

## Metering Dispensation D/559 – Harker GSP

### Imbalance Settlement Group

Date of meeting **6 June 2023**

Paper number **266/03**

Owner/author **Mike Smith**

Purpose of paper **Decision**

Classification **Public**

Document version **V1.0**

Summary **Electricity North West Limited has applied for a lifetime Metering Dispensation from Code of Practice (CoP) 1 for the Metering Equipment related to its Harker Grid Supply Point Metering Systems. We invite the ISG to approve Metering Dispensation D/559, on a lifetime basis.**

### 1. BSC requirements

1.1 [Section L<sup>1</sup>](#) of the Balancing and Settlement Code (BSC) requires all Metering Equipment to either:

- comply with the requirements set out in the relevant Code of Practice (CoP) at the time the Metering System is first registered for Settlement under the BSC (L3.2.2)<sup>2</sup>; or
- be the subject of, and comply with, a Metering Dispensation (L3.4).

1.2 Section L allows the Registrant of a Metering System to apply for a Metering Dispensation if, for financial or practical reasons, Metering Equipment will not or does not comply with some or all the requirements of a CoP.

1.3 The process for applying for a Metering Dispensation is set out in [BSCP32<sup>3</sup>](#).

### 2. Background to Metering Dispensation D/559

2.1 In April 1992, under the Pooling & Settlement Agreement for England and Wales, NORWEB plc (NORWEB) applied for Metering Dispensation D/51 for Harker Grid Supply Point (GSP), GSP\_HARK\_1.

2.2 At that time, Harker GSP had five Supergrid Transformers (SGTs) rated at 120MVA, each owned by National Grid Electricity Transmission (NGET). From the GSP there were two feeder circuits for the Scottish Power Interconnector and several NORWEB circuits.

2.3 Metering Dispensation D/51 was to have NORWEB as Registrant of the Metering Equipment on the LV side of the SGTs, and not at their circuit connections to the shared NGET 132kV busbars, and to use a difference metering arrangement with the other non-NORWEB circuits.

2.4 In 2005, under the British Electricity Transmission and Trading Arrangements (BETTA), the Scottish Interconnectors were de-registered as Interconnector Boundary Points. This had the effect of treating the Scottish Transmission circuits as GSP connections. However, the metering for them was still required in order to work out the GSP Metered Volumes for NORWEB.

2.5 Currently, NORWEB (now Electricity North West Limited (ENWL)) is the Registrant of the SGT and 'interconnector' circuit metering.

<sup>1</sup> 'Metering'

<sup>2</sup> Metering Equipment comprised in a Metering System registered under the Pooling and Settlement Agreement (P&SA), before the Go-Live Date, needed to comply with the version of the "Code of Practice" (as defined in and for the purposes of the P&SA) with which such Metering Equipment was, immediately before the Go-live Date, required to comply with, by virtue of the provisions of the P&SA (L3.2.3 (a)).

<sup>3</sup> 'Metering Dispositions'

- 2.6 NGET is undertaking an asset replacement scheme at Harker and is building a new indoor Gas Insulated Switchgear (GIS) substation adjacent to the existing Air Insulated Switchgear (AIS) substation and replacing the SGTs with larger 240MVA units.
- 2.7 The existing 132kV circuits will be transferred to, and new circuits connected at, the new Harker GSP substation. Once the transfer is complete ENWL will withdraw D/51, rather than simply update it. This is because BSCP32 requires a new application when there are any changes to Metering Equipment under an existing Metering Dispensation.
- 2.8 At the new Harker GSP substation the NGET 132kV busbars will not be shared with any other BSC Party. The Defined Metering Point (DMP) will be at the point of connection of the ENWL circuits to the new GIS 132kV busbars, as per the current arrangement. The Actual Metering Point (AMP) will be at the low voltage (LV) side of the replacement SGT's, again, as per the current arrangement.

### **3. Metering Dispensation D/559 – Harker GSP**

- 3.1 ENWL has applied for a Metering Dispensation from CoP1 for the Metering Equipment related to its Harker GSP (Attachments A - C). ENWL wishes to register the Metering Equipment provided by NGET on the LV side of the SGT's and on the 132kV busbars for the NGET feeder circuits to Scotland, thus maintaining the status quo arrangement.
- 3.2 The metering on four of the six SGT circuits will be located (the AMP) marginally greater than 100m away from the DMP (see actual lengths in Part D1 of the Metering Dispensation application).
- 3.3 ENWL would like to continue with the current metering philosophy of deducting the NGET interconnector (feeder circuits to Scotland) metered data off the sum of the NGET SGTs' metered data. This will preserve the convention of the 'direction of imports and exports' for these circuits that has existed since 1992. This is in case the metered data for the three interconnector circuits is used in any Scottish Power Transmission or NGET operational systems. This approach will significantly simplify the transition of the Metering Equipment as the circuits are transferred from the old Harker 132kV AIS substation to the new Harker 132kV GIS substation.
- 3.4 Technically, this is no longer 'difference metering' but is the summation of the SGTs' metered data with metered data for three circuits that will be registering flows 'non-conventionally' but, achieve the same result (i.e. determine the GSP\_HARK\_1 GSP Metered Volume).
- 3.5 NGET has confirmed that this is their preferred approach and has formed the basis of their detailed design for the replacement substation.
- 3.6 To guarantee the correct summation of metering is achieved throughout all stages of the transfers, a specific requirement for the contractor to detail the existing Metering System (i.e. current transformer locations and polarities, Metering Equipment connections etc.) has been written into the contract documentation associated with the switchgear replacement works.

### **4. MDRG comments**

- 4.1 We circulated the Metering Dispensation application and its attachments to the Metering Dispensation Review Group (MDRG) for comments (Attachments A - C).
- 4.2 One MDRG Member responded and supports the application as they agree with the approach and the AMPs are close enough to the DMP to comply [with the overall accuracy limits of CoP1].

### **5. NETSO comments**

- 5.1 We circulated the Metering Dispensation application and its attachments to the National Electricity Transmission System Operator (NETSO) for comments (Attachments A - C).
- 5.2 At the time of writing the NETSO has not confirmed if it has any objection to the Metering Dispensation application.

## 6. Elexon's view

- 6.1 Elexon supports this application as CoP1 overall accuracy limits for the Harker GSP Metering Systems will be maintained at the DMP (the ENWL circuit connections to the NGET 132kV busbars).
- 6.2 Two of the AMPs are within 100m of the DMP and do not need to be covered by a Metering Dispensation. The losses from the AMPs for four of the six new SGTs, to the DMP, have been calculated and are deemed negligible, and will not be compensated for. Moving the AMPs for the four circuits to avoid the need for a Metering Dispensation will result in higher costs for little additional benefit.
- 6.3 Preserving the existing AIS substation metering arrangement at the GIS substation is the 'least risk' approach to metering the new GSP substation.
- 6.4 Metering the SGT circuits, rather than the ENWL feeders, also simplifies the transfer of the ENWL circuits and allows for future ENWL circuits to be added without requiring new Metering Equipment for them or updating the GSP Aggregation Rule to accommodate metered data from them.
- 6.5 The SGTs that feed the Scottish 'interconnector' circuits are normally run on a different section of the 132kV busbars, however, if the running arrangement needed to be changed for some reason, having the SGT metering for those circuits within the GSP Aggregation Rule will take account of this.

## 7. Recommendation

- 7.1 We invite the ISG to:
  - a) **APPROVE** Metering Dispensation D/559, from Code of Practice 1, for the Harker Grid Supply Point, on a lifetime basis.

