No planned work
CM25 132kV Transformers	N/A	N/A	N/A	No planned work
CM21 132kV UG Cable (Gas)	N/A	N/A	N/A	No asset population
CM23 132kV UG Cable (Oil)	N/A	N/A	N/A	No planned work
CM22 132kV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM20 132kV OHL Support - Tower	Pass	Pass	Pass	
CM18 132kV OHL Fittings	N/A	N/A	N/A	No planned work
CM19 132kV OHL (Tower Line) Conductor	N/A	N/A	N/A	No planned work
Other				
CM15 Submarine Cables	N/A	N/A	N/A	Not Used

Ofgem criteria test summary – High Value Projects (HVP) (South Wales – SWALES)

CNAIM model number and asset category	Test 1 Pass / Fail	Test 2 Pass / Fail	Test 3 Pass / Fail	Evidence
LV Network				
CM3 LV Switchgear and Other	N/A	N/A	N/A	Hybrid used
CM2 LV UGB	N/A	N/A	N/A	Hybrid used
LV Switchgear (at s/s)	N/A	N/A	N/A	No HVP
LV UGB and LV Pillars OD (not at s/s)	N/A	N/A	N/A	No HVP
CM1 LV OHL Support	N/A	N/A	N/A	No HVP
HV Network				
CM5 HV Switchgear (GM) - Primary	N/A	N/A	N/A	No HVP
CM6 HV Distribution Switchgear	N/A	N/A	N/A	No HVP
CM7 HV Distribution Transformers	N/A	N/A	N/A	No HVP
HV UG Cable	N/A	N/A	N/A	No Model
CM4 HV OHL Support - Poles	N/A	N/A	N/A	No HVP
EHV Network				
CM16 EHV Switchgear (GM)	N/A	N/A	N/A	No HVP
CM17 EHV Transformers	N/A	N/A	N/A	No HVP
CM12 EHV UG Cable (Gas)	N/A	N/A	N/A	No HVP
CM14 EHV UG Cable (Oil)	N/A	N/A	N/A	No HVP
CM13 EHV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM11 EHV OHL Support - Towers	N/A	N/A	N/A	No HVP
CM8 EHV OHL Support - Poles	N/A	N/A	N/A	No HVP
CM9 EHV OHL Fittings	N/A	N/A	N/A	No HVP
CM10 EHV OHL (Tower Line) Conductor	N/A	N/A	N/A	No HVP
132kV Network				
CM24 132kV Circuit Breakers	N/A	N/A	N/A	No HVP
CM25 132kV Transformers	N/A	N/A	N/A	No HVP
CM21 132kV UG Cable (Gas)	N/A	N/A	N/A	No asset population
CM23 132kV UG Cable (Oil)	N/A	N/A	N/A	No HVP
CM22 132kV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM20 132kV OHL Support - Tower	N/A	N/A	N/A	No HVP
CM18 132kV OHL Fittings	N/A	N/A	N/A	No HVP
CM19 132kV OHL (Tower Line) Conductor	N/A	N/A	N/A	No HVP
Other				
CM15 Submarine Cables	N/A	N/A	N/A	Not Used

Ofgem criteria test summary – Asset Replacement (South West – SWEST)

CNAIM model number and asset category	Test 1 Pass / Fail	Test 2 Pass / Fail	Test 3 Pass / Fail	Evidence
LV Network				
CM3 LV Switchgear and Other	N/A	N/A	N/A	Hybrid used
CM2 LV UGB	N/A	N/A	N/A	Hybrid used
LV Switchgear (at s/s)	Pass	Pass	Pass	
LV UGB and LV Pillars OD (not at s/s)	Pass	Pass	Pass	
CM1 LV OHL Support	Pass	Pass	Pass	
HV Network				
CM5 HV Switchgear (GM) - Primary	Pass	Pass	Pass	
CM6 HV Distribution Switchgear	Pass	Pass*	Pass	SWEST_HV_Switchgear_GM
CM7 HV Distribution Transformers	Pass	Pass	Fail	SWEST_HV_Transformer
HV UG Cable	N/A	N/A	N/A	No Model
CM4 HV OHL Support - Poles	Pass	Pass	Pass	
EHV Network				
CM16 EHV Switchgear (GM)	Pass	Pass	Fail	SWEST_EHV_Switchgear_GM
CM17 EHV Transformers	Pass	Pass	Pass	
CM12 EHV UG Cable (Gas)	Pass	Pass #	Pass	SWEST_EHV_UG_Cable_Gas
CM14 EHV UG Cable (Oil)	Pass	Pass	Pass	
CM13 EHV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM11 EHV OHL Support - Towers	Pass	Pass	Pass	
CM8 EHV OHL Support - Poles	Pass	Pass	Pass	
CM9 EHV OHL Fittings	Pass	Pass	Pass	
CM10 EHV OHL (Tower Line) Conductor	N/A	N/A	N/A	No planned work
132kV Network				
CM24 132kV Circuit Breakers	Pass	Pass	Pass	
CM25 132kV Transformers	Pass	Pass	Pass	
CM21 132kV UG Cable (Gas)	N/A	N/A	N/A	No asset population
CM23 132kV UG Cable (Oil)	Pass	Pass	Pass	
CM22 132kV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM20 132kV OHL Support - Tower	Pass	Pass	Pass	
CM18 132kV OHL Fittings	Pass	Pass	Pass	
CM19 132kV OHL (Tower Line) Conductor	Pass	Pass**	Pass	SWEST_132kV_Conductor_Tower
Other				
CM15 Submarine Cables	N/A	N/A	N/A	Not Used

Pass* - There is small inconsistency in the BPDT. Removal volumes and addition volumes are different by 0.002 units. This can cause the test to be failed if assessing an exact match.

Pass** - There is small inconsistency in the Original NAW. Removal volumes and addition volumes are different by 0.001km. This can cause the test to be failed if assessing an exact match.

Pass # - The volume of assets available to be removed is lower than the interventions proposed in the BPDT. Adjustments to intervention selection volumes have been made so that intervention volumes are 'enhanced' to match the BPDT removal volumes.

Ofgem criteria test summary – Asset Refurbishment (South West – SWEST)

CNAIM model number and asset category	Test 1 Pass / Fail	Test 2 Pass / Fail	Test 3 Pass / Fail	Evidence
LV Network				
CM3 LV Switchgear and Other	N/A	N/A	N/A	Hybrid used
CM2 LV UGB	N/A	N/A	N/A	Hybrid used
LV Switchgear (at s/s)	N/A	N/A	N/A	No planned work
LV UGB and LV Pillars OD (not at s/s)	N/A	N/A	N/A	No planned work
CM1 LV OHL Support	N/A	N/A	N/A	No planned work
HV Network				
CM5 HV Switchgear (GM) - Primary	N/A	N/A	N/A	No planned work
CM6 HV Distribution Switchgear	N/A	N/A	N/A	No planned work
CM7 HV Distribution Transformers	N/A	N/A	N/A	No planned work
HV UG Cable	N/A	N/A	N/A	No Model
CM4 HV OHL Support - Poles	N/A	N/A	N/A	No planned work
EHV Network				
CM16 EHV Switchgear (GM)	N/A	N/A	N/A	No planned work
CM17 EHV Transformers	N/A	N/A	N/A	No planned work
CM12 EHV UG Cable (Gas)	N/A	N/A	N/A	No planned work
CM14 EHV UG Cable (Oil)	N/A	N/A	N/A	No planned work
CM13 EHV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM11 EHV OHL Support - Towers	Pass	Pass	Pass	
CM8 EHV OHL Support - Poles	N/A	N/A	N/A	No planned work
CM9 EHV OHL Fittings	N/A	N/A	N/A	No planned work
CM10 EHV OHL (Tower Line) Conductor	N/A	N/A	N/A	No planned work
132kV Network				
CM24 132kV Circuit Breakers	N/A	N/A	N/A	No planned work
CM25 132kV Transformers	N/A	N/A	N/A	No planned work
CM21 132kV UG Cable (Gas)	N/A	N/A	N/A	No asset population
CM23 132kV UG Cable (Oil)	N/A	N/A	N/A	No planned work
CM22 132kV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM20 132kV OHL Support - Tower	Pass	Pass	Pass	
CM18 132kV OHL Fittings	N/A	N/A	N/A	No planned work
CM19 132kV OHL (Tower Line) Conductor	N/A	N/A	N/A	No planned work
Other				
CM15 Submarine Cables	N/A	N/A	N/A	Not Used

Ofgem criteria test summary – High Value Projects (HVP) (South West – SWEST)

CNAIM model number and asset category	Test 1 Pass / Fail	Test 2 Pass / Fail	Test 3 Pass / Fail	Evidence
LV Network				
CM3 LV Switchgear and Other	N/A	N/A	N/A	Hybrid used
CM2 LV UGB	N/A	N/A	N/A	Hybrid used
LV Switchgear (at s/s)	N/A	N/A	N/A	No HVP
LV UGB and LV Pillars OD (not at s/s)	N/A	N/A	N/A	No HVP
CM1 LV OHL Support	N/A	N/A	N/A	No HVP
HV Network				
CM5 HV Switchgear (GM) - Primary	N/A	N/A	N/A	No HVP
CM6 HV Distribution Switchgear	N/A	N/A	N/A	No HVP
CM7 HV Distribution Transformers	N/A	N/A	N/A	No HVP
HV UG Cable	N/A	N/A	N/A	No Model
CM4 HV OHL Support - Poles	N/A	N/A	N/A	No HVP
EHV Network				
CM16 EHV Switchgear (GM)	N/A	N/A	N/A	No HVP
CM17 EHV Transformers	N/A	N/A	N/A	No HVP
CM12 EHV UG Cable (Gas)	N/A	N/A	N/A	No HVP
CM14 EHV UG Cable (Oil)	N/A	N/A	N/A	No HVP
CM13 EHV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM11 EHV OHL Support - Towers	N/A	N/A	N/A	No HVP
CM8 EHV OHL Support - Poles	N/A	N/A	N/A	No HVP
CM9 EHV OHL Fittings	N/A	N/A	N/A	No HVP
CM10 EHV OHL (Tower Line) Conductor	N/A	N/A	N/A	No HVP
132kV Network				
CM24 132kV Circuit Breakers	N/A	N/A	N/A	No HVP
CM25 132kV Transformers	N/A	N/A	N/A	No HVP
CM21 132kV UG Cable (Gas)	N/A	N/A	N/A	No asset population
CM23 132kV UG Cable (Oil)	N/A	N/A	N/A	No HVP
CM22 132kV UG Cable (Non Pressurised)	N/A	N/A	N/A	Not Used
CM20 132kV OHL Support - Tower	N/A	N/A	N/A	No HVP
CM18 132kV OHL Fittings	N/A	N/A	N/A	No HVP
CM19 132kV OHL (Tower Line) Conductor	N/A	N/A	N/A	No HVP
Other				
CM15 Submarine Cables	N/A	N/A	N/A	Not Used

Appendix A Equally as Challenging reports

This appendix provides specific licence area and HI category information relating to failed equally challenging tests or where further explanation is required.

WMID – LV Switchgear at substations

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Pass
Test 2	Volumes of interventions test	Pass
Test 3	Consequential intervention test	Fail

For WPD the HI category of LV Switchgear at substations consists of four asset register categories

- LV Circuit Breaker
- LV Pillar (ID)
- LV Pillar (OD at Substation)
- LV Board (WM)

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement resulted in a one-for-one replacement ratio. The total volume being removed (disposals) was the same as the total volume of additions.

There was however an assumption that the replacement of WM Boards resulted in the addition of LV Pillars (ID).

The BPDT volumes of disposals and additions are shown in the tables below:

WMID - LV Switchgear at Substations – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
LV Circuit Breaker	0	0	0	0	0	0	0	0	**0**
LV Pillar (ID)	5	5	5	5	5	5	4	5	**39**
LV Pillar (OD at Substation)	141	141	141	141	141	141	141	141	**1128**
LV Board (WM)	76	76	76	76	76	75	75	75	**605**
Total									**1772**

WMID - LV Switchgear at Substations – BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
LV Circuit Breaker	0	0	0	0	0	0	0	0	**0**
LV Pillar (ID)	81	81	81	81	81	80	79	80	**644**
LV Pillar (OD at Substation)	141	141	141	141	141	141	141	141	**1128**
LV Board (WM)	0	0	0	0	0	0	0	0	**0**
Total									**1772**

The Original NAW stated asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 was 1772 (the same as the BPDT removals total). The volume of additions in HI1 was 1772 (the same as the BPDT additions total). The planned interventions from the Original NAW are shown below.

	WMID – LV Switchgear at Substations – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-
C2	1,500	-	-222	-23	-136	-1,119
C3	272	-	-9	-1	-17	-245
C4	-	-	-	-	-	-
	1,772	**-**	**(231)**	**(24)**	**(153)**	**(1,364)**

The Rebased NAW states asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 is 1772 (the same as the BPDT removals total and Original NAW). The volume of additions in HI1 is 1772 (the same as the BPDT additions total and the Original NAW). The planned interventions from the Rebased NAW are shown below.

	WMID – LV Switchgear at Substations – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	129	-	-36	-57	-10	-26
C2	1,105	-	-424	-453	-74	-154
C3	498	-	-200	-232	-20	-46
C4	40	-	-	-31	-	-9
	1,772	**-**	**(660)**	**(773)**	**(104)**	**(235)**

Since the volumes from the Rebased NAW match the volumes from the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Pass)

The removals in the Original NAW result in 90% of maximum risk being removed.

The removals in the Rebased NAW result in 94% of maximum risk being removed.

Since the Rebased NAW percentage is higher than the Original NAW percentage, test 1 is passed.

It should be noted that percentage of maximum in the Rebased NAW is higher than the Original NAW, making the deliverables more challenging. This has resulted as a consequence of making as many adjustments as possible to the selected interventions in order to try to meet test 3.

Test 3 – Consequential intervention test (Result Fail)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 255, equating to 14% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 660, equating to 37% of total removals.

