

SYDNEY METRO NORTHWEST

METRO TRAINS SYDNEY

**ANNUAL PERFORMANCE
REPORT**

FOR THE YEAR ENDING 30th JUNE 2017

Table of Contents

1	Annual Compliance Reporting	3
1.1	Safety and reliability of the network operator's network	3
1.1.1	Programs and activities undertaken to maintain or improve the safety and reliability of the network operator's network	3
1.2	Advice to the public about hazards associated with electricity in relation to the network operator's network	3
1.2.1	Programs and activities undertaken to promote the public knowledge and understanding of electrical network safety hazards	4
1.3	Management of bushfire risk relating to electricity lines and other assets of the network operator's network that are capable of initiating bush fire	4
1.3.1	Programs and activities undertaken to maintain or improve the management of bushfire risk associated with the network operator's network.	4
1.3.2	Bushfire risk management report	4
2	Contextual Information	5
2.1	Deviation from standards	5
2.2	Significant community infrastructure	5
3	Formal safety assessment reviews and residual risks	6
3.1	Classification of risk levels	6
3.2	Risks within the scope of the ENSMS	6
3.3	Reviews of formal safety assessments	6
4	Safety risk management actions	7
5	Compliance with directions	8
5.1	Outstanding directions not complied with	8
6	Statistical Reporting	9
6.1	Network asset failures	9
6.2	Encroachment on network assets	9
6.3	Unauthorised access to the network	10
6.4	Customer Safety Reporting	11
6.5	ENO comments	11
Appendix 1	Overview of Sydney Metro Northwest Electrical Distribution System	12
Appendix 2	Detail Description of Network	13
Appendix 3	NRT Risk Management Plan	15
Appendix 4	Commissioning Event 1&2 Hazard Register	16
Appendix 5	Commissioning Event 1 Safety Assurance Statement	17

1 Annual Compliance Reporting

This section of the report is to provide general information about the Electricity Network Operator's (ENO's) performance of their Electricity Network Safety Management System (ENSMS) implemented in accordance with the Electricity Supply (Safety and Network Management) Regulation 2014 and Australian Standard AS 5577.

[This template provides the base level of information required by IPART. The ENO may add any information or commentary as they see fit to supplement this base information.]

The Metro Trains Sydney (MTS) Safety Management System (SMS) provides the management model for both strategic planning and day-to-day safety management of railway operations. As an integral part of the model, Element 32 Management of the Electrical Distribution Network is developed in accordance with the Electricity Supply (Safety and Network Management) Regulation 2014 s.5, for the Sydney Metro Northwest the Network Operator to take all reasonable steps to ensure that the design, construction, commissioning, operation, and decommissioning of its electrical network is safe. The Electricity Supply (Safety and Network Management) Regulation 2014 s.7(1)(a) also mandates that the MTS SMS must also be in accordance with the requirements of AS 5577 Electrical Network Safety Management Systems in the management model. A description of the Electricity Network operated by MTS is given in Appendix 1 and 2.

The reporting period for this report is from 1st July 2016 to 30th June 2017. MTS became a non-licensed ENO on 21st Mar 2017. The first energisation of its electrical equipment was bulletined on 23rd Jun 2017 when the 132kV AC feeder at the Bulk Supply Point (BSP) in the Sydney Metro Train Facility (SMTF) was energised from Endeavor Energy's Rouse Hill switching station.

1.1 Safety and reliability of the network operator's network

1.1.1 Programs and activities undertaken to maintain or improve the safety and reliability of the network operator's network

[The ENO is to use this section to provide a brief description of any programs, initiatives and activities implemented to promote the safety and reliability of the electrical network outside of a business as usual context (e.g., trials of new technologies, asset management systems and maintenance procedures).

These descriptions are to include a reference to hazard assessments that have identified the 'at risk' elements targeted by the program or activity. The descriptions are to identify whether the program is a new or ongoing program. Where a program is ongoing, the description will outline any reviews undertaken to verify its effectiveness and appropriateness.]