---

## Attachments

Attachment A – Metering Dispensation application (D/559)

Attachment B – D/559 Request document

Attachment C – D/599 Loss calculations

---

## For more information, please contact:

Mike Smith, Metering Analyst

mike.smith@elexon.co.uk

020 7380 4033

**BSCP32/4.1 Application for a Metering Dispensation**

## Part A – Applicant Details

|  |  |
|--|--|
| <b>To: BSCCo</b>   | <b>Date Sent: 21<sup>st</sup> April 2023</b> |
| <b>From: Requesting Applicant Details</b>  |  |
| Name of Sender:  |  |
| Contact email address:   |  |
| Contact Tel. No.   | Contact Fax. No.                             |
| Name of Applicant Company: <a href="#">Electricity North West Limited (ENWL)</a> |  |
| Address: <a href="#">Hartington Road, Preston</a>                                |  |
|  |  |
|  |  |
| Post Code: <a href="#">PR1 8AF</a>   | Our Ref:                                     |
| <b>Name of Authorised Signatory:</b>   |  |
| Authorised Signature: _____  | Password:                                    |

**Confidentiality:**

Does any part of this application form contain confidential information?

**Request for Confidentiality**    **NO**

If 'YES', please state the parts of the application form that are considered confidential, including justification below. Information that is considered confidential:

[Not applicable](#)

Reasons for requesting confidentiality:

[Not applicable](#) .....

number, site name, expiry date (if any) and BSC Panel determinations will routinely be made available in the public domain unless the applicant informs BSCCo otherwise at the time of application

**BSCP32/4.1 Application for a Metering Dispensation (Cont.)****Part B - Affected Party Details**

Number of Affected parties 1<sup>1</sup>

Does this Metering Dispensation affect the metering arrangements for a generator that has applied for/obtained a CFD Agreement?  Yes  No

If Yes, you must contact the Low Carbon Contracts Company and advise them of your Metering Dispensation application and include them as an Affected Party.

Have you notified all Affected Parties?  Yes  No

|  |                  |
|--|------------------|
| Contact Name at Affected party:  |                  |
| Contact email address:   |                  |
| Contact Tel. No.   | Contact Tel. No. |
| Company Name of Affected party: <a href="#">National Grid Electricity Transmission</a> |                  |
| Address: <a href="#">National Grid House</a>   |                  |
| <a href="#">Warwick Technology Park</a>  |                  |
| <a href="#">Gallows Hill</a>   |                  |
| <a href="#">Warwick</a>  |                  |
| Post Code: <a href="#">CV34 6DA</a>  |                  |

<sup>1</sup> For more than one Affected party, Part B should be completed for each, using additional copies of Part B as required.

**BSCP32/4.1 Application for a Metering Dispensation (Cont.)****Part C – Reason for Application**

If the application is an extension or update for an existing Metering Dispensation, enter existing ref: D/51

**Site Specific**

Describe why you require a Metering Dispensation. Include any steps you propose to limit the impact on Settlement and other Registrants:

**Background**

In April 1992, under the Pooling & Settlement Agreement for England and Wales, NORWEB plc (NORWEB) applied for Metering Dispensation D/51 for Harker Grid Supply Point (GSP), GSP\_HARK\_1.

At that time Harker GSP had five Super Grid Transformers (SGTs) rated at 120 MVA each owned by National Grid Electricity Transmission (NGET). From the GSP there were two feeder circuits for the Scottish Power Interconnector and several NORWEB circuits.

Harker GSP also includes two outgoing 132kV circuits supplying ENWL Spadeadam 132/11kV substation. The Spadeadam GT1 circuit is dedicated at Harker GSP and Spadeadam GT2 circuit is tee'd off the AT line at Harker GSP. Spadeadam 132/11kV substation in-turn supplies Northern Power Grid, an embedded Distribution System Connection Point metered via 2 off 11kV circuit breakers on the 11kV busbars at Spadeadam for which ENWL is the registrant.

The Metering Dispensation D/51 was to have NORWEB as Registrant of the Metering Equipment on the LV side of the SGTs (and not at their circuit connections to the shared National Grid 132kV busbars), and to use a difference metering arrangement with the other non-NORWEB circuits.

In 2005, under the British Electricity Transmission and Trading Arrangements (BETTA), the Scottish Interconnectors were deregistered as Interconnector Boundary Points (effectively treating the Scottish Transmission circuits as GSP connections) but the metering for them was still required in order to work out the GSP Metered Volumes for NORWEB.

Currently, NORWEB (now ENWL) is the Registrant of the SGT and interconnector circuit metering.

NGET is undertaking an asset replacement scheme at Harker and is building a new indoor Gas Insulated Switchgear (GIS) substation adjacent to the existing Air Insulated Switchgear (AIS) substation and replacing the SGTs with larger 240MVA units.

The existing 132kV circuits will be transferred to, and new circuits connected at, the new Harker GSP substation. Once complete, ENWL will withdraw D/51 as there will have been a change to Metering Equipment under D/51 (BSCP32 'Metering Dispensations', Section 1.9), not simply an 'update' to it.

### Metering Dispensation application

At the new Harker GSP substation, the NGET 132kV busbars will not be shared with any other BSC Party.

The Defined Metering Point (DMP) will be at the point of connection of the ENWL circuits to the new GIS 132kV busbars as per the current arrangement. The Actual Metering Point (AMP) will be at the LV side of the replacement SGT's again as per the current arrangement.

ENWL wishes to register the metering provided by NGET on the LV side of the SGT's and on the 132kV busbars for the NGET feeder circuits to Scotland, thus maintaining the status quo arrangement.

The metering on four of the six SGT circuits will be located marginally greater than 100m away from the DMP (see actual lengths in Part D1 of this document).

ENWL would like to continue with the current metering philosophy of deducting the NGET interconnector (feeder circuits to Scotland) metered data off the sum of the NGET SGTs metered data.

This will preserve the convention of the 'direction of imports and exports' for these circuits that has existed since 1992. This is in case the metered data for the three interconnector circuits is used in any Scottish Power Transmission or NGET operational systems.

This approach will significantly simplify the transition of the metering equipment as the circuits are transferred from the old Harker 132kV AIS substation to the new Harker 132kV GIS substation.

Technically, this is no longer 'difference metering' but is the summation of the SGTs metered data with metered data for three circuits that will be registering flows 'non-conventionally' but, achieve the same result (i.e. determine the GSP\_HARK\_1 GSP Metered Volume).

NGET have confirmed that this is their preferred approach and has formed the basis of their detailed design for the replacement substation.

To guarantee the correct summation of metering is achieved throughout all stages of the transfers, a specific requirement for the contractor to detail the existing metering system (i.e. CT locations and polarities, metering equipment connections etc) has been written into the contract documentation associated with the switchgear replacement works.

Please see attached document 'Harker Metering Dispensation Request Rev4' for all additional information.

### End to End Checks

Existing Harker GSP instrumentation is somewhat limited in terms ENW access to recorded power flows at SGT circuit breakers and Scottish Power Transmission circuits.

It is expected that end-to-end checks of the existing arrangements at Harker GSP and verification of SGT flow data and SPT flow data can be verified with the addition of third party instrument data at Harker GSP.

Harker NEW will include additional MW and MVA<sub>r</sub> transducers on all outgoing ENW circuits which will allow for accurate End-to-End verification checks.

**Period of Metering Dispensation required**

## Lifetime

|  |                |
|--|----------------|
| If temporary, indicate for how long the Metering Dispensation is required. | Not applicable |
|--|----------------|

Provide justified reasoning for the period of Metering Dispensation requested in the box below:

Rationale for duration of Metering Dispensation:

It is intended that the ENWL circuits will remain connected for the lifetime of the substation.

The Metering Dispensation would permit future ENWL circuits (which the substation has been designed to accommodate) to be connected without further modifications and costs to the CVA metering scheme.

This proposal also allows for standard ENWL bay arrangements to be installed in line with other ENWL sites (i.e. metering on NGET SGT's).



**Part D1 - Loss Adjustments for Power Transformer and/or Cable/Line Losses**

Where loss adjustments are proposed and applied (or are to be applied) to the Metering System or Asset Metering System for power transformer and/or cable/line losses, provide the following information:

Describe how do you propose to correct the Metering System, or Asset Metering System, to account for the losses of this power transformer?

Not applicable, metering on LV side of SGT's.

In order to validate the loss adjustments applied (or to be applied) to the Metering System, or Asset Metering System, please provide the following information together with supporting data (e.g. power transformer test certificates):

Not applicable

What are the iron losses for this power transformer?