CNAIM has been used to forecast the profile of HI values at the end of March 2023 without intervention. This is shown below:

LV Switchgear at Substations – Asset population at end of March 2023 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	2,819	258	57	10	26
C2	6,304	2,619	453	74	154
C3	1,387	967	232	20	46
C4	34	17	31	-	9
	10,544	**3,861**	**773**	**104**	**235**

This shows that there are 1112 assets that will be in the HI3-HI5 bands. Selecting all of these assets leaves a further 660 to be selected from the lower bands. It is not possible to select any further higher HI band assets and consequently it is not possible to meet test 3.

WMID – HV Transformer (GM)

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Pass
Test 2	Volumes of interventions test	Pass
Test 3	Consequential intervention test	Fail

For WPD the HI category of HV Transformer (GM) consists of one asset register category

- 6.6/11kV Transformer (GM)

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement resulted in a one-for-one replacement ratio. The total volume being removed (disposals) was the same as the total volume of additions.

The BPDT volumes of disposals and additions are shown in the tables below:

WMID - HV Transformer (GM) – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
6.6/11kV Transformer (GM)	251	251	251	251	251	252	252	252	**2011**

WMID - HV Transformer (GM) – BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
6.6/11kV Transformer (GM)	251	251	251	251	251	252	252	252	**2011**

In the Original NAW the volume of assets being removed from HI bands HI1:HI5 was 2011 (the same as the BPDT removals total). The volume of additions in HI1 was 2011 (the same as the BPDT additions total). The planned interventions from the Original NAW are shown below.

	WMID – HV Transformer (GM) – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	400	-	-	-	-91	-309
C2	1,155	-	-	-1	-377	-777
C3	425	-	-	-1	-178	-246
C4	31	-	-	-	-13	-18
	2,011	**-**	**-**	**(2)**	**(659)**	**(1,350)**

In the Rebased NAW the volume of assets being removed from HI bands HI1:HI5 is 2011 (the same as the BPDT removals total and original NAW). The volume of additions in HI1 is 2011 (the same as the BPDT additions total and the original NAW). The planned interventions from the Rebased NAW are shown below.

	WMID – HV Transformer (GM) – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	130	-	-36	-57	-10	-26
C2	1,338	-59	-424	-453	-74	-154
C3	525	-373	-200	-232	-20	-46
C4	18	-4	-	-31	-	-9
	2,011	**(436)**	**(660)**	**(773)**	**(104)**	**(235)**

Since the volumes from the Rebased NAW match the volumes from the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Pass)

The removals in the Original NAW result in 99% of maximum risk being removed.

The removals in the Rebased NAW result in 99% of maximum risk being removed.

Since the Rebased NAW percentage is equal to the Original NAW percentage, test 1 is passed.

Test 3 – Consequential intervention test (Result Fail)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 2, equating to 0.1% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 1456, equating to 72% of total removals.

CNAIM has been used to forecast the profile of HI values at the end of March 2023 without intervention. This is shown below:

HV Transformers (GM) – Asset population at end of March 2023 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	981	84	22	1	23
C2	11,882	822	123	15	319
C3	1,191	110	15	4	23
C4	4	4	-	-	10
	14,058	**1,020**	**160**	**20**	**375**

This shows that there are 555 assets that will be in the HI3-HI5 bands. Selecting all of these assets leaves a further 1456 to be selected from the lower bands. It is not possible to select any further higher HI band assets and consequently it is not possible to meet test 3.

WMID – EHV Switchgear

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Fail
Test 2	Volumes of interventions test	Pass
Test 3	Consequential intervention test	Pass

For WPD the HI category of EHV Switchgear (GM) consists of ten asset register categories

- 33kV CB (Air Insulated Busbars)(ID) (GM)
- 33kV CB (Air Insulated Busbars)(OD) (GM)
- 33kV CB (Gas Insulated Busbars)(ID) (GM)
- 33kV CB (Gas Insulated Busbars)(OD) (GM)
- 33kV Switch (GM)
- 33kV RMU
- 66kV CB (Air Insulated Busbars)(ID) (GM)
- 66kV CB (Air Insulated Busbars)(OD) (GM)
- 66kV CB (Gas Insulated Busbars)(ID) (GM)
- 66kV CB (Gas Insulated Busbars)(OD) (GM)

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement within EHV Switchgear (GM) resulted in a one-for-one replacement ratio. The total volume being removed (disposals) was the same as the total volume of additions.

The volumes of removals and additions for EHV Switchgear (GM) were assumed to be like-or-like replacements at an asset category level, with the volume of additions being the same as removals.

The BPDT volumes of disposals and additions are shown in the tables below:

WMID - EHV Switchgear (GM)– BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV CB (Air Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	3	0	**3**
33kV CB (Air Insulated Busbars)(OD) (GM)	12	11	12	11	12	12	12	12	**94**
33kV CB (Gas Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
33kV CB (Gas Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
33kV Switch (GM)	0	0	0	0	0	1	0	1	**2**
33kV RMU	0	0	0	0	0	0	0	0	**0**
66kV CB (Air Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Air Insulated Busbars)(OD) (GM)	0	0	0	0	0	1	1	1	**3**
66kV CB (Gas Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Gas Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
Total									**102**

WMID - EHV Switchgear (GM)– BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV CB (Air Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	3	0	**3**
33kV CB (Air Insulated Busbars)(OD) (GM)	12	11	12	11	12	12	12	12	**94**
33kV CB (Gas Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
33kV CB (Gas Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
33kV Switch (GM)	0	0	0	0	0	1	0	1	**2**
33kV RMU	0	0	0	0	0	0	0	0	**0**
66kV CB (Air Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Air Insulated Busbars)(OD) (GM)	0	0	0	0	0	1	1	1	**3**
66kV CB (Gas Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Gas Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
Total									**102**

The Original NAW stated asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 was 102 (the same as the BPDT removals total). The volume of additions in HI1 was 102 (the same as the BPDT additions total). The planned interventions from the Original NAW are shown below.

	WMID – EHV Switchgear (GM) – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	44	-	-	-	-	-44
C2	48	-	-	-	-	-48
C3	10	-	-	-	-	-10
C4	-	-	-	-	-	-
	102	**-**	**-**	**-**	**-**	**(102)**

The Rebased NAW states asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 is 102 (the same as the BPDT removals total and Original NAW). The volume of additions in HI1 is 102 (the same as the BPDT additions total and the Original NAW). The planned interventions from the Rebased NAW are shown below.

	WMID – EHV Switchgear (GM)– Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	1	-	-	-	-	-1
C2	98	-	-	-53	-31	-14
C3	3	-	-	-	-	-3
C4	-	-	-	-	-	-
	102	**-**	**-**	**(53)**	**(31)**	**(18)**

Since the volumes from the Rebased NAW match the volumes from the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Fail)

The removals in the Original NAW result in 94% of maximum risk being removed.

The removals in the Rebased NAW result in 93% of maximum risk being removed.

Since the Rebased NAW percentage is the lower than the Original NAW percentage, test 1 is failed.

Test 1 is conducted at the HI category level where the selection of maximum risk reduction does not consider whether the selected assets are related to the replacements proposed within the BPDT.

In this HI category, the test failure cannot be avoided when selecting interventions at an asset register level. In order to try to pass the test WPD has selected the maximum risk assets in each of the four related asset register categories where interventions were proposed within the BPDT. This is illustrated below. If this test was conducted at a disaggregated level it would show that 100% of the possible maximum risk has been removed by the selected interventions. The following shows the interventions for each asset register category.

33kV CB (Air Insulated Busbars)(ID) (GM)

There are 3 removals in this asset register category in the BPDT. The following tables show that the maximum risk assets have been selected from the population.

33kV CB (Air Insulated Busbars)(ID) (GM) – Rebased NAW Asset Population					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	16	-	-	-	1
C2	151	10	3	-	1
C3	-	-	-	-	-
C4	-	-	-	-	-
	167	**10**	**3**	**-**	**2**

33kV CB (Air Insulated Busbars)(ID) (GM) – Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-1
C2	-	-	-1	-	-1
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**-**	**(1)**	**-**	**(2)**

33kV CB (Air Insulated Busbars)(OD) (GM)

There are 94 removals in this asset register category in the BPDT. The following tables show that the maximum risk assets have been selected from the population.

33kV CB (Air Insulated Busbars)(OD) (GM) – Rebased NAW Asset Population					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	14	-	-	-	-
C2	38	26	62	29	13
C3	-	-	-	-	-
C4	-	-	-	-	-
	52	**26**	**62**	**29**	**13**

33kV CB (Air Insulated Busbars)(OD) (GM) – Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-52	-29	-13
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**-**	**(52)**	**(29)**	**(13)**

33kV Switch (GM)

There are 2 removals in this asset register category in the BPDT. The following tables show that the maximum risk assets have been selected from the population.

33kV Switch (GM) – Rebased NAW Asset Population					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	8	-	1	-	-
C2	-	-	-	2	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	8	**-**	**1**	**2**	**-**

33kV Switch (GM) – Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-2	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**-**	**-**	**(2)**	**-**

66kV CB (Air Insulated Busbars)(OD) (GM)

There are 3 removals in this asset register category in the BPDT. The following tables show that the maximum risk assets have been selected from the population.

66kV CB (Air Insulated Busbars)(OD) (GM) – Rebased NAW Asset Population					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	2	-	-	-	-
C3	54	9	16	4	3
C4	-	-	-	-	-
	56	**9**	**16**	**4**	**3**

66kV CB (Air Insulated Busbars)(OD) (GM) – Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-
C3	-	-	-	-	-3
C4	-	-	-	-	-
	-	**-**	**-**	**-**	**(3)**

Test 3 – Consequential intervention test (Result Pass)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 0, equating to 0% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 0, equating to 0% of total removals.

Since the proportion of the replacements in lower HI bands are the same (zero) test 3 is passed.

WMID – EHV Cable (Oil)

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Fail
Test 2	Volumes of interventions test	Pass
Test 3	Consequential intervention test	Pass

For WPD the HI category of EHV UG Cable (Oil) consists of two asset register categories

- 33kV UG Cable (Oil)
- 66kV UG Cable (Oil)

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement within EHV UG Cable (Oil) resulted in a no additions. This was to represent the practice of replacing EHV UG Cable (Oil) with EHV UG Cable (Non-pressurised). Consequently the volume of additions is zero.

The BPDT volumes of disposals and additions are shown in the tables below:

WMID - EHV Cable (Oil) – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV Cable (Oil)	0	0	0	0	0	0	0	0	**0**
66kV Cable (Oil)	0	0	0.1	0.1	0.1	0.1	0.1	0.1	**0.6**
Total									**0.6**

WMID - EHV Cable (Oil) - Distribution – BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV Cable (Oil)	0	0	0	0	0	0	0	0	**0**
66kV Cable (Oil)	0	0	0	0	0	0	0	0	**0**
Total									**0**

The Original NAW stated asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 was 0.6km (the same as the BPDT removals total). The volume of additions in HI1 was 0km (the same as the BPDT additions total).

The planned interventions from the Original NAW are shown below.

	WMID - EHV Cable (Oil) – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-
C2	-	-	-	-	-	-0.60
C3	-	-	-	-	-	-
C4	-	-	-	-	-	-
	-	-	-	-	-	**-0.60**

The Rebased NAW states asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 is 0.6km (the same as the BPDT and the Original NAW). The volume of additions in HI1 is 0km (the same as the BPDT and the Original NAW).

The planned interventions from the Rebased NAW are shown below.

	WMID - EHV Cable (Oil) – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-
C2	-	-	-	-	-	-
C3	-	-	-	-	-	-
C4	-	-	-	-	-0.29	-0.31
	-	-	-	-	**(0.29)**	**(0.31)**

Since the volumes from the Rebased NAW are the same as the volumes from the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Fail)

The removals in the Original NAW result in 94% of maximum risk being removed.

The removals in the Rebased NAW result in 72% of maximum risk being removed.

Since the Rebased NAW percentage is the lower than the Original NAW percentage, test 1 is failed.

Test 1 is conducted at the HI category level where the selection of maximum risk reduction does not consider whether the selected assets are related to the replacements proposed within the BPDT.

In this HI category, the test failure cannot be avoided when selecting interventions at an asset register level. In order to try to pass the test WPD has selected the maximum risk assets in the related asset register category where interventions were proposed within the BPDT. This is illustrated below. If this test was conducted at a disaggregated level it would show that 100% of the possible maximum risk has been removed by the selected interventions. The following shows the interventions for each asset register category.

33kV Cable (Oil)

There are no removals in this asset register category in the BPDT.

33kV Cable (Oil) – Rebased NAW Asset Population					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	26.13	-	-	10.18	15.65
C2	6.28	-	-	-	-
C3	-	-	-	-	-
C4	8.41	-	-	1.05	4.63
	40.82	**-**	**-**	**11.23**	**20.29**

33kV Cable (Oil) – Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	-	-	-	-

66kV Cable (Oil)

There are 0.60km removals in this asset register category in the BPDT. The following tables show that the maximum risk assets have been selected from the population.

66kV Cable (Oil) – Rebased NAW Asset Population					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	2.03	0.54	0.10	0.79	0.17
C2	0.12	-	-	-	-
C3	-	-	-	-	-
C4	0.85	-	-	1.30	0.31
	3.00	**0.54**	**0.10**	**2.09**	**0.48**

66kV Cable (Oil) – Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-0.29	-0.31
	-	**-**	**-**	**-0.29**	**-0.31**

Test 3 – Consequential intervention test (Result Pass)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 0, equating to 0% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 0, equating to 0% of total removals.

Since the proportion of the replacements in lower HI bands are the same (zero) test 3 is passed.

WMID – EHV Fittings

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Fail
Test 2	Volumes of interventions test	Pass
Test 3	Consequential intervention test	Pass

For WPD the HI category of EHV Fittings consists of two asset register categories

- 33kV Fittings
- 66kV Fittings

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement resulted in a one-for-one replacement ratio. The total volume being removed (disposals) was the same as the total volume of additions.