Nil. Network was under construction.

Table 1 Non-compliances relating to the safety and reliability of the electricity network

Identified non-compliances	Actions against non-compliances	Progress of actions
0	0	0

[The ENO is to use this table to provide a summary of non-compliances within the ENSMS (as opposed to non-compliances or defects on the network) relating to safety and reliability of the electricity network identified through audits, reviews, safety assessments and incident investigations. Additionally, any actions identified to address the non-compliances are to be identified and the progress tracked. This table will cover non-compliances identified within the year for which the report relates, any non-compliances addressed within this year and any non-compliances outstanding from previous years.]

1.2 Advice to the public about hazards associated with electricity in relation to the network operator's network

1.2.1 Programs and activities undertaken to promote the public knowledge and understanding of electrical network safety hazards

[The ENO is to use this section to provide a brief description of programs and activities implemented to promote the public knowledge and understanding of electrical network safety hazards.

These descriptions are to include a reference to hazard assessments that have identified the ‘at risk’ groups targeted by the program or activity. The descriptions are to identify whether the program is a new or ongoing program. Where a program is ongoing, the description will outline any reviews undertaken to verify its effectiveness and appropriateness.]

Nil.

1.3 Management of bushfire risk relating to electricity lines and other assets of the network operator’s network that are capable of initiating bush fire

1.3.1 Programs and activities undertaken to maintain or improve the management of bushfire risk associated with the network operator’s network.

[The ENO is to use this section to provide a brief description of programs and activities implemented to promote the safe management of bushfire risk associated with the electricity network.

These descriptions are to include a reference to hazard assessments that have identified the ‘at risk’ groups and elements targeted by the program or activity. The descriptions are to identify whether the program is a new or ongoing program. Where a program is ongoing, the description will outline any reviews undertaken to verify its effectiveness and appropriateness.]

Not Applicable. Network was under construction.

Table 2 Non- compliances relating to the management of bushfire risk associated with the electricity network

Identified non-compliances	Actions against non-compliances	Progress of actions

[The ENO is to use this table to provide a summary of non-compliances within the ENSMS (as opposed to non-compliances or defects on the network) relating to the management of bushfire risk identified through audits, reviews, safety assessments and incident investigations. Additionally, any actions identified to address the non-compliances are to be identified and the progress tracked. This table will cover non-compliances identified within the year for which the report relates, any non-compliances addressed within this year and any non-compliances outstanding from previous years]

1.3.2 Bushfire risk management report

[The ENO is to attach the previous calendar year’s bushfire risk management report. The ENO may provide any relevant commentary relating to this report.]

N/A. No previous bushfire report.

2 Contextual Information

2.1 Deviation from standards

[Where an ENO has deviated from established internal or external standards, codes and guidelines, they are to list these deviations. Each deviation is to be accompanied by an explanation as to why safety it is at the same level or superior to what would be achieved under the standards. This list is to include deviations in the system as well as stand-alone site instances.]

Nil. Network was under construction and it was designed to standards, codes and guidelines.

Table 3 Deviations from standards

Deviation description	Justification
NA	0

[The deviation description is to outline what the deviation was and whether it is a system or site specific deviation.]

2.2 Significant community infrastructure

[For the purposes for incident reporting over the previous financial year, [ENO] considered the following to be significant community infrastructure – list pieces of significant community infrastructure. Examples of significant infrastructure are:

- *Peer group A1, A2, A3 and B hospitals.*
- *Road tunnels on motorways that have emergency evacuation systems.*
- *Rail and air transport systems where travel is affected.*
- *Events and buildings where greater than 5000 people could be affected by an outage*
- *Other community infrastructure determined by the Network Operator to be of National, State or Regional significance.*

The network operator should consider the community they serve and the risks to that community as a result of the loss of infrastructure when determining whether a piece of infrastructure is to be voluntarily included in their list.]