Not applicable

What are the copper losses for this power transformer?

Not applicable

Are there any other losses that have been taken into account? Yes/No\*. If Yes what are they?

Not applicable

Demonstrate how these elements of loss have been used in the corrections to the Metering System.

Not applicable

\*Delete as applicable.

Describe how do you propose to correct the Metering System, or Asset Metering System, to account for the losses of the power cable/line?

From the proposed site layout drawing (PDD-101268-LAY-009) a number of 132kV circuits from the SGT meter point and the termination onto the proposed 132kV GIS switchgear at Harker GSP are marginally greater than 100 meters.

Refer to next section for cable specifications and lengths.

To determine the overall impact of the difference in associated losses to that of the existing arrangement with the 132kV SGT cable considered as a zero-impedance link, the Harker / Hutton interconnected 132kV network has been studied on Power System Software IPSA version 2.9 utilising the ENWL Master network model adapted from the current Annual Losses exercise INM\_Master\_220221\_LOSSES.

In applying standard load factors to distribution network true demand (typically 60%) and appropriate scaling of embedded generation (Offshore wind 40%, On-shore wind 30%, Synchronous 50%). Average NET loading conditions can be approximated.

As a result of modelling the difference between cable lengths set at zero-impedance to increased average cable lengths associated with the proposed layout at Harker GSP, the resultant Loss Adjustment Factor would be of the order of 7 dp accuracy per GSP unit = 1.000000435

It is therefore recommended that correction intervention because of marginal excess cable lengths greater than 100meters is not applied or required in this instance.

In order to validate the loss adjustments applied (or to be applied) to the Metering System, or Asset Metering System, please provide the following information together with supporting data (e.g. cable/line manufacturer's data sheet):

Please see attached document 'Hark\_Loss\_App01' for all additional information.

What is the type of power cable/line?

1000mm<sup>2</sup>, 1c Cu XLPE per phase (based on the NGET Front End Engineering Design submission).

What is the length of this power cable/line?

Based on the 'Harker Preliminary Cable System Rating Assessment provided by NGET as part of the Front End Engineering Design submission:

|                                |        |
|--------------------------------|--------|
| SGT12A AMP to 132kV busbar DMP | = 120m |
| SGT13 AMP to 132kV busbar DMP  | = 160m |
| SGT14 AMP to 132kV busbar DMP  | = 190m |
| SGT15 AMP to 132kV busbar DMP  | = 90m  |
| SGT16A AMP to 132kV busbar DMP | = 150m |
| SGT18 AMP to 132kV busbar DMP  | = 80m  |

Please refer to attached drawing PDD-101268-LAY-009 for further information from which it can be seen that the High Accuracy Metering (HAM) equipment on the SGTs are located immediately adjacent to the SGT LV turrets and the lengths stated above are the lengths of cables between the HAM units and the GIS CB termination.

What is the DC resistance of this power cable/line?

Final cable details to be determined by NGET during detailed design.

What is the impedance of this power cable/line?

Final cable details to be determined by NGET during detailed design.

What is the capacitance of this power cable/line?

Final cable details to be determined by NGET during detailed design.

Are there any other losses that have been taken into account?

No (See above). If Yes what are they?

Demonstrate how these elements of loss have been used in the corrections to the Metering System, or Asset Metering System.

See above / attached document 'Hark\_Loss\_App01' for all additional information.

\*Delete as applicable.

## Materiality

Please complete the following:

|   |  |
|---|--|
| What is the cost of providing compliant Metering Equipment or Asset Metering Equipment? | What does this cost entail?  |
| Approx. £4,680k   | <p><u>Metering on ENWL circuits</u><br/>This would require GIS HAM equipment to be installed for each of the nine ENWL bays and three NGET/SPT bays. Installing HAM directly at the GIS switchgear has been identified as being more expensive than installing the metering at the LV side of the SGT's. Furthermore, when the future ENWL feeder circuits are installed the addition of the metering CT's and VT's would increase the cost of these future works and require the metering arrangements to be modified.</p> <p><u>Relocate metering within 100m.</u><br/>The HAM equipment on the SGT circuits are currently proposed to be installed immediately adjacent to the LV terminals of each SGT as per standard arrangements. This is the most practical location based on the substation layout. Relocation of the HAM equipment to within 100m to address the non-compliance identified in Part D1 would introduce further cost to this option, due to the requirement for additional civils and equipment costs, not currently required as the HAM equipment forms part of the SGT bay layout.</p> |
| What is the cost of the proposed solution?  | What does this cost entail?  |
| Approx. £3,510k   | The proposal details HAM equipment to be installed on the LV side of the six SGT bays (forming part of the standard SGT bay layout) and on the three NGET Scottish feeder bays. There is no provision for further NGET SGT or feeder circuits to be installed in the future, thus the proposed metering arrangement would not require any future modifications when the ENWL feeder circuits are installed.  |
| What is the impact to Settlement of your proposed solution?                             | Why?   |

|  |   |
|--|---|
| This solution presents the minimal impact with regards Settlement metering (both as part of this project and in future years) and provides a cost saving of over £1M on the project. | Settlement metering for the ENWL demand would be calculated by subtracting the NGET Scottish flows from the NGET SGT flows as per the existing arrangement at Harker under metering dispensation D/51.                      |
| What is the impact to other Registrants of your proposed solution?   | Why?  |
| None   | Standard settlement metering exists to their circuits and allows the provision of metering data to be maintained in-line with previous arrangements for use in any Scottish Power Transmission or NGET operational systems. |

#### Site Details (for Site Specific Metering Dispensation)

|  |  |
|--|--|
| Site Name:   | Harker Grid Supply Point (GSP_HARK_1)  |
| Site Address:                                      | Low Harker, Carlisle, Cumbria, CA6 4DQ |
| MSID(s) :  | MSSQ 0020<br>MSSQ 0022<br>MSSQ 0024    |
| Registered in: CMRS:                               | CMRS                                   |
| For SMRS, please advise of SMRA in space provided. | Not Applicable                         |

#### Manufacturer Details (for Generic Metering Dispensation)

|  |                |
|--|----------------|
| Manufacturer Name:   | Not Applicable |
| Metering Equipment / Asset Metering Equipment Details*:<br>*Delete as applicable | Not Applicable |

## BSCP32/4.1 Application for a Metering Dispensation (Cont.)

### Part D - Technical Details

#### Code of Practice details

|   |  |
|---|--|
| Metering Dispensation against Code of Practice*                             | Balancing and Settlement Code, Code of Practice One (CoP1)   |
| Issue of Code of Practice*:   | Issue 3 Version 15.0   |
| If against Code of Practice 11 against which Asset Metering Type            |  |
| Capacity of Metering Circuits/Site Maximum Demand (MW/MVA):                 | 1440MVA<br>SGTs 12A, 13, 14, 15, 16A & 18 at 240MVA each.<br>Harker GSP metered at LV.   |
| (Proposed) Commissioning Date of Metering:                                  | The current programme is to commission the metering over 3 years between 2026 and 2028.  |
| Accuracy at Defined Metering Point:   | CoP1 requires an accuracy of $\pm 0.5\%$ at full load and a unity power factor.  |
| Accuracy of Proposed Solution (including loss adjustments):                 | The physical difference between the metering point on the LV side of the SGTs rather than on the outgoing feeder bars is short lengths of 132kV cables between the SGTs and the 132kV GIS switchgear.<br>Correction factors for the associated losses are calculated to be approximately 1.0000004 (see part D1) thus it is proposed that no loss adjustment factor would be required and therefore maintain the existing aggregation rule for HARK_1. |
| Outstanding non-compliances on Metering Systems or Asset Metering Systems*: | None.  |
| *Delete as applicable   |  |
| Deviations from the Code of Practice (reference to appropriate clause):     | Under the requested dispensation, the metering will not be at the Defined Metering Point (CoP1 Appendix A (1)).<br>There are no other BSC Parties are connected to the busbar (SPTL is not a BSC Party) and their assets are considered part of the GB Transmission System (since BETTA).  |

\* insert Code of Practice number and issue

**Any Other Technical Information**

Please refer to following documents included with this submission as supporting information.