The BPDT volumes of disposals and additions are shown in the tables below:

WMID - EHV Fittings – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV Fittings	75	71	67	63	60	56	53	49	**494**
66kV Fittings	71	66	62	58	54	51	47	44	**453**
Total									**947**

WMID - EHV Fittings - Distribution – BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV Fittings	75	71	67	63	60	56	53	49	**494**
66kV Fittings	71	66	62	58	54	51	47	44	**453**
Total									**947**

The Original NAW stated asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 was 947 (the same as the BPDT removals total). The volume of additions in HI1 was 947 (the same as the BPDT additions total).

The planned interventions from the Original NAW are shown below.

	WMID - EHV Fittings – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-205
C2	-	-	-	-	-	-521
C3	-	-	-	-	-	-221
C4	-	-	-	-	-	-
	-	-	-	-	-	**(947)**

The Rebased NAW states asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 is 947 (the same as the BPDT and the Original NAW). The volume of additions in HI1 is 947 (the same as the BPDT and the Original NAW).

The planned interventions from the Rebased NAW are shown below.

	WMID - EHV Fittings – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-40	-7
C2	-	-	-	-27	-377	-482
C3	-	-	-	-	-	-14
C4	-	-	-	-	-	-
	-	**-**	**-**	**(27)**	**(417)**	**(503)**

Since the volumes from the Rebased NAW are the same as the volumes from the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Fail)

The removals in the Original NAW result in 100% of maximum risk being removed.

The removals in the Rebased NAW result in 99% of maximum risk being removed.

Since the Rebased NAW percentage is the lower than the Original NAW percentage, test 1 is failed.

Test 1 is conducted at the HI category level where the selection of maximum risk reduction does not consider whether the selected assets are related to the replacements proposed within the BPDT.

In this HI category, the test failure cannot be avoided when selecting interventions at an asset register level. In order to try to pass the test WPD has selected the maximum risk assets in the related asset register category where interventions were proposed within the BPDT. This is illustrated below. If this test was conducted at a disaggregated level it would show that 100% of the possible maximum risk has been removed by the selected interventions. The following shows the interventions for each asset register category.

33kV Fittings

There are 494 removals in this asset register category in the BPDT. The following tables show that the maximum risk assets have been selected from the population.

33kV Fittings – Rebased NAW Asset Population					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	19	122	40	7
C2	24	161	561	366	54
C3	-	-	-	-	-
C4	-	-	-	-	-
	24	**180**	**683**	**406**	**61**

33kV Fittings – Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-40	-7
C2	-	-	-27	-366	-54
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**-**	**(27)**	**(406)**	**(61)**

66kV Fittings

There are 453 removals in this asset register category in the BPDT. The following tables show that the maximum risk assets have been selected from the population.

66kV Fittings – Rebased NAW Asset Population					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	279	54	571	428
C3	-	-	2	-	14
C4	-	-	-	-	-
	-	**279**	**56**	**571**	**442**

66kV Fittings – Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-11	-428
C3	-	-	-	-	-14
C4	-	-	-	-	-
	-	**-**	**-**	**(11)**	**(442)**

Test 3 – Consequential intervention test (Result Pass)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 0, equating to 0% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 0, equating to 0% of total removals.

Since the proportion of the replacements in lower HI bands are the same (zero) test 3 is passed.

WMID – 132kV UG Cable (Gas)

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Pass
Test 2	Volumes of interventions test	Pass
Test 3	Consequential intervention test	Fail

For WPD the HI category of HV Transformer (GM) consists of one asset register category

- 132kV UG Cable (Gas)

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement resulted in a one-for-one replacement ratio. The total volume being removed (disposals) was the same as the total volume of additions.

There was however an assumption that the replacement of 132kV UG Cable (Gas) resulted in the addition of 132kV UG Cable (non-pressurised). This results in no additions of 132kV UG Cable (Gas).

The BPDT volumes of disposals and additions are shown in the tables below:

WMID - 132kV UG Cable (Gas) – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
132kV UG Cable (Gas)	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	8.64

WMID - 132kV UG Cable (Gas) – BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
132kV UG Cable (Gas)	0	0	0	0	0	0	0	0	0

In the Original NAW the volume of assets being removed from HI bands HI1:HI5 was 8.64km (the same as the BPDT removals total). The volume of additions in HI1 was zero (the same as the BPDT additions total). The planned interventions from the Original NAW are shown below.

	WMID – 132kV UG Cable (Gas) – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-
C2	-	-	-	-2.37	-	-6.27
C3	-	-	-	-	-	-
C4	-	-	-	-	-	-
	-	-	-	**(2.37)**	-	**(6.27)**

In the Rebased NAW the volume of assets being removed from HI bands HI1:HI5 is 8.64km (the same as the BPDT removals total and original NAW). The volume of additions in HI1 is zero (the same as the BPDT additions total and the original NAW). The planned interventions from the Rebased NAW are shown below.

	WMID – 132kV UG Cable (Gas) – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-
C2	-	-1.53	-7.11	-	-	-
C3	-	-	-	-	-	-
C4	-	-	-	-	-	-
	-	**-1.53**	**-7.11**	**-**	**-**	**-**

Since the volumes from the Rebased NAW match the volumes from the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Pass)

The removals in the Original NAW result in 100% of maximum risk being removed.

The removals in the Rebased NAW result in 100% of maximum risk being removed.

Since the Rebased NAW percentage is equal to the Original NAW percentage, test 1 is passed.

Test 3 – Consequential intervention test (Result Fail)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 2.37km, equating to 27% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 8.64km, equating to 100% of total removals.

CNAIM has been used to forecast the profile of HI values at the end of March 2023 without intervention. This is shown below:

132kV UG Cable (Gas) – Asset population at end of March 2023 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	8.96	7.11	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	8.96	**7.11**	**-**	**-**	**-**

This shows that there are no assets that will be in the HI3-HI5 bands. This means that all replacements will have to be taken from the lower bands. It is not possible to select any higher HI band assets and consequently it is not possible to meet test 3.

EMID – LV Switchgear at substations

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Pass
Test 2	Volumes of interventions test	Pass
Test 3	Consequential intervention test	Fail

For WPD the HI category of LV Switchgear at substations consists of four asset register categories

- LV Circuit Breaker
- LV Pillar (ID)
- LV Pillar (OD at Substation)
- LV Board (WM)

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement resulted in a one-for-one replacement ratio. The total volume being removed (disposals) was the same as the total volume of additions.

There was however an assumption that the replacement of WM Boards resulted in the addition of LV Pillars (ID).

The BPDT volumes of disposals and additions are shown in the tables below:

EMID - LV Switchgear at Substations – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
LV Circuit Breaker	0	0	0	0	0	0	0	0	**0**
LV Pillar (ID)	22	22	22	22	22	22	22	22	**176**
LV Pillar (OD at Substation)	124	124	124	124	124	124	124	124	**992**
LV Board (WM)	23	23	23	23	23	23	23	22	**183**
Total									**1351**

EMID - LV Switchgear at Substations – BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
LV Circuit Breaker	0	0	0	0	0	0	0	0	**0**
LV Pillar (ID)	45	45	45	45	45	45	45	44	**359**
LV Pillar (OD at Substation)	124	124	124	124	124	124	124	124	**992**
LV Board (WM)	0	0	0	0	0	0	0	0	**0**
Total									**1351**

The Original NAW stated asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 was 1351 (the same as the BPDT removals total). The volume of additions in HI1 was 1351 (the same as the BPDT additions total). The planned interventions from the Original NAW are shown below.

	EMID – LV Switchgear at Substations – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-
C2	1,190	-	-207	-96	-619	-268
C3	161	-	-17	-21	-74	-49
C4	-	-	-	-	-	-
	1,351	**-**	**(224)**	**(117)**	**(693)**	**(317)**

The Rebased NAW states asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 is 1351 (the same as the BPDT removals total and Original NAW). The volume of additions in HI1 is 1351 (the same as the BPDT additions total and the Original NAW). The planned interventions from the Rebased NAW are shown below.

	EMID – LV Switchgear at Substations – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	130	-	-	-16	-6	-21
C2	992	-	-571	-94	-36	-183
C3	208	-	-115	-79	-7	-85
C4	21	-117	-9	-10	-	-2
	1,351	**(117)**	**(695)**	**(199)**	**(49)**	**(291)**

Since the volumes from the Rebased NAW match the volumes from the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Pass)

The removals in the Original NAW result in 92% of maximum risk being removed.

The removals in the Rebased NAW result in 92% of maximum risk being removed.

Since the Rebased NAW percentage is the same as the Original NAW percentage, test 1 is passed.

Test 3 – Consequential intervention test (Result Fail)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 341, equating to 25% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 812, equating to 60% of total removals.

CNAIM has been used to forecast the profile of HI values at the end of March 2023 without intervention. This is shown below:

LV Switchgear at Substations – Asset population at end of March 2023 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	4,835	135	16	6	21
C2	8,427	1,050	94	36	183
C3	2,783	616	79	7	85
C4	169	36	10	-	2
	16,214	**1,837**	**199**	**49**	**291**

This shows that there are 539 assets that will be in the HI3-HI5 bands. Selecting all of these assets leaves a further 812 to be selected from the lower bands. It is not possible to select any further higher HI band assets and consequently it is not possible to meet test 3.

EMID – HV Switchgear (GM) - Distribution

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Pass
Test 2	Volumes of interventions test	Pass
Test 3	Consequential intervention test	Fail

For WPD the HI category of HV Switchgear (GM) - Distribution consists of three asset register categories

- 6.6/11kV CB (GM) Secondary
- 6.6/11kV Switch (GM)
- 6.6/11kV RMU

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement within HV Switchgear (GM) – Distribution HI category resulted in a lower volume of additions compared to the volume of removals. This was to represent the practice of replacing multi-switch extensible switchgear with ring main units (RMUs). Consequently the volume of additions for 6.6/11kV Switch (GM) is lower than the volume of removals. Also the volume of additions for 6.6/11kV RMU is higher than the volume of removals.

The volumes of removals and additions for 6.6/11kV CB (GM) Secondary were assumed to be like-or-like replacements, with the volume of additions being the same as removals.

The BPDT volumes of disposals and additions are shown in the tables below:

EMID - HV Switchgear (GM) - Distribution – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
6.6/11kV CB (GM) Secondary	90	90	90	91	91	91	91	91	**725**
6.6/11kV Switch (GM)	260	260	261	261	261	261	261	261	**2086**
6.6/11kV RMU	80	80	82	82	82	83	82	83	**654**
Total									**3465**

EMID - HV Switchgear (GM) - Distribution - BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
6.6/11kV CB (GM) Secondary	90	90	90	91	91	91	91	91	**725**
6.6/11kV Switch (GM)	159	159	160	160	160	160	160	160	**1278**
6.6/11kV RMU	118	118	120	120	120	121	120	121	**958**
Total									**2961**

The Original NAW stated asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 was 3465 (the same as the BPDT removals total). The volume of additions in HI1 was 2961 (the same as the BPDT additions total). The planned interventions from the Original NAW are shown below.

	EMID – HV Switchgear (GM) - Distribution – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	795	-	-330	-	-119	-481
C2	1,288	-	-146	-	-411	-951
C3	860	-	-18	-	-616	-372
C4	18	-	-18	-	-3	-
	2,961	**-**	**(512)**	**-**	**(1,149)**	**(1,804)**

The Rebased NAW states asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 is 3465 (the same as the BPDT removals total and Original NAW). The volume of additions in HI1 is 2961 (the same as the BPDT additions total and the Original NAW). The planned interventions from the Rebased NAW are shown below.

	EMID – HV Switchgear (GM) - Distribution – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	1,451	-	-406	-187	-63	-873
C2	1,171	-	-1,036	-248	-80	-45
C3	315	-	-176	-114	-51	-27
C4	24	-78	-76	-5	-	-
	2,961	**(78)**	**(1,694)**	**(554)**	**(194)**	**(945)**

Since the volumes from the Rebased NAW match the volumes from the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Pass)

The removals in the Original NAW result in 90% of maximum risk being removed.

The removals in the Rebased NAW result in 90% of maximum risk being removed.

Since the Rebased NAW percentage is the same as the Original NAW percentage, test 1 is passed.

Test 3 – Consequential intervention test (Result Fail)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 512, equating to 15% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 1772, equating to 51% of total removals.

CNAIM has been used to forecast the profile of HI values at the end of March 2023 without intervention. This is shown below:

HV Switchgear (GM) - Distribution – Asset population at end of March 2023 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	7,174	1,305	187	63	873
C2	8,493	1,896	248	80	45
C3	5,434	1,243	114	51	27
C4	554	76	5	-	-
	21,655	**4,520**	**554**	**194**	**945**

This shows that there are 1693 assets that will be in the HI3-HI5 bands. Selecting all of these assets leaves a further 1772 to be selected from the lower bands. It is not possible to select any further higher HI band assets and consequently it is not possible to meet test 3.

EMID – HV Transformer (GM)

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Pass
Test 2	Volumes of interventions test	Pass
Test 3	Consequential intervention test	Fail

For WPD the HI category of HV Transformer (GM) consists of one asset register category

- 6.6/11kV Transformer (GM)

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement resulted in a one-for-one replacement ratio. The total volume being removed (disposals) was the same as the total volume of additions.

The BPDT volumes of disposals and additions are shown in the tables below:

EMID - HV Transformer (GM) – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
6.6/11kV Transformer (GM)	209	209	210	209	210	209	210	209	**1675**

EMID - HV Transformer (GM) – BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
6.6/11kV Transformer (GM)	209	209	210	209	210	209	210	209	**1675**

In the Original NAW the volume of assets being removed from HI bands HI1:HI5 was 1675 (the same as the BPDT removals total). The volume of additions in HI1 was 1675 (the same as the BPDT additions total). The planned interventions from the Original NAW are shown below.

	EMID – HV Transformer (GM) – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	286	-	-	-	-20	-266
C2	895	-	-	-	-213	-682
C3	461	-	-	-	-123	-338
C4	33	-	-	-	-7	-26
	1,675	**-**	**-**	**-**	**(363)**	**(1,312)**

In the Rebased NAW the volume of assets being removed from HI bands HI1:HI5 is 1675 (the same as the BPDT removals total and original NAW). The volume of additions in HI1 is 1675 (the same as the BPDT additions total and the original NAW). The planned interventions from the Rebased NAW are shown below.