Not Applicable. Network was under construction.

3 Formal safety assessment reviews and residual risks

MTS as the non-licensed ENO is at an initial stage in the electrical network's development. The electrical network is under construction and for the reporting period no electrical HV infrastructure has been commissioned

Risk work being undertaken to date is temporary in nature and relates to planned HV infrastructure commissioning events. The risks identified are analysed, controlled and are resolved at the completion of the commissioning event (or events) for which they are identified.

Permanent residual design risks for the network are still being finalised. They are, at the time of the development of this report, subject to a formal hazard review process. As such they are not yet available to MTS and have not yet been transferred to MTS as the rail and electrical network operator. It is expected that the Power Systems Sub-system Safety Case which incorporates the residual HV/LV design risks, will be presented to MTS for its acceptance and for the formal transfer of risk in the next reporting period (2017-2018).

3.1 Classification of risk levels

[The ENO will provide the thresholds for which it classifies a risk as low, intermediate, high or extreme to align with appendix B of AS 5577.]

The NRT Risk Management Plan (NWRLOTS-NRT-PRD-PM-PLN-000806) provides background on the risk management systems operating to manage risk on the Sydney Metro Northwest project. This Plan is provided at Appendix 3.

3.2 Risks within the scope of the ENSMS

[The ENO will describe the organisations risks it has incorporated into its ENSMS. The ENO will identify which of these risks are not at ALARP. Where a risk is not at ALARP, the Network Operator will summarise the cause and identify the treatment actions to bring this risk to ALARP status. Where a risk is at ALARP but maintains a residual risk of intermediate or higher, the ENO will articulate why this residual risk is tolerable.]

As described above, MTS has not incorporated any risks into its ENSMS. MTS has however participated as part of the NRT Consortium in the management of risk for the Design and Commissioning of the electrical network. Commissioning risks tend to be transitory in nature – closed at the completion of the applicable commissioning event(s). To demonstrate that electrical risks have been considered as part of the commissioning events which have occurred within the reporting period, please see the electrical risks provided at Appendix 4.

For the current reporting period the only commissioning event completed is Commissioning Event 1 the energisation of the Bulk Supply Point HV Cable. For additional SFAIRP information and verification of engineering assurance process please find attached the completed Safety Assurance Statement for Commissioning Event 1, provided at Appendix 5.

3.3 Reviews of formal safety assessments

[The ENO will describe which formal safety assessments relating to ENSMS scoped risks have been reviewed in the year to which the report relates. This description will include details of the trigger, the findings and outcomes of the review.]

Nil. No reviews of Formal Safety Assessments undertaken in the reporting period.

4 Safety risk management actions

[For each open safety risk management action within the ENSMS scope, at the conclusion of the reporting year, the ENO is to describe the relevant risk, the proposed risk management actions and the progress against these actions.]

Please refer to Appendix 5, section 3.9.

Table 4 Risk management actions – open, completed and raised.

Criteria	Number
Number of risk management actions within the ENSMS scope that were raised in the reporting year	18
Number of open safety risk management actions within the ENSMS scope from any reporting year	2
Percentage of safety risk management actions within the ENSMS scope completed by the due date within the reporting year	89%

5 Compliance with directions

[The following table is for ENO to report how many directions have been issued by IPART under clause 13 of the Electricity Supply (Safety and Network Management) Regulation 2014 within the reporting year, how many directions are yet to be addressed and how many outstanding directions have not been complied with by the directions deadline.]

Publication of Hardship Policy

Table 5 Data on directions issued by IPART

Total number of directions issued by IPART	Total number of directions Outstanding	Number of outstanding directions not complied with by the due date
1	0	0

5.1 Outstanding directions not complied with

[The ENO will provide a summary of each outstanding direction that is past its due date. The summary will include a description of the response to each direction and the reason that it is past due.]

Nil.