- 1) Harker Metering Dispensation Request Rev4
- 2) Hark\_Loss\_App01 (Losses calculation)
- 3) Drawing PDD-101268-LAY-009

**Declaration**

We declare that other than as set out above we are in all other respects, in compliance with the requirements of the relevant Code of Practice and the BSC. A schematic is attached to this application for clarification of the metering points involved.

*Signature:* ..... *Date:* 21<sup>st</sup> April 2023

*Password:* .....

Duly authorised for and on behalf of Applicant Company

---

**Confirmation of Receipt and Reference**

BSCCo acknowledges receipt of this document and has assigned the reference number as indicated on the first page.

*Signature:* M Smith..... *Date:* 21 April 2023

Duly authorised for and on behalf of BSCCo



# Harker 132kV Switchgear Reinforcement CVA Metering Dispensation Request

Author : Rob Gordon and Andrew Malen

Revision : 004

Date : 11<sup>th</sup> April 2023



Revision History

| Revision | Description of Change                              | Author                     | Date     |
|----------|--|----------------------------|----------|
| 001      | First Issue for internal review                    | Rob Gordon                 | 23/08/22 |
| 002      | Amended for ENWL and NGET review                   | Rob Gordon<br>Andrew Malen | 12/09/22 |
| 003      | Statement added to Section 6 about Settlement data | Rob Gordon                 | 14/09/22 |
| 004      | Amended following ENWL review                      | Rob Gordon                 | 11/04/23 |
|          |  |                            |          |

## Contents

|   |   |   |
|---|---|---|
| 1 | Introduction .....                      | 3 |
| 2 | Existing Harker 132kV Substation.....   | 3 |
| 3 | Replacement Harker132kV Substation..... | 4 |
| 4 | Defined Metering Point .....            | 5 |
| 5 | Options.....                            | 5 |
| 6 | Conclusion.....                         | 7 |
|   | APPENDIX A.....                         | 8 |
|   | APPENDIX B.....                         | 9 |

## 1 Introduction

Harker 132kV is a joint owned National Grid Electricity Transmission (NGET) and Electricity North West Ltd (ENWL) substation where NGET are the site managers. The substation has reached its end of life and is programmed for replacement in the RIIO-ED2 period.

Currently the existing ENWL Central Volume Allocation (CVA) metering at Harker is covered by a lifetime metering dispensation, D/51, granted in 1992.

The replacement substation will continue to be a joint NGET / ENWL substation with NGET as the majority owner and continuing to act as site manager. The replacement substation will be situated at a new location adjacent to the existing site. The replacement Harker 132kV will be an indoor Gas Insulated Switchgear (GIS) substation.

The initial Front-End Engineering Design (FEED) for the replacement Harker substation is being undertaken by NGET and due to be completed in late 2022 before proceeding to detailed design in 2023.

This paper seeks to maintain a like for like metering arrangement at replacement Harker 132kV and therefore is to support a request for a dispensation to BSC-CoP1 Issue 3 (Version 15) for the proposed new Harker 132kV Substation.

## 2 Existing Harker 132kV Substation

Harker 132kV Substation is situated north of Carlisle, Cumbria, adjacent to the M6 and just south of the Scottish Border. The existing 132kV substation is currently referred to within ENWL as Harker 609600.

The existing Harker 132kV is an Air Insulated Substation (AIS) double busbar arrangement, main and reserve, arranged with Normally Open Points (NOPs) to create dedicated busbars (System Intact) for the NGET owned Scottish Power Transmission (SPT) circuits that connect into the Scottish transmission network. The remaining busbars are dedicated (System Intact) for the ENWL circuits. The ownership boundary between NGET and ENWL is at the clamp on the busbar side of the busbar isolators associated with the eight feeder circuits at Harker 132kV.

The attached simplified electrical schematic diagram (Appendix A) shows the existing 132kV CVA metering arrangement.

There are eight ENWL feeder circuits at Harker 132kV substation connecting to:

- Sellafeld/Siddick 1/Seaton 1
- Carlisle 2/Spadeadam 2
- Sellafeld/Stainburn 2/Seaton 2
- Carlisle North 1/Spadeadam 1
- Sellafeld/Egremont 1/Penrith 2
- Carlisle 3/Penrith 1
- Carlisle 1/Carlisle North 2
- Sellafeld/Egremont 2/Stainburn1

These are supplied by four 120MVA SGTs:

- SGT1
- SGT2
- SGT3A
- SGT4

There are two NGET/SPT 132kV feeder circuits connecting to:

- Chapel Cross
- Gretna/Hawick

These are normally supplied by one SGT:

- SGT3B

Each of the five SGTs have High Accuracy Metering (HAM) units located at the LV connections and the two NGET/SPT circuits have HAM units installed on the outgoing circuit connections on the 132kV feeder bays within Harker 132kV substation.

Settlement metering is calculated for ENWL by subtracting the NGET/SPT flows from the total SGT NGET flows. To ensure system security for both NGET/SPT and ENWL busbars the NOPs can be reconfigured under different SGT outage scenarios, thus the above metering arrangement ensures the correct flows are recorded for all operational running arrangements.

### 3 Replacement Harker 132kV Substation

The replacement Harker 132kV substation is to be referred as Harker GSP 609630 within ENWL and will be situated directly north and adjacent to the existing substation.

This replacement 132kV substation will be a GIS double busbar arrangement, main and reserve, again configured with NOPs creating dedicated busbars for the NGET/SPT circuits and dedicated busbars for the ENWL circuits under Standard Running Arrangements. The ownership boundary between NGET and ENWL is at the buffer zone on the busbar side of the busbar isolators associated with the nine feeder circuits at Harker 132kV.

The attached simplified electrical schematic diagram (Appendix A) shows the new proposed 132kV CVA metering arrangement.

As part of the circuit transfers the existing eight circuits will be reconfigured to create nine ENWL feeder circuits at the replacement Harker 132kV substation connecting to:

- Sellafeld/Siddick 1/Seaton 1
- Carlisle North 2
- Carlisle 2/Spadeadam 2
- Sellafeld/Egremont 2/Stainburn1
- Carlisle 3/Penrith 1
- Sellafeld/Egremont 1/Penrith 2
- Carlisle 1
- Carlisle North 1/Spadeadam 1
- Sellafeld/Stainburn 2/Seaton 2

The replacement substation has been designed to accommodate space for two additional ENWL feeder circuits to allow for future load and generation demand. This will bring the total ENWL feeder circuits to eleven in the future.

These are to be supplied by four 240MVA SGTs:

- SGT13
- SGT14
- SGT15
- SGT18

There will be three NGET/SPT feeder circuits connecting to:

- Chapel Cross
- Gretna 1/Hawick 1
- Gretna 2/Hawick 2

These are to be supplied by two SGTs:

- SGT12
- SGT16

## 4 Defined Metering Point

The existing metering systems located at Harker 609600 are registered as GSP\_HARK\_1.

New metering systems to replace the existing registered GSP\_HARK\_1 are to be located at Harker 609630.

The physical location at which the overall accuracy requirement are to be met as per BSC CoP1 which states:

*For transfers of electricity between the following parties the Defined Metering Point (DMP) shall be at one of the following locations:-*

- 1. For transfers between the Transmission System and a Distribution System operated by a Licensed Distribution System Operator where no other Party(s) are connected to the busbar, the DMP shall be at the point(s) of connection to the Transmission System A Party shall install Metering Equipment at a point on the circuit (e.g. the common incoming circuit for double busbar connections) within 100 metres of the DMP. Such point shall be the Actual Metering Point for the purposes of this Code of Practice.*
- 2. For transfers between the Transmission System and a Distribution System operated by a Licensed Distribution System Operator where other Party(s) are connected to the busbar, the DMP shall be at the circuit connections to that Distribution System operated by a Licenced Distribution System Operator.*
- 3. For transfers between the Transmission System and more than one Distribution System operated by a Licensed Distribution System Operator connected to the same busbar, the DMP shall be at the circuit connections of each Distribution System operated by a Licensed Distribution System Operator to such busbar.*

## 5 Options

The options considered for the replacement CVA metering are as follows:

1. Install HAM units on all three NGET/SPT circuits and the LV side of all six SGTs only and use the aggregate rule for the ENWL demand.
2. Install HAM units on all three NGET/SPT circuits and all nine ENWL circuits within the new 132kV GIS switchgear.
3. Install HAM units for all three NGET/SPT circuits and all nine ENWL circuits in separate compounds for outside the substation compound

The above options are described below.