	EMID – HV Transformer (GM) – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	104	-	-63	-9	-1	-31
C2	950	-132	-447	-52	-29	-290
C3	597	-523	-42	-5	-1	-26
C4	24	-10	-	-	-1	-13
	1,675	**(665)**	**(552)**	**(66)**	**(32)**	**(360)**

Since the volumes from the Rebased NAW match the volumes from the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Pass)

The removals in the Original NAW result in 98% of maximum risk being removed.

The removals in the Rebased NAW result in 98% of maximum risk being removed.

Since the Rebased NAW percentage is equal to the Original NAW percentage, test 1 is passed.

Test 3 – Consequential intervention test (Result Fail)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 0, equating to 0% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 1217, equating to 73% of total removals.

CNAIM has been used to forecast the profile of HI values at the end of March 2023 without intervention. This is shown below:

HV Transformer (GM) – Asset population at end of March 2023 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	2,819	63	9	1	31
C2	14,796	447	52	29	290
C3	1,181	42	5	1	26
C4	10	-	-	1	13
	18,806	**552**	**66**	**32**	**360**

This shows that there are 458 assets that will be in the HI3-HI5 bands. Selecting all of these assets leaves a further 1217 to be selected from the lower bands. It is not possible to select any further higher HI band assets and consequently it is not possible to meet test 3.

EMID – EHV Switchgear (GM)

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Fail
Test 2	Volumes of interventions test	Pass
Test 3	Consequential intervention test	Fail

For WPD the HI category of EHV Switchgear (GM) consists of ten asset register categories

- 33kV CB (Air Insulated Busbars)(ID) (GM)
- 33kV CB (Air Insulated Busbars)(OD) (GM)
- 33kV CB (Gas Insulated Busbars)(ID) (GM)
- 33kV CB (Gas Insulated Busbars)(OD) (GM)
- 33kV Switch (GM)
- 33kV RMU
- 66kV CB (Air Insulated Busbars)(ID) (GM)
- 66kV CB (Air Insulated Busbars)(OD) (GM)
- 66kV CB (Gas Insulated Busbars)(ID) (GM)
- 66kV CB (Gas Insulated Busbars)(OD) (GM)

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement within EHV Switchgear (GM) resulted in a one-for-one replacement ratio. The total volume being removed (disposals) was the same as the total volume of additions.

The volumes of removals and additions for EHV Switchgear (GM)were assumed to be like-or-like replacements, with the volume of additions being the same as removals.

The BPDT volumes of disposals and additions are shown in the tables below:

EMID - EHV Switchgear (GM)– BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV CB (Air Insulated Busbars)(ID) (GM)	32	32	31	31	31	31	31	31	**250**
33kV CB (Air Insulated Busbars)(OD) (GM)	4	4	4	4	4	4	4	4	**32**
33kV CB (Gas Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
33kV CB (Gas Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
33kV Switch (GM)	0	0	0	0	0	0	0	1	**1**
33kV RMU	0	0	0	0	0	0	0	0	**0**
66kV CB (Air Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Air Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Gas Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Gas Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
Total									**283**

EMID - EHV Switchgear (GM)– BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV CB (Air Insulated Busbars)(ID) (GM)	32	32	31	31	31	31	31	31	**250**
33kV CB (Air Insulated Busbars)(OD) (GM)	4	4	4	4	4	4	4	4	**32**
33kV CB (Gas Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
33kV CB (Gas Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
33kV Switch (GM)	0	0	0	0	0	0	0	1	**1**
33kV RMU	0	0	0	0	0	0	0	0	**0**
66kV CB (Air Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Air Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Gas Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Gas Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
Total									**283**

The Original NAW stated asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 was 283 (the same as the BPDT removals total). The volume of additions in HI1 was 283 (the same as the BPDT additions total). The planned interventions from the Original NAW are shown below.

	EMID – EHV Switchgear (GM) – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	81	-	-	-	-	-81
C2	125	-	-	-	-20	-105
C3	37	-	-	-	-4	-33
C4	40	-	-	-	-11	-29
	283	**-**	**-**	**-**	**(35)**	**(248)**

The Rebased NAW states asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 is 283 (the same as the BPDT removals total and Original NAW). The volume of additions in HI1 is 283 (the same as the BPDT additions total and the Original NAW). The planned interventions from the Rebased NAW are shown below.

	EMID – EHV Switchgear (GM)– Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-
C2	265	-49	-105	-23	-9	-80
C3	18	-12	-3	-	-	-2
C4	-	-	-	-	-	-
	283	**(61)**	**(108)**	**(23)**	**(9)**	**(82)**

Since the volumes from the Rebased NAW match the volumes from the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Fail)

The removals in the Original NAW result in 98% of maximum risk being removed.

The removals in the Rebased NAW result in 75% of maximum risk being removed.

Since the Rebased NAW percentage is the lower than the Original NAW percentage, test 1 is failed.

Test 1 is conducted at the HI category level where the selection of maximum risk reduction does not consider whether the selected assets are related to the replacements proposed within the BPDT.

In this HI category, the test failure cannot be avoided when selecting interventions at an asset register level. In order to try to pass the test WPD has selected the maximum risk assets in the related asset register category where interventions were proposed within the BPDT. This is illustrated below. If this test was conducted at a disaggregated level it would show that 100% of the possible maximum risk has been removed by the selected interventions. The following shows the interventions for each asset register category.

33kV CB (Air Insulated Busbar)(ID) (GM)

There are 250 removals in this asset register category in the BPDT. The following tables show that the maximum risk assets have been selected from the population.

33kV CB (Air Insulated Busbar)(ID) (GM)– Rebased NAW Asset Population					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	1	-	-	-	-
C2	646	105	23	9	49
C3	12	3	-	-	-
C4	-	-	-	-	-
	659	**108**	**23**	**9**	**49**

33kV CB (Air Insulated Busbar)(ID) (GM)– Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-49	-105	-23	-9	-49
C3	-12	-3	-	-	-
C4	-	-	-	-	-
	(61)	**(108)**	**(23)**	**(9)**	**(49)**

33kV CB (Air Insulated Busbar)(OD) (GM)

There are 32 removals in this asset register category in the BPDT. The following tables show that the maximum risk assets have been selected from the population.

33kV CB (Air Insulated Busbar)(OD) (GM)– Rebased NAW Asset Population					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	82	25	27	21	33
C3	5	1	2	1	2
C4	-	-	-	-	-
	87	**26**	**29**	**22**	**35**

33kV CB (Air Insulated Busbar)(OD) (GM)– Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-30
C3	-	-	-	-	-2
C4	-	-	-	-	-
	-	-	-	-	**(32)**

33kV Switch (GM)

There is 1 removal in this asset register category in the BPDT. The following tables show that the maximum risk assets have been selected from the population.

33kV Switch (GM)– Rebased NAW Asset Population					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	52	9	-	4	-
C2	26	6	2	3	2
C3	-	-	-	-	-
C4	-	-	-	-	-
	78	**15**	**2**	**7**	**2**

33kV Switch (GM)– Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-1
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	-	-	-	**(1)**

Test 3 – Consequential intervention test (Result Fail)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 0, equating to 0% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 169, equating to 60% of total removals.

CNAIM has been used to forecast the profile of HI values at the end of March 2023 without intervention. This is shown below:

EHV Switchgear (GM) – Asset population at end of March 2023 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	53	9	-	4	-
C2	881	147	53	33	106
C3	20	9	3	1	4
C4	-	-	-	-	-
	954	**165**	**56**	**38**	**110**

This shows that there are 204 assets that will be in the HI3-HI5 bands. This value is higher than the total replacement interventions required, but not all these assets can be selected because a proportion of them relate to asset register categories where interventions were not proposed in the

BPDT. The following tables show the details for five of the ten asset categories (those where EMID has assets) that make up the EHV Switchgear (GM) HI category.

33kV CB (Air Insulated Busbars)(ID) (GM)

The planned volume of removals in this asset category is 250 over the RIIO-ED1 period.

33kV CB (Air Insulated Busbars)(ID) (GM) – Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-49	-105	-23	-9	-49
C3	-12	-3	-	-	-
C4	-	-	-	-	-
	(61)	**(108)**	**(23)**	**(9)**	**(49)**

33kV CB (Air Insulated Busbars)(ID) (GM) – Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	1	-	-	-	-
C2	646	105	23	9	49
C3	12	3	-	-	-
C4	-	-	-	-	-
	659	**108**	**23**	**9**	**49**

There are 81 assets in the HI3-HI5 bands. Selecting all of these assets leaves a further 169 to be selected from the lower bands. It is not possible to select any further higher HI band assets.

33kV CB (Air Insulated Busbars)(OD) (GM)

The planned volume of removals in this asset category is 32 over the RIIO-ED1 period.

33kV CB (Air Insulated Busbars)(OD) (GM)– Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-30
C3	-	-	-	-	-2
C4	-	-	-	-	-
	-	**-**	**-**	**-**	**(32)**

33kV CB (Air Insulated Busbars)(OD) (GM)– Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	82	25	27	21	33
C3	5	1	2	1	2
C4	-	-	-	-	-
	87	**26**	**29**	**22**	**35**

The assets selected for replacement are the 32 assets in the highest risk parts of the matrix. There are no assets selected from the lower HI Bands because there are sufficient in higher bands to meet the replacement volumes.

33kV CB (Gas Insulated Busbars)(ID) (GM)

There are no planned volumes of removals in this asset category in the BPDT.

33kV CB (Gas Insulated Busbars)(ID) (GM) - Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**-**	**-**	**-**	**-**

33kV CB (Gas Insulated Busbars)(ID) (GM) - Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	111	-	-	-	18
C3	-	-	-	-	-
C4	-	-	-	-	-
	111	**-**	**-**	**-**	**18**

33kV Switch (GM)

The planned volume of removals in this asset category is 1 over the RIIO-ED1 period.

33kV Switch (GM) - Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-1
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**-**	**-**	**-**	**(1)**

33kV Switch (GM) - Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	52	9	-	4	-
C2	26	6	2	3	2
C3	-	-	-	-	-
C4	-	-	-	-	-
	78	**15**	**2**	**7**	**2**

The asset selected for replacement is the 1 asset in the highest risk part of the matrix. There are no assets selected from the lower HI Bands because there are sufficient in higher bands to meet the replacement volumes.

33kV RMU

There were no planned volumes of removals in this asset category in the BPDT.

33kV RMU - Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**-**	**-**	**-**	**-**

33kV RMU - Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	16	11	1	-	4
C3	3	5	1	-	2
C4	-	-	-	-	-
	19	**16**	**2**	**-**	**6**

Summary

Of the five asset categories where EMID has assets in the EHV Switchgear (GM) HI category, there are replacements proposed in three of them. For two asset categories: 33kV CB (Air Insulated Busbars)(OD) (GM) and 33kV Switch (GM) there are sufficient higher HI band assets to meet the replacement requirements. For 33kV CB (Air Insulated Busbars)(OD) (GM) there are 81 assets in the higher bands. Selecting all of these assets leaves a further 169 to be selected from the lower bands. At a disaggregated level, It is not possible to select any further higher HI band assets and consequently it is not possible to meet test 3.

EMID – 132kV Conductor (Tower Lines)

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Pass
Test 2	Volumes of interventions test	Pass *
Test 3	Consequential intervention test	Pass

Pass* - There is small inconsistency in the Original NAW. Removal volumes and addition volumes are different by 0.001km. This can cause test 2 to be failed if assessing an exact match.

For WPD the HI category of 132kV Conductor (Tower Lines) consists of one asset register category

- 132kV OHL (Tower Line) Conductor

Test 2 – Volumes of Interventions test (Result Pass*)

This test can fail due to a minor discrepancy in rounding to the third decimal place which leads to values not being exactly the same.

Within the RIIO-ED1 Business Plan it was assumed that asset replacement resulted in a one-for-one replacement ratio. The total volume being removed (disposals) was the same as the total volume of additions.

The BPDT volumes of disposals and additions are shown in the tables below:

EMID - 132kV OHL (Tower Line) Conductor – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
132kV OHL (Tower Line) Conductor	30.000	31.000	32.000	33.000	34.000	35.000	36.000	37.000	**268.000**

EMID - 132kV OHL (Tower Line) Conductor – BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
132kV OHL (Tower Line) Conductor	30.000	31.000	32.000	33.000	34.000	35.000	36.000	37.000	**268.000**

In the Original NAW the volume of assets being removed from HI bands HI1:HI5 was 267.999km (0.001km lower than the BPDT removals total). The volume of additions in HI1 was 268.000km (the same as the BPDT additions total). The planned interventions from the Original NAW are shown below.

	EMID – 132kV OHL (Tower Line) Conductor – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	111.102	-	-	-	-16.886	-94.215
C2	114.720	-	-	-	-19.967	-94.753
C3	19.157	-	-	-	-0.654	-18.503
C4	23.021	-	-	-	-23.021	-
	268.000	**-**	**-**	**-**	**-60.528**	**-207.471**

In the Rebased NAW the volume of assets being removed from HI bands HI1:HI5 is 268.000km (the same as the BPDT removals total but 0.001km different to the original NAW). The volume of additions in HI1 is 268.000km (the same as the BPDT additions total and the original NAW). The planned interventions from the Rebased NAW are shown below.

	EMID – 132kV OHL (Tower Line) Conductor – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	23.095	-	-	-	-23.095	-
C2	233.216	-	-	-86.546	-146.670	-
C3	11.689	-	-	-	-11.689	-
C4	-	-	-	-	-	-
	268.000	**-**	**-**	**-86.546**	**-181.454**	**-**

Since the volume difference relates to a 0.001km difference between addition and removal volumes in the Original NAW, test 2 is passed (when rounded to 2 decimal places).

Test 1 – Statistical Test of "equally as challenging" (Result Pass)

The removals in the Original NAW result in 85 of maximum risk being removed.

The removals in the Rebased NAW result in 85% of maximum risk being removed.

Since the Rebased NAW percentage is the same as the Original NAW percentage, test 1 is passed.

Test 3 – Consequential intervention test (Result Pass)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 0, equating to 0% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 0, equating to 0% of total removals.