6 Statistical Reporting

6.1 Network asset failures

Table 6 Network asset failures

Asset type	Asset population or length	Target functional failure rate	Conditional failures past due in the reporting year	Functional failures			
				Unassisted		Assisted	
				No fire	Fire	No fire	Fire
Pole/tower							
Pole top structures/components							
Conductor – Transmission/sub - transmission							
Conductor – High Voltage							
Conductor – Low voltage							
Service wire							
Primary plant – Power transformers							
Primary plant– distribution transformers							
Primary plant – Reactive plant							
Primary plant – switchgear							
Secondary plant – protection Equipment							
Secondary plant – SCADA							
Secondary plant – substation batteries							

Note: Asset length for conductors is to be calculated by the route length.

[The ENO may insert any commentary they see fit to explain or justify the target failure rates or any issues that may have contributed to the observed failure rates. [The ENO may use more detailed information when reporting statistics. These can be added under the headline metrics. Where an ENO provides more detailed data (i.e. it is disaggregated further than required), the data should also be provided to IPART using a weighted average where:

$$\sum_n \text{metric} = (\text{metric}_{\text{type } 1} * \text{proportion}_{\text{type } 1}) + \dots + (\text{metric}_{\text{type } n} * \text{proportion}_{\text{type } n}).$$

Not Applicable. Network was under construction.

6.2 Encroachment on network assets

Table 7 Vegetation

Criteria	Inside bushfire prone areas	Outside bushfire prone areas
Category 1 defects		
Category 2 defects overdue		
Category 3 & 4 defects overdue		
Total vegetation encroachments as a result of third parties		

Not Applicable. Network was under construction.

Table 8 Ground Clearance

Criteria	Inside bushfire prone areas	Outside bushfire prone areas
Number of OHa spans for which inspections were planned		
Number of OH spans for which inspections became overdue		
Number of OH spans for which LIDAR inspections became overdue		
Number of defects identified		
Number of defect rectifications that became overdue		
Total ground clearance encroachments as a result of third parties		

Not Applicable. Network was under construction.

Table 9 Clearance to structures

Criteria	Inside bushfire prone areas	Outside bushfire prone areas
Category 1 defects		
Category 2 defects overdue		
Category 3 & 4 defects overdue		
Total structure encroachments as a result of third parties		

[Reporting on encroachments is to consist of all defects newly identified during the reporting period. The ENO may provide commentary as they see fit relating to encroachments on their network. The rectification of a defect includes where a network asset ceases to encroach as a result of deviating from standards as per section 2.

Note that a structure is regarded as ‘a stationary object that is built, constructed or erected, temporarily or permanently, at the direction of a person or persons’

Category 1 Defects: Defects that pose a direct and immediate risk to the safety of the public/staff and requiring immediate rectification.

Category 2 Defects: Defects that pose a risk to the safety of the public/staff and require rectification with one month.

Category 3 Defects: Defects that pose a predictable future risk to the safety of the public/staff and require rectification within 6 months

Category 4 Defects: Defects that pose a predictable future risk to the safety of the public/staff but can be rectified through planned maintenance.]

Not Applicable. Network was under construction.

6.3 Unauthorised access to the network

[The ENO is to report the number of times in the reporting year that there has been unauthorised access to their network. This includes unauthorised access by their workers and by other parties. The ENO will also report on the number of planned security inspections to be undertaken on their network assets and the number of inspections that became overdue, as well as the number of security inspections from any year that are still overdue.]

Table 10 Unauthorised access to the network

Criteria	Network Operator	Accredited Service Providers	General Public
Major substations and switching stations			
Distribution substations, regulators, switches and associated equipment			
Electricity mains outside major substations			
Communications equipment outside major substations			

Not Applicable. Network was under construction.

6.4 Customer Safety Reporting

[The ENO is to report on activity and safety issues identified with private electrical installations connected to their network. Note that the Electricity Supply Amendment (Advanced Meters) Act 2016 includes amendments to the Electricity Supply (Safety and Network Management) Regulation 2014. As a result of these amendments, IPART is interested only in customer installation safety incidents as a result of the network operators electricity network or their workers.]