### 5.1 Option 1 – AIS and GIS HAM units on all NGET/SPT circuits and SGTs

Install compliant metering equipment on each SGT and NGET/SPT circuit at Harker.

This option will require either AIS or GIS HAM units to be installed on the LV side of the six SGT bays and GIS HAM units on the three NGET/SPT feeder bays.

Settlement metering for the ENWL demand would be calculated by subtracting the NGET/SPT flows from the NGET flows as per the existing arrangement at Harker 609600 under metering dispensation D/51. This will also allow for the two off future ENWL circuits to connect without the additional costs or additions/modifications of the settlement CVA metering arrangements.

Overall costs are estimated to be approximately £3,510k and this option is considered to be the most cost-effective option.

### 5.2 Option 2 – GIS HAM units on all NGET/SPT and ENWL circuits

Install compliant metering equipment for all the ENWL and NGET/SPT circuits at Harker.

This option will require GIS HAM units to be installed for each of the nine ENWL bays and three NGET/SPT bays. Installing GIS HAM units is found to be more expensive than installing AIS HAM units.

Connection of the two future ENWL circuits that have been planned for will incur additional costs and modifications of the CVA metering scheme.

ENWL do not currently have any HAM units on any of their circuits throughout the 132kV network, therefore this option would be inconsistent with other CVA metering applied throughout ENWL. Furthermore, this option would be unique to ENW as no settlement power flows would be recorded across the SGT transformation points which is common practice at transmission interface points to capture SGT flow data.

It has been advised that due to the physical switchgear layouts, installation of the HAM units on the ENWL circuits would potentially prevent the standard ENWL protection configurations from being installed, thus requiring non-standard protection schemes to be developed which would require further additional equipment (i.e. slip-over CT's and high impedance protection schemes) to be installed on each ENWL circuit, thus further increasing the overall cost and complexity associated with this option.

Overall costs for the twelve circuits are estimated to be approximately £4,680k which is considered excessive compared to the option outlined in 5.1 above (excluding other protection redesign requirements). With a further two circuits to be added in the future this would increase the overall total to approximately £5,460k.

### 5.3 Option 3 – AIS HAM units on all NGET/SPT and ENWL circuits

Another option considered was for individual feeder metering using open terminal AIS HAM units in place of GIS HAM units.

This would involve extending the overall compound area of the new 132kV GIS site or the establishment of additional 132kV compounds either in the adjacent land to the substation or at each of the 132kV circuits terminal towers downlead positions.

132kV compounds in an extended site or land directly adjacent to the new substation would allow the metering to be inserted in each circuit without the need for a metering dispensation. However, extending the existing substation compound or constructing external compounds would require the addition of back to back 132kV cable sealing ends for each circuit at considerable cost.

For new 132kV compounds in land at each of the 132kV circuits terminal tower downlead positions the metering would not be in the ideal location due to the physical distance from the new substation.

This option was discounted for the following reasons:

- The need to acquire the land and obtain planning consent introduced uncertainty from both a cost and time point of view.
- The physical arrangement of the related assets being spread between the NGET compound and respective ENWL compounds would be disjointed and lead to safety and operational issues.
- The introduction of further separate compounds would mean that additional 132kV AIS apparatus will be required.
- Metering Equipment would be at a point on the circuit in excess of the maximum 100 metres of the DMP as required by the BSC-CoP if the compounds are established at the circuit terminal tower sealing end platforms.
- Overall costs are estimated to be well in excess of the other two options.

## 6 Conclusion

The conclusion is that the installation of nine HAM units on the ENWL circuits as well as the NGET/SPT circuits is not a reasonably practicable solution due to excessive costs.

Also, overall management of settlement data will be simplified if the existing difference metering and current aggregation practice is retained throughout the 132kV circuit transfer sequence. If alternative 'total outgoing 132kV CB metering' is determined then separate aggregation rules between the old and the new site could prove complicated during the migration of the 132kV circuits increasing the risk of settlement errors.

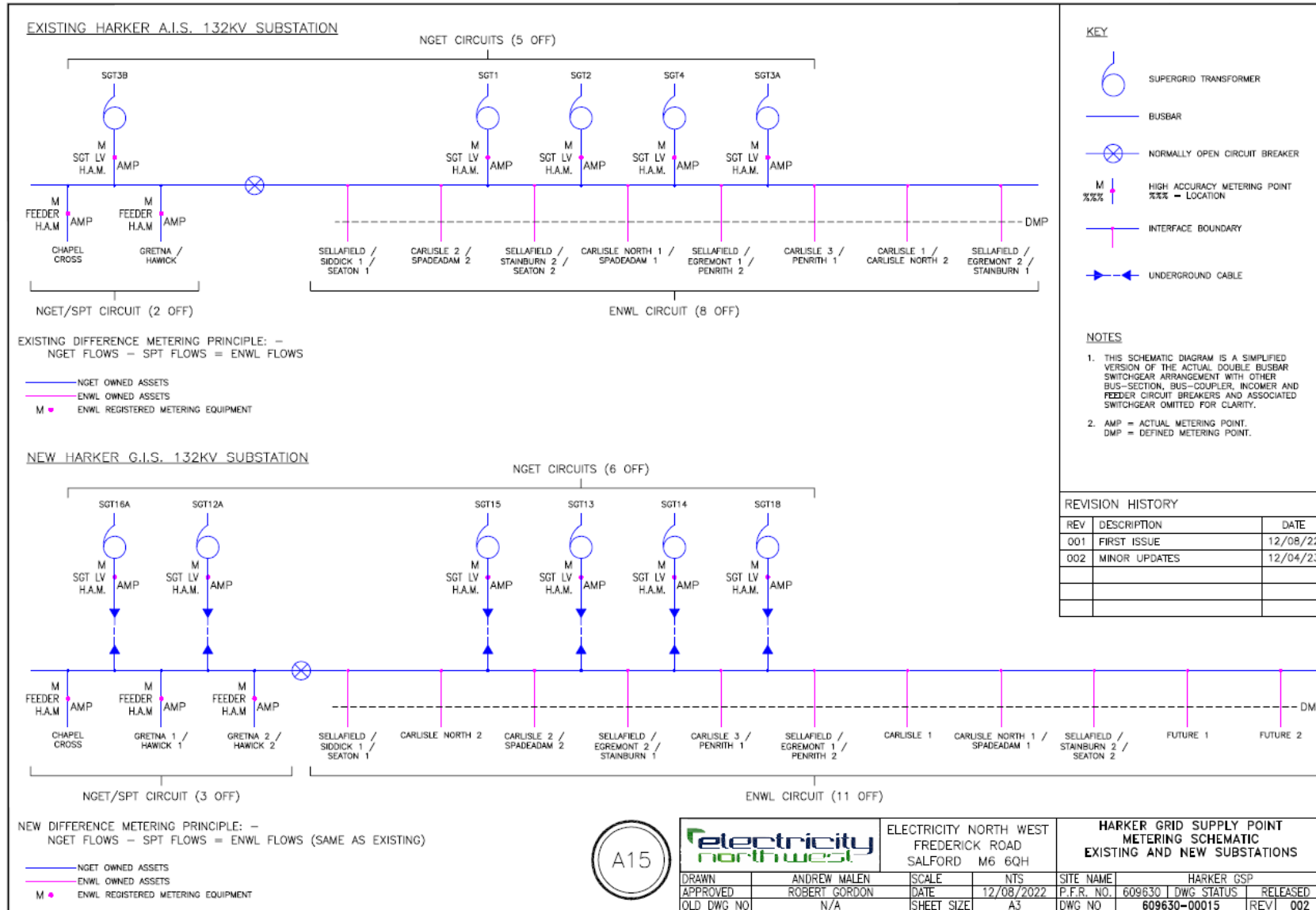
The preferred option is Option 1 above. ENWL seek to apply for a metering dispensation at the replacement Harker 609630 for the ENWL feeders. The difference metering scheme is to be based on the existing metering dispensation D/51. This would allow future ENWL circuits to be connected without further modifications and costs to the CVA metering scheme.