Since the proportion of the replacements in lower HI bands are the same (zero) test 3 is passed.

SWALES – HV Switchgear (GM) - Distribution

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Pass
Test 2	Volumes of interventions test	Pass
Test 3	Consequential intervention test	Fail

For WPD the HI category of HV Switchgear (GM) - Distribution consists of three asset register categories

- 6.6/11kV CB (GM) Secondary
- 6.6/11kV Switch (GM)
- 6.6/11kV RMU

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement within HV Switchgear (GM) – Distribution HI category resulted in a lower volume of additions compared to the volume of removals. This was to represent the practice of replacing multi-switch extensible switchgear with ring main units (RMUs). Consequently the volume of additions for 6.6/11kV Switch (GM) is lower than the volume of removals. Also the volume of additions for 6.6/11kV RMU is higher than the volume of removals.

The volumes of removals and additions for 6.6/11kV CB (GM) Secondary were assumed to be like-or-like replacements, with the volume of additions being the same as removals.

The BPDT volumes of disposals and additions are shown in the tables below:

SWALES - HV Switchgear (GM) - Distribution – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
6.6/11kV CB (GM) Secondary	8	8	8	8	8	8	9	10	**67**
6.6/11kV Switch (GM)	107	107	107	107	107	107	107	107	**856**
6.6/11kV RMU	17	17	17	16	17	17	17	17	**135**
Total									**1058**

SWALES - HV Switchgear (GM) - Distribution - BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
6.6/11kV CB (GM) Secondary	8	8	8	8	8	8	9	10	**67**
6.6/11kV Switch (GM)	92	92	92	92	92	92	92	92	**736**
6.6/11kV RMU	22	22	22	21	22	22	22	22	**175**
Total									**978**

The Original NAW stated asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 was 1058 (the same as the BPDT removals total). The volume of additions in HI1 was 978 (the same as the BPDT additions total). The planned interventions from the Original NAW are shown below.

	SWALES – HV Switchgear (GM) - Distribution – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-
C2	788	-	-112	-25	-47	-668
C3	190	-	-11	-1	-2	-192
C4	-	-	-	-	-	-
	978	**-**	**(123)**	**(26)**	**(49)**	**(860)**

The Rebased NAW states asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 is 1058 (the same as the BPDT removals total and Original NAW). The volume of additions in HI1 is 978 (the same as the BPDT additions total and the Original NAW). The planned interventions from the Rebased NAW are shown below.

	SWALES – HV Switchgear (GM) - Distribution – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	292	-	-66	-48	-79	-147
C2	430	-83	-81	-67	-137	-24
C3	241	-148	-38	-45	-68	-7
C4	15	-5	-3	-5	-7	-
	978	**(236)**	**(188)**	**(165)**	**(291)**	**(178)**

Since the volumes from the Rebased NAW match the volumes from the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Pass)

The removals in the Original NAW result in 86% of maximum risk being removed.

The removals in the Rebased NAW result in 91% of maximum risk being removed.

Since the Rebased NAW percentage is higher than the Original NAW percentage, test 1 is passed.

It should be noted that percentage of maximum in the Rebased NAW is higher than the Original NAW, making the deliverables more challenging. This has resulted as a consequence of making as many adjustments as possible to the selected interventions in order to try to meet test 3.

Test 3 – Consequential intervention test (Result Fail)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 149, equating to 14% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 424, equating to 40% of total removals.

CNAIM has been used to forecast the profile of HI values at the end of March 2023 without intervention. This is shown below:

HV Switchgear (GM) – Asset population at end of March 2023 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	2,628	154	53	79	151
C2	4,246	220	75	143	32
C3	2,304	138	51	69	9
C4	76	6	5	7	-
	9,254	**518**	**184**	**298**	**192**

At the HI category level this shows that there are 674 assets that will be in the HI3-HI5 bands. Selecting all of these assets leaves a further 384 to be selected from the lower bands. However the HV Switchgear (GM) – Distribution HI asset category is a combination of three asset register categories and at the disaggregated level the volume being required from lower HI bands is 424.

The following tables show the details for the three asset categories that make up the HV Switchgear (GM) - Distribution HI category.

6.6/11kV CB (GM) Secondary

The planned volume of removals in this asset category is 67 over the RIIO-ED1 period.

6.6/11kV CB (GM) Secondary – Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-10	-7	-17	-5
C2	-	-11	-5	-8	-1
C3	-	-2	-1	-	-
C4	-	-	-	-	-
	-	**(23)**	**(13)**	**(25)**	**(6)**

6.6/11kV CB (GM) Secondary – Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	394	50	7	17	5
C2	143	20	5	8	1
C3	115	2	1	-	-
C4	7	-	-	-	-
	659	**72**	**13**	**25**	**6**

There are 44 assets in the HI3-HI5 bands. Selecting all of these assets leaves a further 23 to be selected from the lower bands. It is not possible to select any further higher HI band assets.

6.6/11kV Switch (GM)

The planned volume of removals in this asset category is 856 over the RIIO-ED1 period.

6.6/11kV Switch (GM) – Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-56	-30	-57	-66
C2	-83	-70	-44	-129	-19
C3	-148	-36	-34	-60	-5
C4	-5	-3	-4	-7	-
	(236)	**(165)**	**(112)**	**(253)**	**(90)**

6.6/11kV Switch (GM) – Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	525	56	30	57	66
C2	382	70	44	129	19
C3	148	36	34	60	5
C4	5	3	4	7	-
	1,060	**165**	**112**	**253**	**90**

There are 455 assets in the HI3-HI5 bands. Selecting all of these assets leaves a further 401 to be selected from the lower HI bands. It is not possible to select any further higher HI band assets.

6.6/11kV RMU

The planned volume of removals in this asset category is 135 over the RIIO-ED1 period.

6.6/11kV RMU – Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-11	-5	-76
C2	-	-	-18	-	-4
C3	-	-	-10	-8	-2
C4	-	-	-1	-	-
	-	**-**	**(40)**	**(13)**	**(82)**

6.6/11kV RMU – Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	1,709	48	16	5	80
C2	3,721	130	26	6	12
C3	2,041	100	16	9	4
C4	64	3	1	-	-
	7,535	**281**	**59**	**20**	**96**

There are 175 assets in the HI3-HI5 bands. There are no assets selected from the lower HI Bands because there are sufficient in higher bands to meet the replacement volumes.

Summary

For one of the three asset categories (6.6/11kV RMU) there are sufficient higher HI band assets to meet the replacement requirements. For 6.6/11kV CB (GM) Secondary there is a requirement to select 23 from lower HI bands. For 6.6/11kV Switch (GM) there is a requirement to select 401 from lower HI bands. Together the total volume required from lower HI bands is 424. It is not possible to select any further higher HI band assets and consequently it is not possible to meet test 3.

SWALES – HV Transformer (GM)

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Pass
Test 2	Volumes of interventions test	Pass
Test 3	Consequential intervention test	Fail

For WPD the HI category of HV Transformer (GM) consists of one asset register category

- 6.6/11kV Transformer (GM)

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement resulted in a one-for-one replacement ratio. The total volume being removed (disposals) was the same as the total volume of additions.

The BPDT volumes of disposals and additions are shown in the tables below:

SWALES - HV Transformer (GM) – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
6.6/11kV Transformer (GM)	108	108	109	109	109	109	109	109	**870**

SWALES - HV Transformer (GM) – BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
6.6/11kV Transformer (GM)	108	108	109	109	109	109	109	109	**870**

In the Original NAW the volume of assets being removed from HI bands HI1:HI5 was 870 (the same as the BPDT removals total). The volume of additions in HI1 was 870 (the same as the BPDT additions total). The planned interventions from the Original NAW are shown below.

	SWALES – HV Transformer (GM) – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	207	-	-	-	-15	-192
C2	594	-	-	-	-224	-370
C3	69	-	-	-	-31	-38
C4	-	-	-	-	-	-
	870	**-**	**-**	**-**	**(270)**	**(600)**

In the Rebased NAW the volume of assets being removed from HI bands HI1:HI5 is 870 (the same as the BPDT removals total and original NAW). The volume of additions in HI1 is 870 (the same as the BPDT additions total and the original NAW). The planned interventions from the Rebased NAW are shown below.

	SWALES – HV Transformer (GM) – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	114	-	-7	-38	-61	-8
C2	723	-	-160	-240	-219	-104
C3	27	-	-	-13	-10	-4
C4	6	-	-	-	-1	-5
	870	**-**	**(167)**	**(291)**	**(291)**	**(121)**

Since the volumes from the Rebased NAW match the volumes from the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Pass)

The removals in the Original NAW result in 94% of maximum risk being removed.

The removals in the Rebased NAW result in 99% of maximum risk being removed.

Since the Rebased NAW percentage is higher than the Original NAW percentage, test 1 is passed.

It should be noted that percentage of maximum in the Rebased NAW is higher than the Original NAW, making the deliverables more challenging. This has resulted as a consequence of making as many adjustments as possible to the selected interventions in order to try to meet test 3.

Test 3 – Consequential intervention test (Result Fail)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 0, equating to 0% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 167, equating to 19% of total removals.

CNAIM has been used to forecast the profile of HI values at the end of March 2023 without intervention. This is shown below:

HV Transformers (GM) – Asset population at end of March 2023 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	1,269	137	38	61	8
C2	5,045	937	240	219	104
C3	183	25	13	10	4
C4	1	1	-	1	5
	6,498	**1,100**	**291**	**291**	**121**

This shows that there are 703 assets that will be in the HI3-HI5 bands. Selecting all of these assets leaves a further 167 to be selected from the lower bands. It is not possible to select any further higher HI band assets and consequently it is not possible to meet test 3.

SWALES – EHV Switchgear (GM)

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Fail
Test 2	Volumes of interventions test	Pass *
Test 3	Consequential intervention test	Fail

* There are insufficient assets on the network to be able to meet the volumes in the BPDT. Test 2 has been passed by selecting intervention volumes that match the BPDT but are higher than the volumes of assets reported for the end of DPCR5.

For WPD the HI category of EHV Switchgear (GM) consists of ten asset register categories

- 33kV CB (Air Insulated Busbars)(ID) (GM)
- 33kV CB (Air Insulated Busbars)(OD) (GM)
- 33kV CB (Gas Insulated Busbars)(ID) (GM)
- 33kV CB (Gas Insulated Busbars)(OD) (GM)
- 33kV Switch (GM)
- 33kV RMU
- 66kV CB (Air Insulated Busbars)(ID) (GM)
- 66kV CB (Air Insulated Busbars)(OD) (GM)
- 66kV CB (Gas Insulated Busbars)(ID) (GM)
- 66kV CB (Gas Insulated Busbars)(OD) (GM)

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement within EHV Switchgear (GM) resulted in a one-for-one replacement ratio. The total volume being removed (disposals) was the same as the total volume of additions.

The volumes of removals and additions for EHV Switchgear (GM) were assumed to be like-or-like replacements, with the volume of additions being the same as removals.

The BPDT volumes of disposals and additions are shown in the tables below:

SWALES - EHV Switchgear (GM)– BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV CB (Air Insulated Busbars)(ID) (GM)	12	12	11	12	12	12	12	12	**95**
33kV CB (Air Insulated Busbars)(OD) (GM)	3	3	3	3	3	3	3	4	**25**
33kV CB (Gas Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
33kV CB (Gas Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
33kV Switch (GM)	1	2	1	2	2	2	1	1	**12**
33kV RMU	0	0	0	0	0	0	0	0	**0**
66kV CB (Air Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Air Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Gas Insulated	0	0	0	0	0	0	0	0	**0**

Busbars)(ID) (GM)									
66kV CB (Gas Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
Total									**132**

SWALES - EHV Switchgear (GM)– BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV CB (Air Insulated Busbars)(ID) (GM)	12	12	11	12	12	12	12	12	**95**
33kV CB (Air Insulated Busbars)(OD) (GM)	3	3	3	3	3	3	3	4	**25**
33kV CB (Gas Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
33kV CB (Gas Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
33kV Switch (GM)	1	2	1	2	2	2	1	1	**12**
33kV RMU	0	0	0	0	0	0	0	0	**0**
66kV CB (Air Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Air Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Gas Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Gas Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
Total									**132**

The Original NAW stated asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 was 132 (the same as the BPDT removals total). The volume of additions in HI1 was 132 (the same as the BPDT additions total). The planned interventions from the Original NAW are shown below.

	SWALES – EHV Switchgear (GM) – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	22	-	-	-	-22	-
C2	77	-	-	-8	-69	-
C3	23	-	-	-2	-21	-
C4	10	-	-	-3	-7	-
	132	**-**	**-**	**(13)**	**(119)**	**-**

The Rebased NAW states asset movements at the aggregate HI category level, but is constructed from a combination of the individual asset register categories. The following table shows the volumes of interventions in the BPDT and the volumes of assets reported for the end of DPCR5, for the three asset categories where interventions are proposed in the BPDT.

SWALES - EHV Switchgear (GM)– BPDT Removals and Asset Volumes at the end of DPCR5		
Asset Register Asset Category	**BPDT Removals**	**Volumes at end of DPCR5**
33kV CB (Air Insulated Busbars)(ID) (GM)	95	267
33kV CB (Air Insulated Busbars)(OD) (GM)	25	296
33kV Switch (GM)	12	6

This shows that for 33kV Switch (GM) the volumes to be removed are greater than the volumes available to be removed. This is due to assets being removed prior to the end of DPCR5. Selecting only the assets that are available would lead to 126 removals, leaving a shortfall of 6.

In order to overcome this shortfall and therefore pass test 2, WPD has selected an additional 6 HI4C2 33kV CB (Air Insulated Busbars)(OD) (GM) assets as substitutions for the 33kV Switch assets where there is a shortfall. The HI4C2 assets are the highest risk 33kV switchgear assets available to be removed. The Rebased NAW shows that the 'enhanced' volume of assets being removed from HI bands HI1:HI5 is 132.