Table 11 Customer safety reporting

Criteria	Number
Number of customer shocks from installations caused by the ENO's electricity network	

Not Applicable. Network was under construction.

6.5 ENO comments

[The ENO may include commentary in this section as they see fit.]

Nil.

Appendix 1 Overview of Sydney Metro Northwest Electrical Distribution System

The Sydney Metro Northwest electrical system provides electrical power to traction, facility and station substations which includes:

- A Power Control System and Operations Control Centre to allow operators to monitor and automatically reconfigure the system for train operations
- Two Bulk Supply Points (BSPs) at Chatswood North and the SMTF, providing power supply to the entire Project from either Bulk Supply Point
- A 33kV distribution network taking power from the BSPs and delivering it to traction substations through the existing Epping to Chatswood Rail link (ECRL) network (Chatswood North, Lady Game Drive, Delhi Road and Macquarie University substations) and throughout the new line (at the Epping Services Facility, Cherrybrook Station, Showground Station, Bella Vista Station, Rouse Hill Station and the SMTF)
- An 11kV station distribution network deriving power from the 33kV network at Chatswood North, Lady Game Drive, Epping Services Facility and the SMTF Substations
- A series of traction substations delivering 1500V DC power at locations along the line to provide traction power to the Overhead Wiring (OHW) and traction return system
- A standard railway catenary and contact wire system together with solid conductor catenary OHW system
- A low voltage distribution system at each station and services facility to provide the power to building services, station systems
- A low voltage distribution system along the corridor to supply power to tunnel ventilation, fire detection, trackway exhausts, drainage systems, signalling, communications and control systems.

An overview of the electrical system depicted in Figure A1. Whereas a more detailed description of the Electrical System is given in the following section and the single line schematic of the reticulated 132/33/11kV network is shown in Figure A2.