This option also allows for standard ENWL bay arrangements to be installed in line with other ENWL sites.

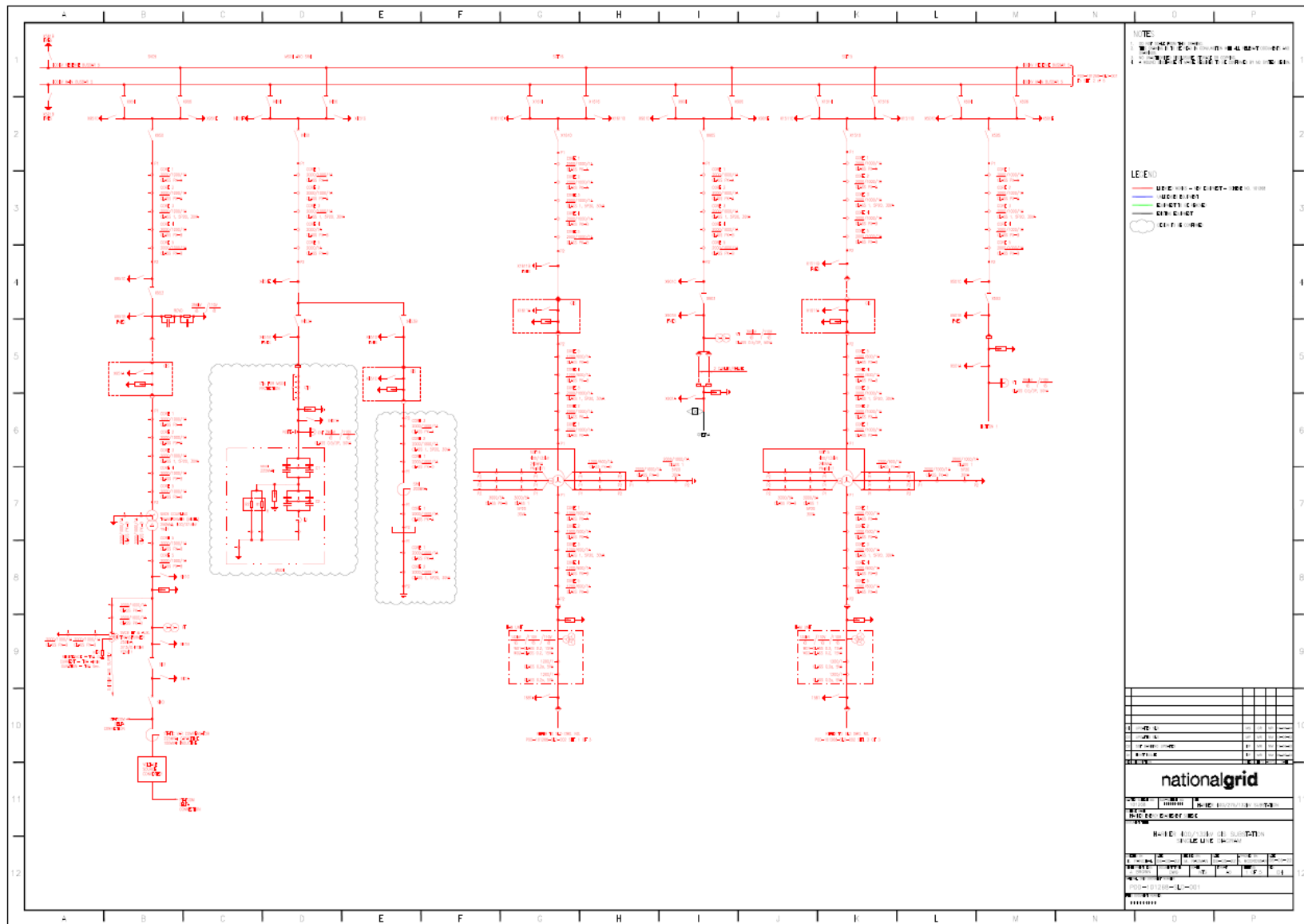
Please refer to Appendix B for Line Diagrams of the proposed arrangements in relation to Option 1.