	SWALES – EHV Switchgear (GM)– Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-
C2	123	-	-15	-20	-9	-79
C3	9	-	-5	-	-4	-
C4	-	-	-	-	-	-
	132	**-**	**(20)**	**(20)**	**(13)**	**(79)**

Since the 'enhanced' volumes from the Rebased NAW are the same as the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Fail)

The removals in the Original NAW result in 99% of maximum risk being removed.

The removals in the Rebased NAW result in 96% of maximum risk being removed.

Since the Rebased NAW percentage is the lower than the Original NAW percentage, test 1 is failed.

Test 1 is conducted at the HI category level where the selection of maximum risk reduction does not consider whether the selected assets are related to the replacements proposed within the BPDT.

In this HI category, the test failure cannot be avoided when selecting interventions at an asset register level. In order to try to pass the test WPD has selected the maximum risk assets in the related asset register category where interventions were proposed within the BPDT. This is illustrated below. If this test was conducted at a disaggregated level it would show that 100% of the possible maximum risk has been removed by the selected interventions. The following shows the interventions for each asset register category.

33kV CB (Air Insulated Busbar)(ID) (GM)

There are 95 removals in this asset register category in the BPDT. The following tables show that the maximum risk assets have been selected from the population.

33kV CB (Air Insulated Busbar)(ID) (GM)– Rebased NAW Asset Population					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	13	-	-	-	-
C2	148	18	20	-	61
C3	2	5	-	-	-
C4	-	-	-	-	-
	163	**23**	**20**	**-**	**61**

33kV CB (Air Insulated Busbar)(ID) (GM)– Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-9	-20	-	-61
C3	-	-5	-	-	-
C4	-	-	-	-	-
	-	**(14)**	**(20)**	**-**	**(61)**

33kV CB (Air Insulated Busbar)(OD) (GM)

There are 25 removals in this asset register category in the BPDT. An additional 6 removals have been selected as substitutions for 33kV Switch assets (where there is a population shortfall). The following tables show that the maximum risk assets have been selected from the population for both the 25 original removals and 6 additional removals.

33kV CB (Air Insulated Busbar)(OD) (GM)– Rebased NAW Asset Population					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	255	-	-	17	18
C3	-	1	1	4	-
C4	-	-	-	-	-
	255	**1**	**1**	**21**	**18**

33kV CB (Air Insulated Busbar)(OD) (GM)– Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-9	-18
C3	-	-	-	-4	-
C4	-	-	-	-	-
	-	**-**	**-**	**(13)**	**(18)**

33kV Switch (GM)

There are 12 removals in this asset register category in the BPDT but there is a shortfall of asset population so only 6 asset have been selected for removal but this represents the whole population. The following tables show that the maximum risk assets have been selected from the population.

33kV Switch (GM)– Rebased NAW Asset Population					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	6	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**6**	**-**	**-**	**-**

33kV Switch (GM)– Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-6	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**(6)**	**-**	**-**	**-**

Test 3 – Consequential intervention test (Result Fail)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 0, equating to 0% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 20, equating to 15% of total possible removals.

CNAIM has been used to forecast the profile of HI values at the end of March 2023 without intervention. This is shown below:

EHV Switchgear (GM) – Asset population at end of March 2023 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	13	-	-	-	-
C2	520	24	20	17	79
C3	63	6	1	6	-
C4	-	-	-	-	-
	596	**30**	**21**	**23**	**79**

This shows that there are 123 assets that will be in the HI3-HI5 bands. Selecting all of these assets leaves a further 9 to be selected from the lower bands (to meet the original volumes of 132 assets). At the HI asset category level, it is not possible to select any further higher HI band assets and consequently it is not possible to meet test 3.

This situation is exacerbated at the disaggregated level.

The following tables show the details for seven of the ten asset categories (those where SWALES has assets) that make up the EHV Switchgear (GM) HI category.

33kV CB (Air Insulated Busbars)(ID) (GM)

The planned volume of removals in this asset category is 95 over the RIIO-ED1 period.

33kV CB (Air Insulated Busbars)(ID) (GM) – Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-9	-20	-	-61
C3	-	-5	-	-	-
C4	-	-	-	-	-
	-	**(14)**	**(20)**	**-**	**(61)**

33kV CB (Air Insulated Busbars)(ID) (GM) – Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	13	-	-	-	-
C2	148	18	20	-	61
C3	2	5	-	-	-
C4	-	-	-	-	-
	163	**23**	**20**	**-**	**61**

There are 81 assets in the HI3-HI5 bands. Selecting all of these assets leaves a further 14 to be selected from the lower bands. It is not possible to select any further higher HI band assets.

33kV CB (Air Insulated Busbars)(OD) (GM)

The planned volume of removals in this asset category is 25 over the RIIO-ED1 period, but a further 6 have been selected to make up a shortfall in population of 33kV Switch assets.

33kV CB (Air Insulated Busbars)(OD) (GM)– Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-9	-18
C3	-	-	-	-4	-
C4	-	-	-	-	-
	-	**-**	**-**	**(13)**	**(18)**

33kV CB (Air Insulated Busbars)(OD) (GM)– Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	255	-	-	17	18
C3	-	1	1	4	-
C4	-	-	-	-	-
	255	**1**	**1**	**21**	**18**

The assets selected for replacement are the 31 (25+6) assets in the highest risk parts of the matrix. There are no assets selected from the lower HI Bands because there are sufficient in higher bands to meet the replacement volumes.

33kV CB (Gas Insulated Busbars)(ID) (GM)

There are no planned volumes of removals in this asset category in the BPDT.

33kV CB (Gas Insulated Busbars)(ID) (GM) - Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**-**	**-**	**-**	**-**

33kV CB (Gas Insulated Busbars)(ID) (GM) - Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	116	-	-	-	-
C3	7	-	-	-	-
C4	-	-	-	-	-
	123	**-**	**-**	**-**	**-**

33kV CB (Gas Insulated Busbars)(OD) (GM)

There are no planned volumes of removals in this asset category in the BPDT.

33kV CB (Gas Insulated Busbars)(ID) (GM) - Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**-**	**-**	**-**	**-**

33kV CB (Gas Insulated Busbars)(ID) (GM) - Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	1	-	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	1	**-**	**-**	**-**	**-**

33kV Switch (GM)

The planned volume of removals in this asset category is 12 over the RIIO-ED1 period. It is not possible to select 12 removals, because only 6 assets remain on the asset register at the start of RIIO-ED1. The Rebased NAW removals show 6 assets being removed from the HI2 band.

33kV Switch (GM) - Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-6	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**(6)**	**-**	**-**	**-**

33kV Switch (GM) - Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	6	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**6**	**-**	**-**	**-**

The Rebased NAW removals shows 6 assets being removed from the HI2 band but the BPDT required that 12 assets be removed. All assets that exist are selected. There are insufficient assets to meet the required replacement volumes and therefore additional assets have been selected from the 33kV CB (Air Insulated Busbars)(OD) (GM) asset register category.

All the assets that are selected for removal are in the lower HI bands and since it is not possible to select higher HI band assets, this contributes to the failure against test 3.

66kV CB (Air Insulated Busbars)(ID) (GM)

There were no planned volumes of removals in this asset category in the BPDT.

66kV CB (Air Insulated Busbars)(ID) (GM) - Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**-**	**-**	**-**	**-**

66kV CB (Air Insulated Busbars)(ID) (GM) - Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-
C3	1	-	-	-	-
C4	-	-	-	-	-
	1	**-**	**-**	**-**	**-**

66kV CB (Air Insulated Busbars)(ID) (GM)

There were no planned volumes of removals in this asset category in the BPDT.

66kV CB (Air Insulated Busbars)(ID) (GM) - Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**-**	**-**	**-**	**-**

66kV CB (Air Insulated Busbars)(ID) (GM) - Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-
C3	53	-	-	2	-
C4	-	-	-	-	-
	53	**-**	**-**	**2**	**-**

Summary

Of the seven asset categories where SWALES has assets in the EHV Switchgear (GM) HI category, there are replacements proposed in three of them. For 33kV CB (Air Insulated Busbars)(OD) (GM) there are sufficient higher HI band assets to meet the replacement requirements. For 33kV CB (Air Insulated Busbars)(OD) (GM) there are 81 assets in the higher bands. Selecting all of these assets leaves a further 14 to be selected from the lower bands. For 33kV Switch (GM) there are insufficient volumes to meet the 12 required replacements and the six available assets are from lower HI bands. At a disaggregated level, there are 20 replacements from lower HI bands; it is not possible to select any further higher HI band assets and consequently it is not possible to meet test 3.

SWALES – EHV UG Cable (Gas)

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Pass
Test 2	Volumes of interventions test	Pass *
Test 3	Consequential intervention test	Fail

* There are insufficient assets on the network to be able to meet the volumes in the BPDT. Test 2 has been passed by selecting intervention volumes that match the BPDT but are higher than the volumes of assets reported for the end of DPCR5.

For WPD the HI category of EHV UG Cable (Gas) consists of two asset register categories

- 33kV UG Cable (Gas)
- 66kV UG Cable (Gas)

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement within EHV UG Cable (Gas) resulted in a no additions. This was to represent the practice of replacing EHV UG Cable (Gas) with EHV UG Cable (Non-pressurised). Consequently the volume of additions is zero.

The BPDT volumes of disposals and additions are shown in the tables below:

SWALES - EHV Cable (Gas) – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV Cable (Gas)	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	**4.32**
66kV Cable (Gas)	0	0	0	0	0	0	0	0	**0**
Total									**4.32**

SWALES - EHV Cable (Gas) - Distribution – BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV Cable (Gas)	0	0	0	0	0	0	0	0	**0**
66kV Cable (Gas)	0	0	0	0	0	0	0	0	**0**
Total									**0**

The Original NAW stated asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 was 4.32km (the same as the BPDT removals total). The volume of additions in HI1 was 0km (the same as the BPDT additions total).

The planned interventions from the Original NAW are shown below.

	SWALES – EHV Cable (Gas) – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-
C2	-	-	-	-	-	-4.32
C3	-	-	-	-	-	-
C4	-	-	-	-	-	-
	-	-	-	-	-	**(4.32)**

The volume of 33kV Cable (Gas) assets reported for the end of DPCR5 is 3.812km, which is lower than the volume of interventions proposed in the BPDT.

In order to overcome this shortfall and therefore pass test 2, WPD has selected additional 0.508km 33kV Cable (Gas) assets in the HI3C2 risk position (the highest risk position corresponding to 33kV Cable (Gas) assets that remain on the network).

The Rebased NAW states asset movements at the aggregate HI category level. The 'enhanced' volume of assets being removed from HI bands HI1:HI5 is 4.32km. The volume of additions in HI1 is 0km.

The planned interventions from the Rebased NAW are shown below.

	SWALES – EHV Cable (Gas) – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-
C2	-	-2.03	-0.18	-2.11	-	-
C3	-	-	-	-	-	-
C4	-	-	-	-	-	-
	-	**-2.03**	**-0.18**	**-2.11**	**-**	**-**

Since the 'enhanced' volumes from the Rebased NAW are the same as the volumes from the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Pass)

The removals in the Original NAW result in 100% of maximum risk being removed.

The removals in the Rebased NAW result in 113% of maximum risk being removed.

Since the Rebased NAW percentage is the higher than the Original NAW percentage, test 1 is passed.

Note that the percentage in the Rebased NAW is greater than 100% because the 'enhanced' volume of interventions selected in order to pass test 2 exceeds the volume of assets available.

Test 3 – Consequential intervention test (Result Fail)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 0km, equating to 0% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 2.214km, equating to 51% of total removals.

CNAIM has been used to forecast the profile of HI values at the end of March 2023 without intervention. This is shown below:

EHV Cable (Gas) – Asset population at end of March 2023 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	2.47	0.18	1.60	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	2.47	**0.18**	**1.60**	**-**	**-**

At the HI category level this shows that there are 1.60km assets that will be in the HI3-HI5 bands. Selecting all of these assets leaves a further 2.72km to be selected from the lower bands (note that

the volumes available are only 2.65km). At the HI asset category level, it is not possible to select any further higher HI band assets and consequently it is not possible to meet test 3.

The following tables show the details for the two asset categories that make up the EHV Cable (Gas) HI category.

33kV Cable (Gas)

The planned volume of removals in this asset category is 4.32km over the RIIO-ED1 period. The Rebased NAW removals (including an additional 0.508km to make up the shortfall in population volumes) are shown in the table below:

33kV Cable (Gas) – Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-2.03	-0.18	-2.11	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	-2.03	**-0.18**	**-2.11**	**-**	**-**

The Rebased NAW asset volumes are shown below:

33kV Cable (Gas) – Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	2.03	0.18	1.60	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	2.03	**0.18**	**1.60**	**-**	**-**

There are 1.60km of assets in the HI3-HI5 bands. Selecting all of these assets leaves a further 2.72km to be selected from the lower bands. The inclusion of an additional 0.508km of removals from the HI3C2 matrix position increases the amount selected in HI3-HI5 bands to 2.11km. This still leaves 2.21km to be selected from the lower bands. It is not possible to select any further higher HI band assets.

66kV Cable (Gas)

The planned volume of removals in this asset category is 0km over the RIIO-ED1 period.

66kV Cable (Gas) – Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**-**	**-**	**-**	**-**

The Rebased NAW asset volumes are shown below:

66kV Cable (Gas) – Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	0.44	-	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	0.44	**-**	**-**	**-**	**-**

The resultant asset volumes are zero for 66kV Cable (Gas).

Summary

For 33kV Cable (Gas) there is a requirement to select 2.21km from lower HI bands. It is not possible to select any further higher HI band assets and consequently it is not possible to meet test 3.

SWALES – 132kV Conductor (Tower Lines)

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Pass
Test 2	Volumes of interventions test	Pass *
Test 3	Consequential intervention test	Pass

Pass* - There is small inconsistency in the Original NAW. Removal volumes and addition volumes are different by 0.001km. This can cause test 2 to be failed if assessing an exact match.

For WPD the HI category of 132kV Conductor (Tower Lines) consists of one asset register category

- 132kV OHL (Tower Line) Conductor

Test 2 – Volumes of Interventions test (Result Pass*)

This test can fail due to a minor discrepancy in rounding to the third decimal place which leads to values not being exactly the same.