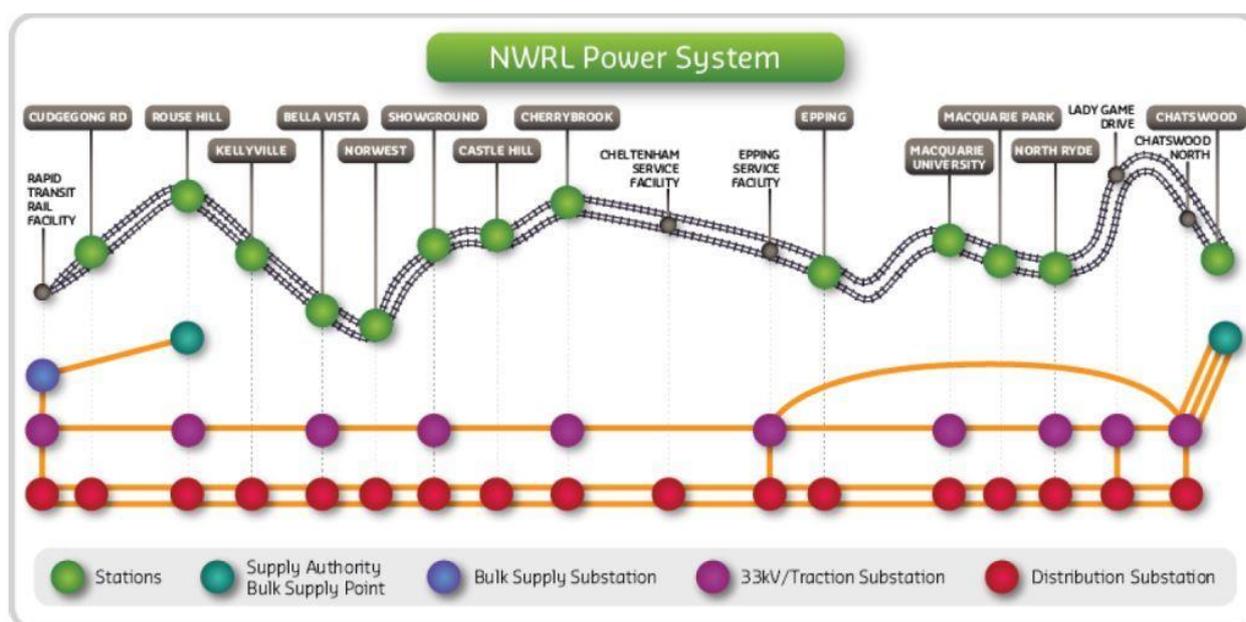


Figure A1 – Overview of SMNW Electrical Distribution System

Appendix 2 Detail Description of Network

The electrical power is supplied to the NRT rail line from two independent bulk substations (BSP): 33 kV Willoughby PCC (Ausgrid) supplies electrical power to the CTN TSS on one side of the line, and the 132 kV Tallawong substation PCC (Endeavour Energy) supplies electrical power to the RTRF TSS via a 132/33/11 kV transformer on the other side of the line. In the event of an outage of one BSP, the remaining BSP in service will supply the complete line.

From these two independent BSPs, the electric network is reticulated at 33kV and 11kV levels supply loads for the running of trains and the electric loads in passenger stations and ancillary buildings along the railway.

The NWRL will be a new high-frequency single deck rapid transit train system 36km rail line initially operating between Cudgegong Road and Chatswood.

The new railway is approximately 23km long, comprising eight new railway stations and the development of precincts around them, including three underground stations (Castle Hill, Showground and Norwest); three stations in open cutting (Cherrybrook, Bella Vista and Cudgegong Road); and two elevated stations on the viaduct (Kellyville and Rouse Hill). The new railway will be connected at Epping stub tunnels to the existing 13km ECRL in which there are four stations (Epping, Macquarie University, Macquarie Park and Chatswood).

The traction power system is designed to meet the short and long term objectives of railway operation. Upon opening for train operation it is designed for at least 17,280 passengers per hour per direction loading and at a maximum headway of 4 minutes. This will be achieved by a fleet of 6-car trainsets operating at 4 minute peak hour headway. The And long term for as at least 28,800 passengers per hour per direction at a maximum headway of 3 minutes inclusive of an extension to Marsden Park from the newly built RTRF. This will be achieved by a fleet of 6-car trainsets operating at 2.4 minute peak hour headway.

Traction Loads

The 1500V DC traction power provides the motive force for the trains, derived from the NWRL33kV network and delivered to the Overhead Wiring from traction substations along the length of the North West Rail Link (NWRL) from Cudgegong Rd to Chatswood.

Six new traction substations in the new section are:

- Epping Service Facility (ESF)
- Cherrybrook Station (CHE)
- Showground Station (SHW)
- Bella Vista (BLV)
- Rouse Hill (RSH) and
- Rapid Transit Rail Facility (RTRF).

Four existing traction substations in the ECRL will be separated from the Sydney Trains network to form part of the NWRL network at:

- Chatswood North (CTN)
- Lady Game Drive Service Facility (LGD)
- North Ryde (NTR) and
- Macquarie University (MQU)

These traction substations provide electrical power to the rail line by means of two traction transformers at each traction substation. The new section (ESF, CHE, SHW, BLV, RSH, RTRF, SFD and MDP) will provide 24-pulse rectification with traction transformers with a $\pm 7,5^\circ$ primary vector

group shift and both operating in parallel. The existing section (CTN, LGD, DEL and MQU) will provide 12-pulse rectification for 6 cars headway.

Station Loads

Of those above twelve Traction Substations, four of them: CTN, LGD, ESF and RTRF, 33/11 kV transformers are provided, which supply electrical power to the 11 kV distribution system, feeding the passenger stations and facility stations. The rated power of the transformers is 7,5 MVA ONAN at CTN and LGD substations and 20 MVA AN at the RTRF and ESF substations.