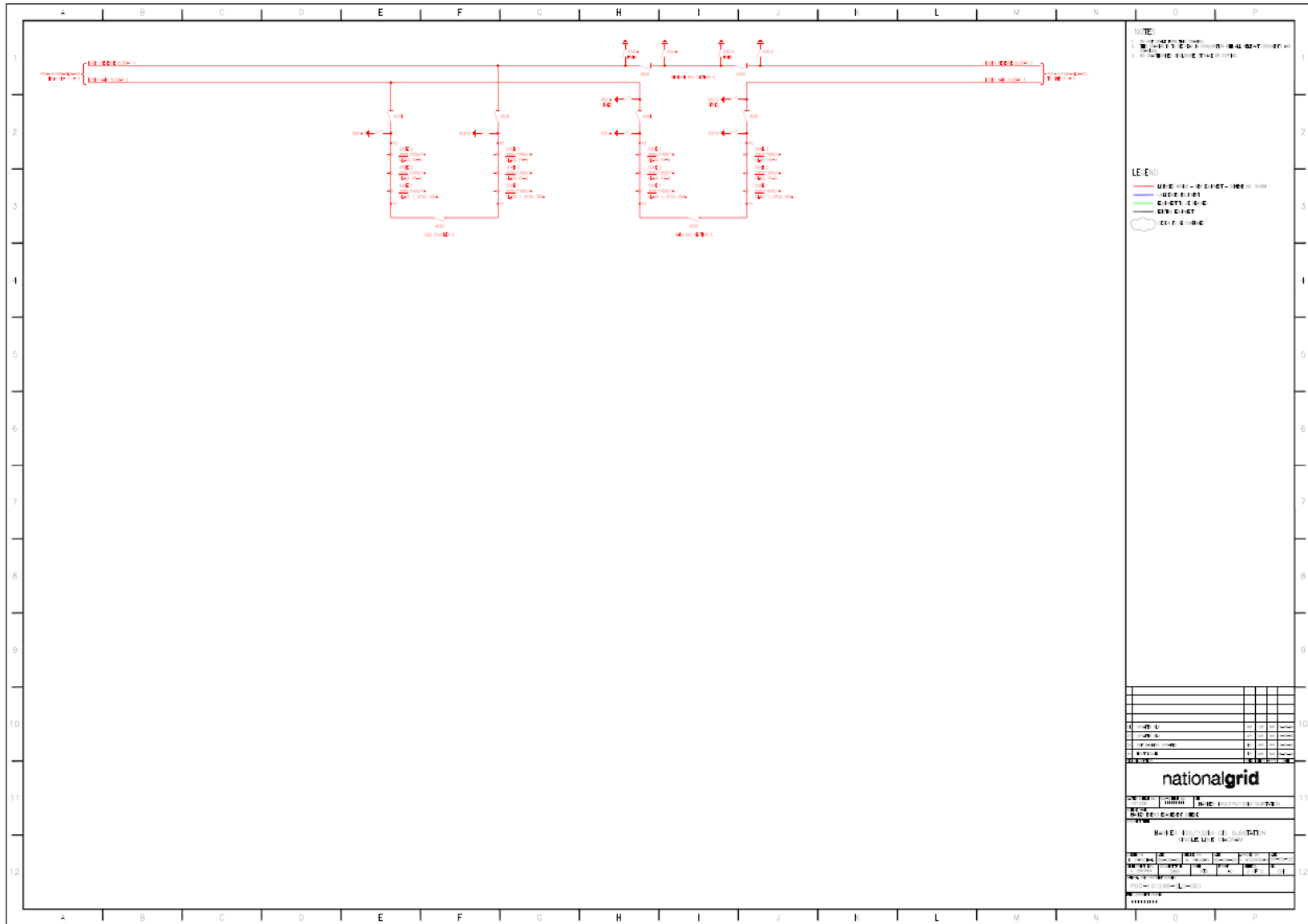
APPENDIX A

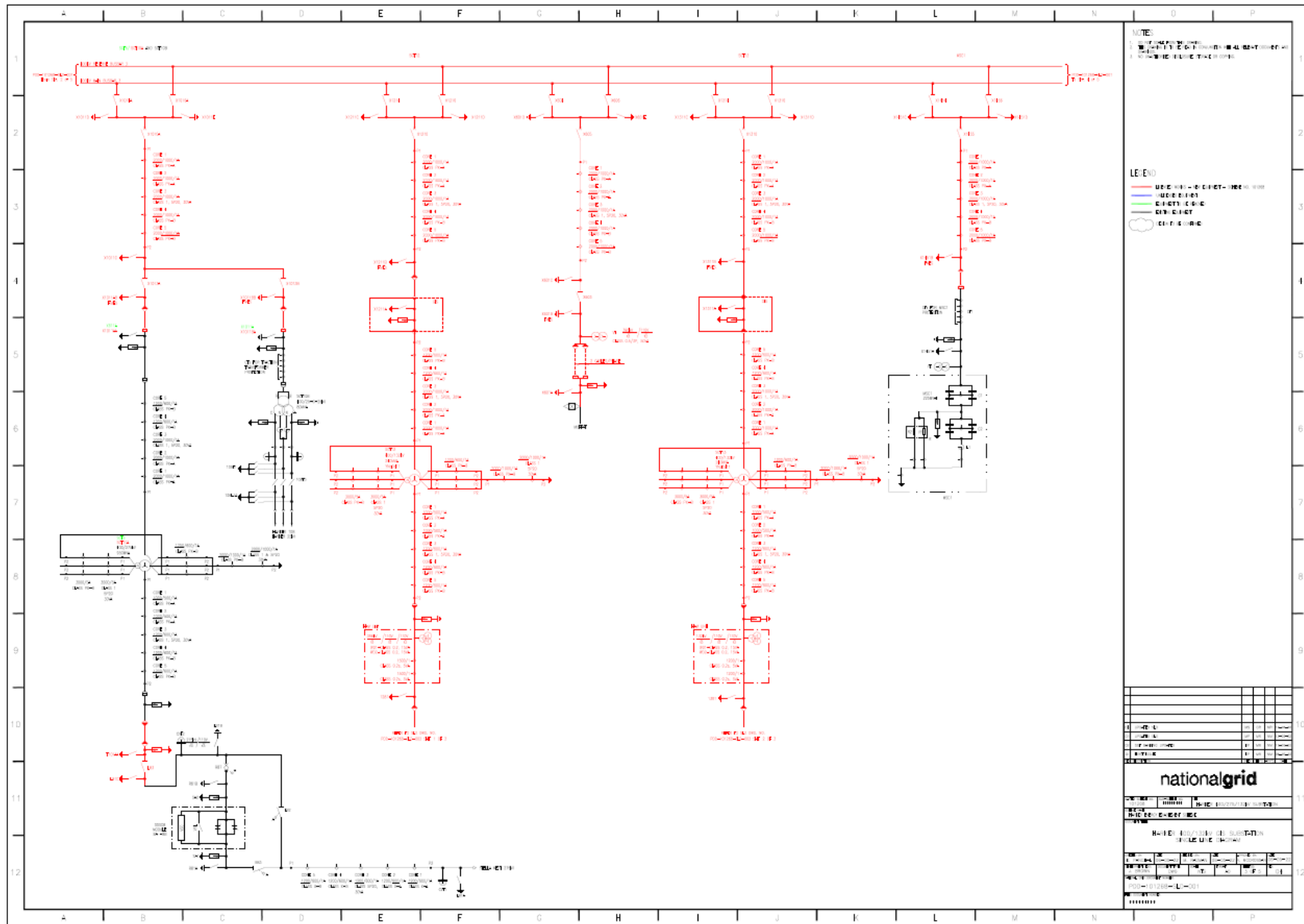


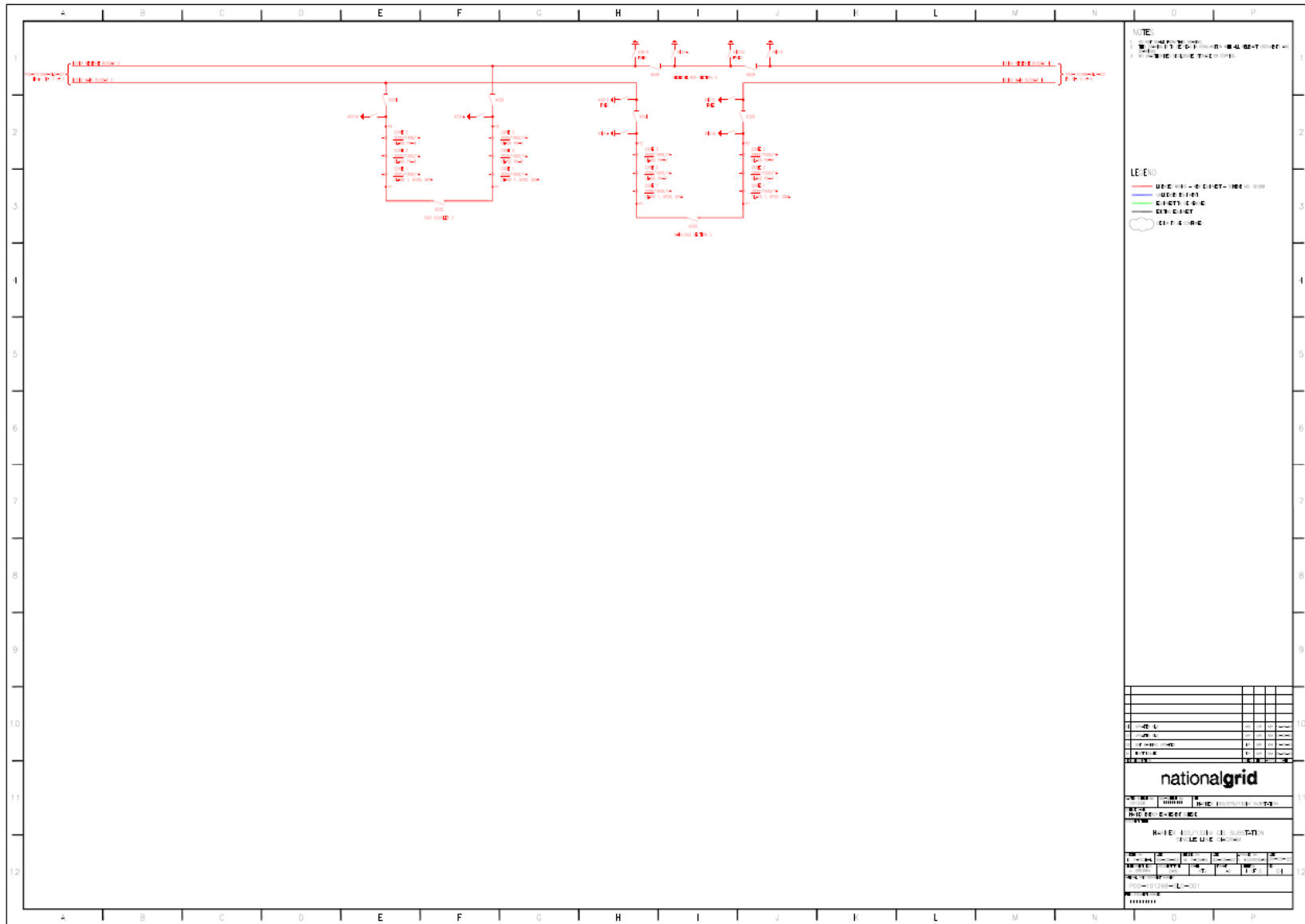
APPENDIX B