Within the RIIO-ED1 Business Plan it was assumed that asset replacement resulted in a one-for-one replacement ratio. The total volume being removed (disposals) was the same as the total volume of additions.

The BPDT volumes of disposals and additions are shown in the tables below:

SWALES - 132kV OHL (Tower Line) Conductor – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
132kV OHL (Tower Line) Conductor	10.600	11.200	11.800	12.300	12.900	13.400	14.000	14.400	**100.600**

SWALES - 132kV OHL (Tower Line) Conductor – BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
132kV OHL (Tower Line) Conductor	10.600	11.200	11.800	12.300	12.900	13.400	14.000	14.400	100.600

In the Original NAW the volume of assets being removed from HI bands HI1:HI5 was 106.000km (the same as the BPDT removals total). The volume of additions in HI1 was 105.599km (a 0.001km minor discrepancy to the BPDT additions total of 106.000km). The planned interventions from the Original NAW are shown below.

	SWALES – 132kV OHL (Tower Line) Conductor – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	22.579	-	-	-	-8.707	-13.872
C2	35.264	-	-	-	-8.813	-26.452
C3	42.756	-	-	-	-1.652	-41.104
C4	-	-	-	-	-	-
	100.599	**-**	**-**	**-**	**-19.172**	**-81.428**

In the Rebased NAW the volume of assets being removed from HI bands HI1:HI5 is 106.000km (the same as the BPDT removals total and original NAW). The volume of additions in HI1 is 106.000km (the same as the BPDT additions total but 0.001km different to the original NAW). The planned interventions from the Rebased NAW are shown below.

	SWALES – 132kV OHL (Tower Line) Conductor – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-
C2	55.076	-	-	-	-22.997	-32.079
C3	45.524	-	-	-	-16.088	-29.436
C4	-	-	-	-	-	-
	100.600	**-**	**-**	**-**	**-39.085**	**-61.515**

Since the volume difference relates to a 0.001km difference between addition and removal volumes in the Original NAW, test 2 is passed (when rounded to 2 decimal places).

Test 1 – Statistical Test of "equally as challenging" (Result Pass)

The removals in the Original NAW result in 95% of maximum risk being removed.

The removals in the Rebased NAW result in 95% of maximum risk being removed.

Since the Rebased NAW percentage is the same as the Original NAW percentage, test 1 is passed.

Test 3 – Consequential intervention test (Result Pass)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 0, equating to 0% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 0, equating to 0% of total removals.

Since the proportion of the replacements in lower HI bands are the same (zero) test 3 is passed.

SWALES – EHV Tower (Steelwork Refurbishment)

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Fail
Test 2	Volumes of interventions test	Pass
Test 3	Consequential intervention test	Pass

For WPD the HI category of EHV Tower (Steelwork) relates to refurbishment on two asset register categories

- 33kV OHL Support - (Towers)
- 66kV OHL support – (Towers)

Within the RIIO-ED1 Business Plan it was assumed that refurbishment resulted in an improvement in health of the asset. There is no asset replacement associated with refurbishment work.

There were three different types of activity included in the BPDT for tower refurbishment:

- Tower steelwork
- Tower painting
- Tower foundations

WPD only included Tower steelwork as providing a secondary deliverable benefit within the original NAW. The following tests compare the impact of Tower steelwork only.

Test 2 – Volumes of Interventions test (Result Pass)

The BPDT volumes of tower steelwork refurbishment are shown in the tables below:

SWALES – EHV Tower Steelwork refurbishment volumes									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV Tower steelwork	1	1	1	1	1	1	1	1	**8**
66kV Tower steelwork	1	1	1	1	1	1	1	1	**8**

In the Original NAW the refurbishments were applied to HI4 assets and resulted in the assets becoming HI2 as shown below.

There are 16 movements, which aligns with the volume of 16 Tower Steelwork refurbishments specified in the BPDT.

	SWALES – EHV Tower Steelwork – Original NAW interventions at end March 2023				
	HI 1	HI 2	HI 3	HI 4	HI 5
C1		14		-14	
C2		2		-2	
C3					
C4					
		16		**-16**	

In the Rebased NAW the refurbishments have been selected based upon the highest risk assets with condition data that shows poor condition steelwork. The post refurbishment position has been determined using CNAIM models with the poor condition steelwork shown as remedied.

The planned interventions from the Rebased NAW are shown below.

	SWALES – EHV Tower Steelwork – Original NAW interventions at end March 2023				
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	1	-	-	1	-2
C2	-	2	8	1	-11
C3	3	-	-	-	-3
C4	-	-	-	-	
	4	**2**	**8**	**2**	**-16**

Since the volume of interventions is the same in the Original NAW, Rebased NAW and BPDT, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Fail)

The refurbishments in the Original NAW result in 100% of maximum risk being removed.

The refurbishments in the Rebased NAW result in 97% of maximum risk being removed.

Since the Rebased NAW percentage is lower than the Original NAW percentage, test 1 is failed.

Test 1 is conducted at the HI category level where the selection of maximum risk reduction does not consider whether the selected assets are related to the replacements proposed within the BPDT.

In this HI category, the test failure cannot be avoided when selecting interventions at an asset register level. In order to try to pass the test WPD has selected the maximum risk assets in the related asset register category where interventions were proposed within the BPDT. This is illustrated below. If this test was conducted at a disaggregated level it would show that 100% of the possible maximum risk has been removed by the selected interventions. The following shows the interventions for each asset register category.

33kV OHL Support - (Towers)

There are 8 refurbishments in this asset register category in the BPDT. The following tables show that the maximum risk assets have been selected from the population.

33kV Towers – Rebased NAW Asset Population					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	2	1	79	6	20
C2	-	-	13	1	6
C3	-	-	-	-	-
C4	-	-	-	-	-
	2	**1**	**92**	**7**	**26**

33kV Towers– Rebased NAW steelwork refurbishments					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	1	-	-	1	-2
C2	-	2	3	1	-6
C3	-	-	-	-	
C4	-	-	-	-	-
	1	**2**	**3**	**2**	**(8)**

66kV OHL Support - (Towers)

There are 8 refurbishments in this asset register category in the BPDT. The following tables show that the maximum risk assets have been selected from the population.

66kV Towers – Rebased NAW Asset Population					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	1	64	5	12
C3	-	2	34	4	3
C4	-	-	-	-	-
	-	**3**	**98**	**9**	**15**

66kV Towers – Rebased NAW steelwork refurbishments					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	5	-	-5
C3	3	-	-	-	-3
C4	-	-	-	-	-
	3	**-**	**5**	**-**	**(8)**

Test 3 – Consequential intervention test (Result Pass)

The volume of lower HI band (HI1-HI3) assets being refurbished within the Original NAW is 0, equating to 0% of total removals.

The volume of lower HI band (HI1-HI2) assets being refurbished within the Rebased NAW is 0, equating to 0% of total removals.

Since the proportion of the refurbishments in lower HI bands are the same (zero) test 3 is passed.

SWEST – HV Switchgear (GM) - Distribution

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Pass
Test 2	Volumes of interventions test	Pass *
Test 3	Consequential intervention test	Pass

Pass* - There is small inconsistency in the BPDT. Removal volumes and addition volumes are different by 0.002 units. This can cause test 2 to be failed if assessing an exact match.

For WPD the HI category of HV Switchgear (GM) - Distribution consists of three asset register categories

- 6.6/11kV CB (GM) Secondary
- 6.6/11kV Switch (GM)
- 6.6/11kV RMU

Test 2 – Volumes of Interventions test (Result Pass*)

This test in can fail due to a minor discrepancy in rounding to the third decimal place which leads to values not being exactly the same.

Within the RIIO-ED1 Business Plan it was assumed that asset replacement resulted in a one-for-one replacement ratio. The total volume being removed (disposals) was the same as the total volume of additions.

The BPDT volumes of disposals and additions are shown in the tables below:

SWEST - HV Switchgear (GM) - Distribution – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
6.6/11kV CB (GM) Secondary	4	4	4	5	5	5	5	5	**37**
6.6/11kV Switch (GM)	298	298	298	297	298	298	298	298	**2383**
6.6/11kV RMU	33	33	33	33	33	33	33	33	**264**
Total									**2684**

SWEST - HV Switchgear (GM) - Distribution - BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
6.6/11kV CB (GM) Secondary	4	4	4	5	5	5	5	5	**37**
6.6/11kV Switch (GM)	213	213	213	213	213	213	213	213	**1704**
6.6/11kV RMU	63.513	63.513	63.513	63.411	63.513	63.513	63.513	63.513	**508.002**
Total									**2684.02**

In the Original NAW the volume of assets being removed from HI bands HI1:HI5 was 2684 (the same as the BPDT removals total). The volume of additions in HI1 was 2684 (the rounded value of the BPDT additions total). The planned interventions from the Original NAW are shown below.

	SWEST – HV Switchgear (GM) - Distribution – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	19		-18	-1	-	-3
C2	1,806	-3	-107	-185	-43	-1,819
C3	404		-	-17	-6	-458
C4	20		-	-	-	-24
	2,249	**(3)**	**(125)**	**(203)**	**(49)**	**(2,304)**

In the Rebased NAW the volume of assets being removed from HI bands HI1:HI5 is 2684 (the same as the BPDT removals total). The volume of additions in HI1 is 2684 (the same as the original NAW). The planned interventions from the Rebased NAW are shown below.

	SWEST – HV Switchgear (GM) - Distribution – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	630	-	-	-231	-256	-304
C2	1,068	-	-60	-482	-482	-197
C3	532	-	-135	-230	-202	-83
C4	19	-	-2	-9	-8	-3
	2,249	**-**	**(197)**	**(952)**	**(948)**	**(587)**

Since the volume difference relates to a difference of 0.002 units between addition and removal volumes in the Original NAW, test 2 is passed (when rounded to 2 decimal places).

Test 1 – Statistical Test of "equally as challenging" (Result Pass)

The removals in the Original NAW result in 89% of maximum risk being removed.

The removals in the Rebased NAW result in 89% of maximum risk being removed.

Since the Rebased NAW percentage is the same as the Original NAW percentage, test 1 is passed.

Test 3 – Consequential intervention test (Result Pass)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 331, equating to 12% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 197, equating to 7% of total removals.

Since the proportion of the replacements in lower HI bands is lower in the rebased NAW test 3 is passed.

SWEST – HV Transformer (GM)

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Pass
Test 2	Volumes of interventions test	Pass
Test 3	Consequential intervention test	Fail

For WPD the HI category of HV Transformer (GM) consists of one asset register category

- 6.6/11kV Transformer (GM)

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement resulted in a one-for-one replacement ratio. The total volume being removed (disposals) was the same as the total volume of additions.

The BPDT volumes of disposals and additions are shown in the tables below:

SWEST - HV Transformer (GM) – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
6.6/11kV Transformer (GM)	191	191	191	191	191	191	191	192	**1529**

SWEST - HV Transformer (GM) – BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
6.6/11kV Transformer (GM)	191	191	191	191	191	191	191	192	**1529**

In the Original NAW the volume of assets being removed from HI bands HI1:HI5 was 1529 (the same as the BPDT removals total). The volume of additions in HI1 was 1529 (the same as the BPDT additions total). The planned interventions from the Original NAW are shown below.

	SWEST – HV Transformer (GM) – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	275	-	-	-1	-	-274
C2	1,057	-	-	-2	-172	-883
C3	195	-	-	-	-74	-121
C4	2	-	-	-	-	-2
	1,529	**-**	**-**	**(3)**	**(246)**	**(1,280)**

In the Rebased NAW the volume of assets being removed from HI bands HI1:HI5 is 1529 (the same as the BPDT removals total and original NAW). The volume of additions in HI1 is 1529 (the same as the BPDT additions total and the original NAW). The planned interventions from the Rebased NAW are shown below.

	SWEST – HV Transformer (GM) – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	521	-	-155	-133	-129	-104
C2	939	-	-195	-257	-299	-188
C3	52	-	-8	-16	-20	-8
C4	17	-	-	-1	-2	-14
	1,529	**-**	**(358)**	**(407)**	**(450)**	**(314)**

Since the volumes from the Rebased NAW match the volumes from the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Pass)

The removals in the Original NAW result in 96% of maximum risk being removed.

The removals in the Rebased NAW result in 99% of maximum risk being removed.

Since the Rebased NAW percentage is higher than the Original NAW percentage, test 1 is passed.

It should be noted that percentage of maximum in the Rebased NAW is higher than the Original NAW, making the deliverables more challenging. This has resulted as a consequence of making as many adjustments as possible to the selected interventions in order to try to meet test 3.

Test 3 – Consequential intervention test (Result Fail)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 3, equating to 0.2% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 358, equating to 23% of total removals.

CNAIM has been used to forecast the profile of HI values at the end of March 2023 without intervention. This is shown below:

HV Transformer (GM) – Asset population at end of March 2023 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	4,160	508	133	129	104
C2	6,206	1,002	257	299	188
C3	101	22	16	20	8
C4	2	-	1	2	14
	10,469	**1,532**	**407**	**450**	**314**

This shows that there are 1171 assets that will be in the HI3-HI5 bands. Selecting all of these assets leaves a further 358 to be selected from the lower bands. It is not possible to select any further higher HI band assets and consequently it is not possible to meet test 3.

SWEST – EHV Switchgear (GM)

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Pass
Test 2	Volumes of interventions test	Pass
Test 3	Consequential intervention test	Fail

For WPD the HI category of EHV Switchgear (GM) consists of ten asset register categories

- 33kV CB (Air Insulated Busbars)(ID) (GM)
- 33kV CB (Air Insulated Busbars)(OD) (GM)
- 33kV CB (Gas Insulated Busbars)(ID) (GM)
- 33kV CB (Gas Insulated Busbars)(OD) (GM)
- 33kV Switch (GM)
- 33kV RMU
- 66kV CB (Air Insulated Busbars)(ID) (GM)
- 66kV CB (Air Insulated Busbars)(OD) (GM)
- 66kV CB (Gas Insulated Busbars)(ID) (GM)
- 66kV CB (Gas Insulated Busbars)(OD) (GM)

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement within EHV Switchgear (GM) resulted in a one-for-one replacement ratio. The total volume being removed (disposals) was the same as the total volume of additions.