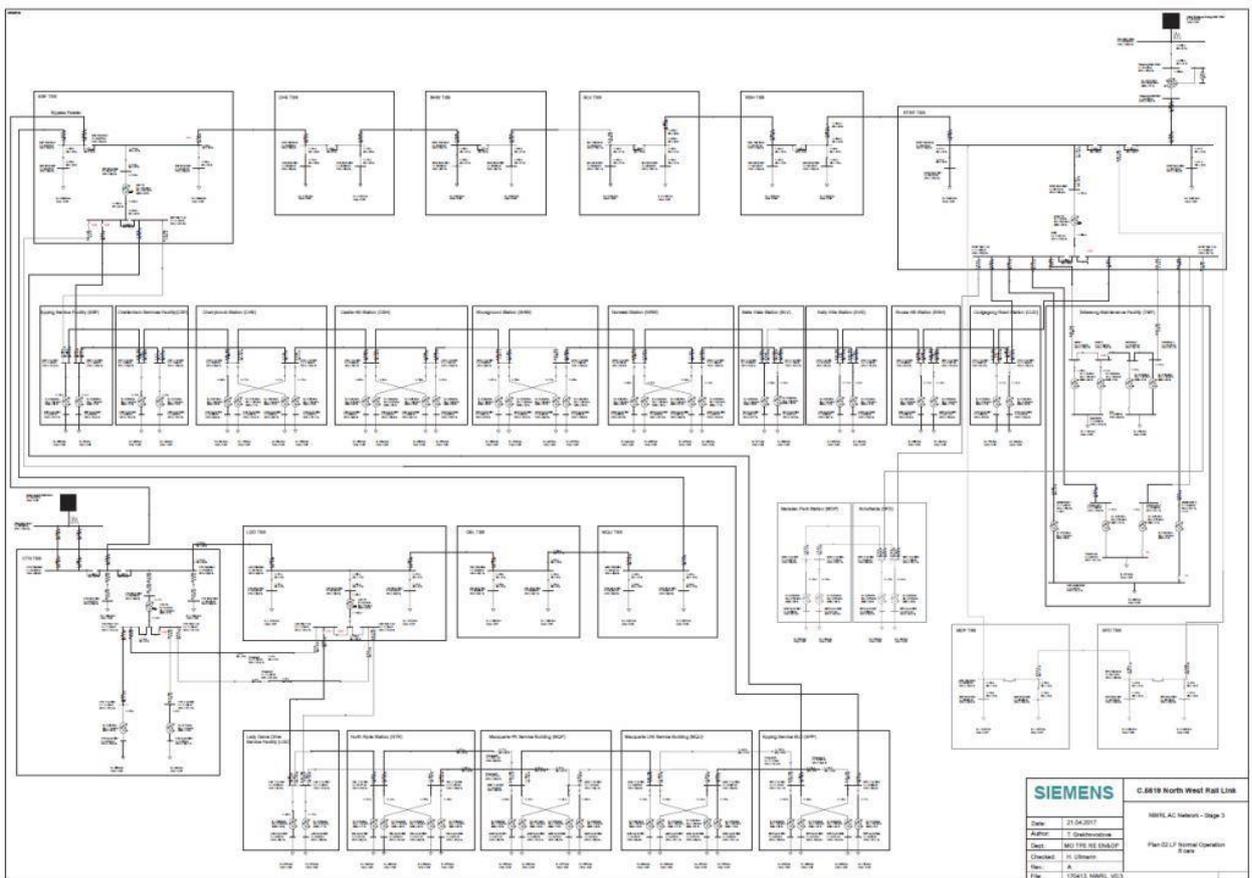


Figure A2 – SMNW AC Network Single Line Schematic (see attachment for larger print)

Appendix 3 NRT Risk Management Plan