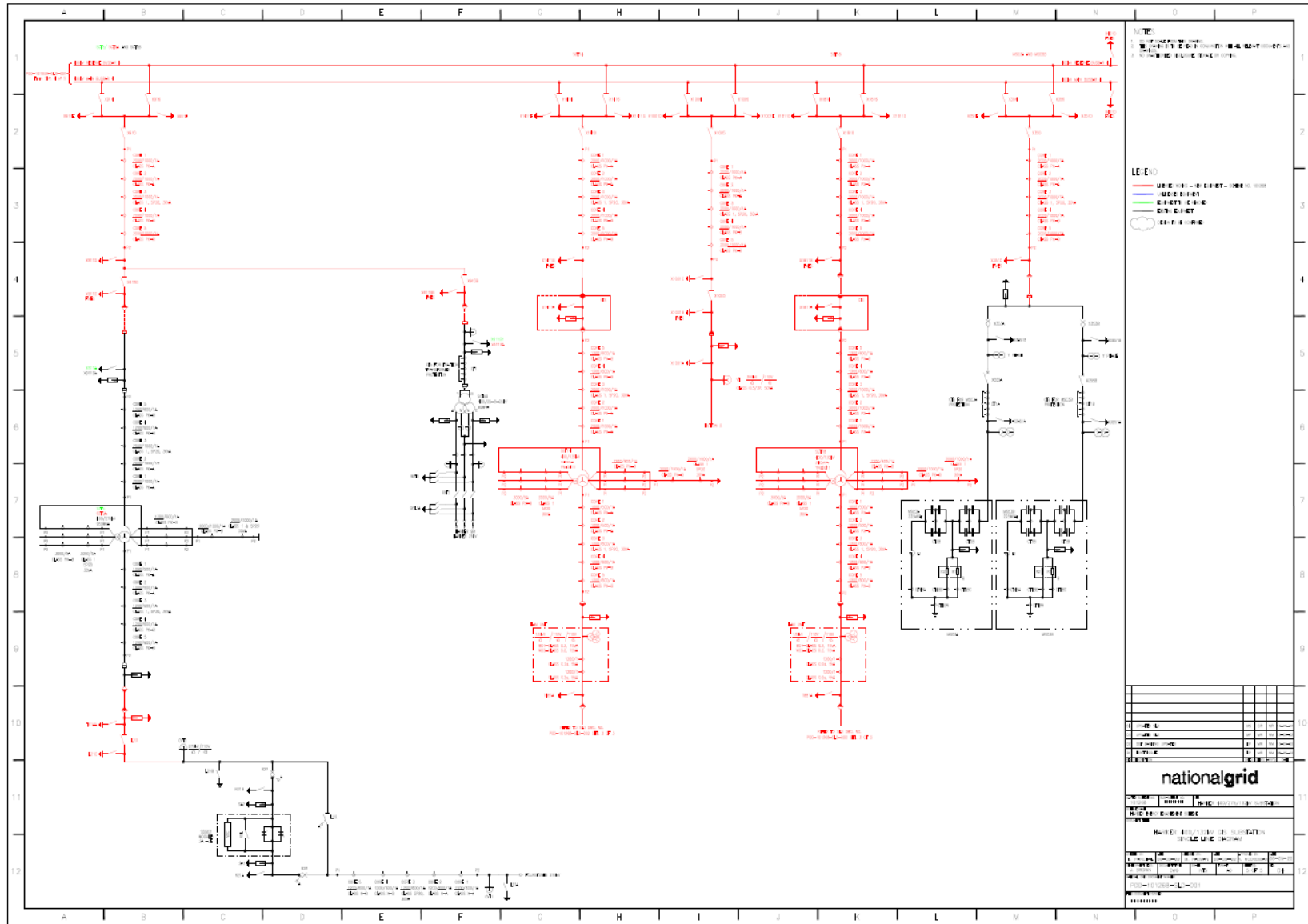


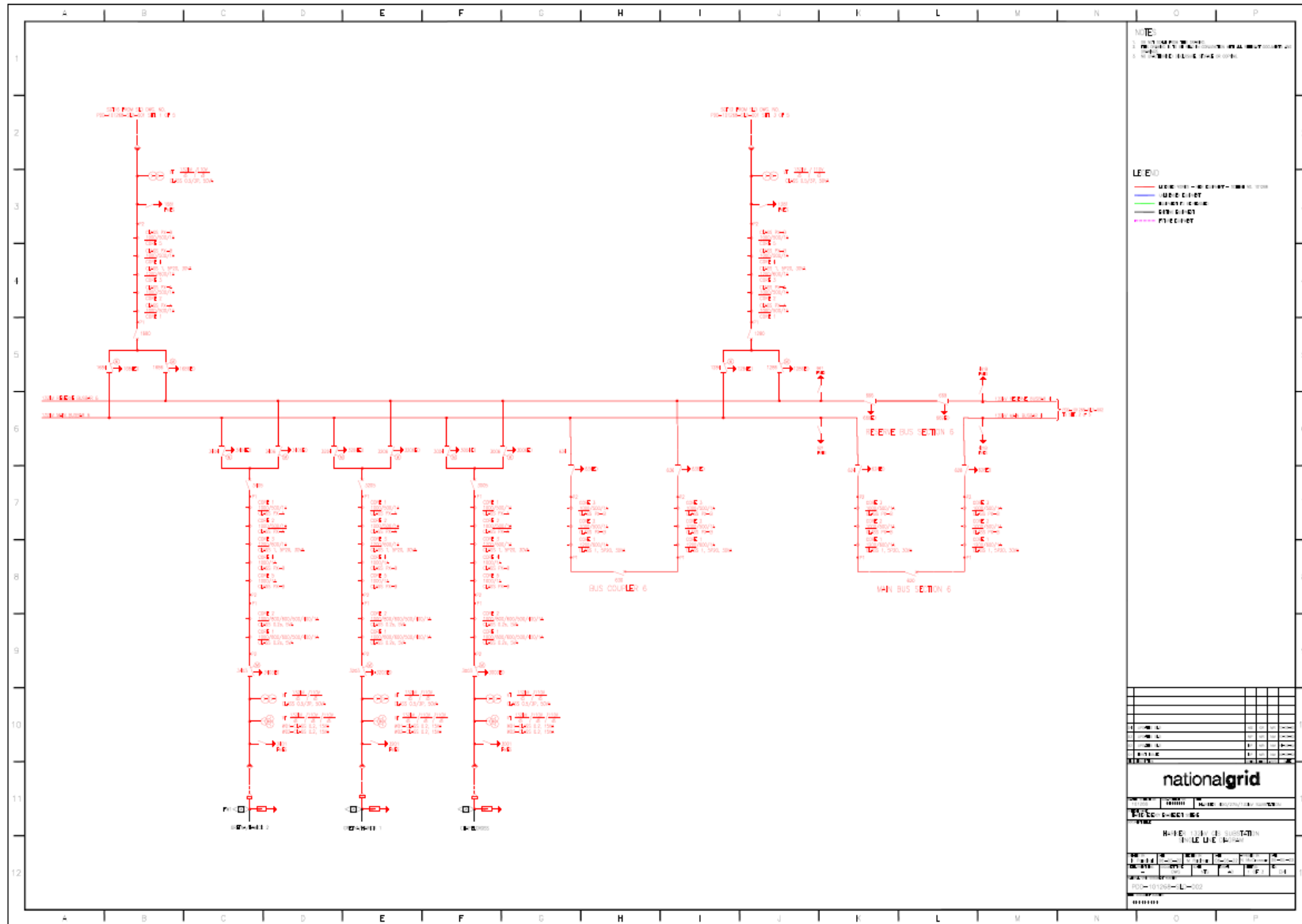
Harker CVA Metering Dispensation Request











# Harker CVA Metering Dispensation Request