The volumes of removals and additions for EHV Switchgear (GM) were assumed to be like-or-like replacements, with the volume of additions being the same as removals.

The BPDT volumes of disposals and additions are shown in the tables below:

SWEST - EHV Switchgear (GM)– BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV CB (Air Insulated Busbars)(ID) (GM)	7	7	8	8	7	7	7	7	**58**
33kV CB (Air Insulated Busbars)(OD) (GM)	13	13	13	13	13	13	13	13	**104**
33kV CB (Gas Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
33kV CB (Gas Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
33kV Switch (GM)	1	1	1	1	1	1	1	1	**8**
33kV RMU	0	0	0	0	0	0	0	0	**0**
66kV CB (Air Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Air Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Gas Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	**0**
66kV CB (Gas Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	**0**
Total									**170**

SWEST - EHV Switchgear (GM)– BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV CB (Air Insulated Busbars)(ID) (GM)	7	7	8	8	7	7	7	7	7
33kV CB (Air Insulated Busbars)(OD) (GM)	13	13	13	13	13	13	13	13	13
33kV CB (Gas Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	0
33kV CB (Gas Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	0
33kV Switch (GM)	1	1	1	1	1	1	1	1	1
33kV RMU	0	0	0	0	0	0	0	0	0
66kV CB (Air Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	0
66kV CB (Air Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	0
66kV CB (Gas Insulated Busbars)(ID) (GM)	0	0	0	0	0	0	0	0	0
66kV CB (Gas Insulated Busbars)(OD) (GM)	0	0	0	0	0	0	0	0	0
Total									**170**

The Original NAW stated asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 was 170 (the same as the BPDT removals total). The volume of additions in HI1 was 170 (the same as the BPDT additions total). The planned interventions from the Original NAW are shown below.

	SWEST – EHV Switchgear (GM) – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	30	-	-2	-2	-1	-25
C2	85	-	-1	-	-3	-81
C3	41	-	-	-	-6	-35
C4	14	-	-	-	-4	-10
	170	**-**	**(3)**	**(2)**	**(14)**	**(151)**

The Rebased NAW states asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 is 170 (the same as the BPDT removals total and Original NAW). The volume of additions in HI1 is 170 (the same as the BPDT additions total and the Original NAW). The planned interventions from the Rebased NAW are shown below.

	SWEST – EHV Switchgear (GM)– Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-
C2	154	-	-26	-9	-41	-78
C3	16	-	-	-	-3	-13
C4	-	-	-	-	-	-
	170	**-**	**(26)**	**(9)**	**(44)**	**(91)**

Since the volumes from the Rebased NAW match the volumes from the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Pass)

The removals in the Original NAW result in 89% of maximum risk being removed.

The removals in the Rebased NAW result in 89% of maximum risk being removed.

Since the Rebased NAW percentage is the same as the Original NAW percentage, test 1 is passed.

Test 3 – Consequential intervention test (Result Fail)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 5, equating to 3% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 26, equating to 15% of total possible removals.

CNAIM has been used to forecast the profile of HI values at the end of March 2023 without intervention. This is shown below:

EHV Switchgear (GM) – Asset population at end of March 2023 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	1	-	-	-	-
C2	769	78	31	128	89
C3	30	-	4	6	13
C4	-	-	-	-	-
	800	**78**	**35**	**134**	**102**

This shows that there are 271 assets that will be in the HI3-HI5 bands. This value is higher than the total replacement interventions required (170), but not all these assets can be selected because a proportion of them relate to asset register categories where interventions were not proposed in the BPDT. The following tables show the details for five of the ten asset categories (those where SWEST has assets) that make up the EHV Switchgear (GM) HI category.

33kV CB (Air Insulated Busbars)(ID) (GM)

The planned volumes of removals in this asset category are 58 over the RIIO-ED1 period.

33kV CB (Air Insulated Busbars)(ID) (GM) – Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-26	-7	-10	-15
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**(26)**	**(7)**	**(10)**	**(15)**

33kV CB (Air Insulated Busbars)(ID) (GM) – Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	1	-	-	-	-
C2	286	44	7	10	15
C3	-	-	-	-	-
C4	-	-	-	-	-
	287	**44**	**7**	**10**	**15**

There are 32 assets in the HI3-HI5 bands. Selecting all of these assets leaves a further 26 to be selected from the lower bands. It is not possible to select any further higher HI band assets in this asset register category.

33kV CB (Air Insulated Busbars)(OD) (GM)

The planned volume of removals in this asset category is 104 over the RIIO-ED1 period.

33kV CB (Air Insulated Busbars)(OD) (GM)– Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-28	-60
C3	-	-	-	-3	-13
C4	-	-	-	-	-
	-	**-**	**-**	**(31)**	**(73)**

33kV CB (Air Insulated Busbars)(OD) (GM)– Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	416	34	22	115	71
C3	-	-	4	6	13
C4	-	-	-	-	-
	416	**34**	**26**	**121**	**84**

The assets selected for replacement are the 231 assets in the highest risk parts of the matrix. There are no assets selected from the lower HI Bands because there are sufficient in higher bands to meet the replacement volumes.

33kV CB (Gas Insulated Busbars)(ID) (GM)

There are no planned volumes of removals in this asset category in the BPDT.

33kV CB (Gas Insulated Busbars)(ID) (GM) - Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**-**	**-**	**-**	**-**

33kV CB (Gas Insulated Busbars)(ID) (GM) - Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	64	-	-	-	-
C3	30	-	-	-	-
C4	-	-	-	-	-
	94	**-**	**-**	**-**	**-**

33kV Switch (GM)

The planned volumes of removals in this asset category are 8 over the RIIO-ED1 period.

33kV Switch (GM) - Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-2	-3	-3
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**-**	**(2)**	**(3)**	**(3)**

33kV Switch (GM) - Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	2	3	3
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**-**	**2**	**3**	**3**

The assets selected for replacement are the 8 assets in the highest risk parts of the matrix. There are no assets selected from the lower HI Bands because there are sufficient in higher bands to meet the replacement volumes.

33kV RMU

There are no planned volumes of removals in this asset category in the BPDT.

33kV RMU - Rebased NAW removals					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	-	-	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	-	**-**	**-**	**-**	**-**

33kV RMU - Rebased NAW Asset Volumes at end of ED1 without intervention					
	HI 1	HI 2	HI 3	HI 4	HI 5
C1	-	-	-	-	-
C2	3	-	-	-	-
C3	-	-	-	-	-
C4	-	-	-	-	-
	3	**-**	**-**	**-**	**-**

Summary

Of the five asset categories where SWEST has assets in the EHV Switchgear (GM) HI category, there are replacements proposed in three of them. For 33kV CB (Air Insulated Busbars)(OD) (GM) and 33kV Switch (GM) there are sufficient higher HI band assets to meet the replacement requirements. For 33kV CB (Air Insulated Busbars)(OD) (GM) there are 32 assets in the higher bands. Selecting all of these assets leaves a further 26 to be selected from the lower bands. At a disaggregated level, there are 26 replacements from lower HI bands; It is not possible to select any further higher HI band assets and consequently it is not possible to meet test 3.

SWEST – EHV UG Cable (Gas)

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Pass
Test 2	Volumes of interventions test	Pass *
Test 3	Consequential intervention test	Pass

* There are insufficient assets on the network to be able to meet the volumes in the BPDT. Test 2 has been passed by selecting intervention volumes that match the BPDT but are higher than the volumes of assets reported for the end of DPCR5.

For WPD the HI category of EHV UG Cable (Gas) consists of two asset register categories

- 33kV UG Cable (Gas)
- 66kV UG Cable (Gas)

There is no 66kV network in SWEST and therefore the following analysis relates solely to 33kV UG Cable (Gas)

Test 2 – Volumes of Interventions test (Result Pass)

Within the RIIO-ED1 Business Plan it was assumed that asset replacement within EHV UG Cable (Gas) resulted in a no additions. This was to represent the practice of replacing EHV UG Cable (Gas) with EHV UG Cable (Non-pressurised). Consequently the volume of additions is zero.

The BPDT volumes of disposals and additions are shown in the tables below:

SWEST - EHV Cable (Gas) – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV Cable (Gas)	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	**34.00**
66kV Cable (Gas)	0	0	0	0	0	0	0	0	**0**
Total									**34.00**

SWEST - EHV Cable (Gas) - Distribution – BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
33kV Cable (Gas)	0	0	0	0	0	0	0	0	**0**
66kV Cable (Gas)	0	0	0	0	0	0	0	0	**0**
Total									**0**

The Original NAW stated asset movements at the aggregate HI category level. The volume of assets being removed from HI bands HI1:HI5 was 34.00km (the same as the BPDT removals total). The volume of additions in HI1 was 0km (the same as the BPDT additions total).

The planned interventions from the Original NAW are shown below.

	SWEST – EHV Cable (Gas) – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-
C2	-	-	-	-	-	-34.00
C3	-	-	-	-	-	-
C4	-	-	-	-	-	-
	-	**-**	**-**	**-**	**-**	**-34.00**

The volume of assets reported for the end of DPCR5 is 33.477km, which is lower than the volume of interventions proposed in the BPDT.

In order to overcome this shortfall and therefore pass test 2, WPD has selected additional 0.523km assets in the HI4C2 risk position. The Rebased NAW states asset movements at the aggregate HI category level. The 'enhanced' volume of assets being removed from HI bands HI1:HI5 is 34.000km. The volume of additions in HI1 is 0km.

The planned interventions from the Rebased NAW are shown below.

	SWEST – EHV Cable (Gas) – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-
C2	-	-	-	-	-32.706	-1.294
C3	-	-	-	-	-	-
C4	-	-	-	-	-	-
	-	**-**	**-**	**-**	**-32.706**	**-1.294**

Since the 'enhanced' volumes from the Rebased NAW are the same as the volumes from the BPDT and Original NAW, test 2 is passed.

Test 1 – Statistical Test of "equally as challenging" (Result Pass)

The removals in the Original NAW result in 100% of maximum risk being removed.

The removals in the Rebased NAW result in 101% of maximum risk being removed.

Since the Rebased NAW percentage is higher than the Original NAW percentage, test 1 is passed.

Note that the percentage in the Rebased NAW is greater than 100% because the 'enhanced' volume of interventions selected in order to pass test 2 exceeds the volume of assets available.

Test 3 – Consequential intervention test (Result Pass)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 0km, equating to 0% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 0km, equating to 0% of total removals.

Since the proportion of the replacements in lower HI bands are the same (zero) test 3 is passed.

SWEST – 132kV Conductor (Tower Lines)

Test Result Summary		
Test 1	Statistical Test of "equally as challenging"	Pass
Test 2	Volumes of interventions test	Pass *
Test 3	Consequential intervention test	Pass

Pass* - There is small inconsistency in the Original NAW. Removal volumes and addition volumes are different by 0.001km. This can cause test 2 to be failed if assessing an exact match.

For WPD the HI category of 132kV Conductor (Tower Lines) consists of one asset register category

- 132kV OHL (Tower Line) Conductor

Test 2 – Volumes of Interventions test (Result Pass*)

This test in can fail due to a minor discrepancy in rounding to the third decimal place which leads to values not being exactly the same.

Within the RIIO-ED1 Business Plan it was assumed that asset replacement resulted in a one-for-one replacement ratio. The total volume being removed (disposals) was the same as the total volume of additions.

The BPDT volumes of disposals and additions are shown in the tables below:

SWEST - 132kV OHL (Tower Line) Conductor – BPDT Disposals									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
132kV OHL (Tower Line) Conductor	9.400	10.100	11.000	11.800	12.700	13.600	14.500	15.500	**98.600**

SWEST - 132kV OHL (Tower Line) Conductor – BPDT Additions									
Asset Register Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	**ED1 Total**
132kV OHL (Tower Line) Conductor	9.400	10.100	11.000	11.800	12.700	13.600	14.500	15.500	**98.600**

In the Original NAW the volume of assets being removed from HI bands HI1:HI5 was 98.601km (0.001km higher than the BPDT removals total). The volume of additions in HI1 was 98.600km (the same as the BPDT additions total). The planned interventions from the Original NAW are shown below.

	SWEST – 132kV OHL (Tower Line) Conductor – Original NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	66.899	-	-	-	-	-66.899
C2	27.981	-	-	-	-	-27.981
C3	3.720	-	-	-	-2.990	-0.731
C4	-	-	-	-	-	-
	98.600	**-**	**-**	**-**	**-2.990**	**-95.611**

In the Rebased NAW the volume of assets being removed from HI bands HI1:HI5 is 106.000km (the same as the BPDT removals total but 0.001km different to the original NAW). The volume of additions in HI1 is 106.000km (the same as the BPDT additions total and the original NAW). The planned interventions from the Rebased NAW are shown below.

	SWEST – 132kV OHL (Tower Line) Conductor – Rebased NAW interventions at end March 2023					
	HI 1 Additions	HI 1 Removals	HI 2 Removals	HI 3 Removals	HI 4 Removals	HI 5 Removals
C1	-	-	-	-	-	-
C2	76.045	-	-	-	-	-76.045
C3	22.555	-	-	-	-13.784	-8.770
C4	-	-	-	-	-	-
	98.600	**-**	**-**	**-**	**-13.784**	**-84.816**

Since the volume difference relates to a 0.001km difference between addition and removal volumes in the Original NAW, test 2 is passed (when rounded to 2 decimal places).

Test 1 – Statistical Test of "equally as challenging" (Result Pass)

The removals in the Original NAW result in 100% of maximum risk being removed.

The removals in the Rebased NAW result in 100% of maximum risk being removed.

Since the Rebased NAW percentage is the same as the Original NAW percentage, test 1 is passed.

Test 3 – Consequential intervention test (Result Pass)

The volume of lower HI band (HI1-HI3) assets being removed within the Original NAW is 0, equating to 0% of total removals.

The volume of lower HI band (HI1-HI2) assets being removed within the Rebased NAW is 0, equating to 0% of total removals.

Since the proportion of the replacements in lower HI bands are the same (zero) test 3 is passed.