

Proposed Establishment of a 33/11 kV Zone Substation at Whinstanes (WSS)

consultation report

5 March 2010

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Appendix 1. Additional Network Data for Proposed Works

1.0 INTRODUCTION

Hamilton Lands zone substation (SSHTL) provides electricity supply to approximately 450 predominantly industrial customers in the Eagle Farm area. SSHTL supplies major customers such as the Brisbane City Council Sewerage Works Plant (SSSWP) and the new TradeCoast Central development (SSTCC).

Increasing electricity demand in the area served by SSHTL is forecast to exceed acceptable feeder utilisation limits and there will be load at risk under contingency conditions in the near future. In particular, the forecast load on 11 kV feeder HTL1A will exceed its 75% utilisation in summer 2011/12. Similarly, the forecast load on 11 kV feeder HTL15A will exceed its 75% utilisation in summer 2012/13. The NCC of HTL1A will be exceeded by forecast load under network normal conditions in summer 2012/13. Furthermore, N-1 (contingency) events at SSHTL may result in interruptions to supply by 2012/13.

The residual LAR arising from the capacity shortfall is not consistent with the EDSD recommendation for N-1 capability and demonstrates a need to take corrective action. The projected exceedance of acceptable feeder utilisation and normal cyclic capacity further justifies action. This involves the proposed construction of new network assets.

Where Network Service Providers (NSPs) such as ENERGEX, propose to establish new large network assets to address such requirements, they are required to consult with registered participants, AEMO and interested parties under clause 5.6.2(f) of the National Electricity Rules (NER). This document has been prepared to comply with clause 5.6.2 of the National Electricity Rules (NER), which requires ENERGEX to:

- Identify future technical limitations to its network.
- Conduct an economic cost effectiveness analysis of possible solutions to the limitations in accordance with the Australian Energy Regulator's (AER) Regulatory Test version 3 (November 2007) for projects where the estimated cost of the augmentation component of the recommended development is greater than \$1 million.
- Consult with Registered Participants, AEMO, and interested parties on possible options to address the projected limitations of ENERGEX's distribution system, where the estimated cost of the augmentation component of the recommended development is greater than \$10 million.

This project has been considered under the reliability limb of the regulatory test as the service standards linked to the technical requirements of Schedule 5.1 of the NER are unable to be met as detailed in Section 2.3 of this report.

This project was identified in the ENERGEX Network Management Plan 2009/10 to 2013/14.

2.0 EXISTING NETWORK

2.1 Introduction

Hamilton Lands zone substation (SSHTL) provides electricity supply to approximately 450 predominantly industrial customers in the Eagle Farm area. SSHTL is supplied from Meeandah bulk supply substation (SSMDH) by the 33 kV feeders F506, F513 and F556 (configuration under WR3873105). SSHTL supplies major customers such as the Brisbane City Council Sewerage Works Plant (SSSWP) and TradeCoast Central substation (SSTCC).

The Australia TradeCoast precinct is experiencing consistent growth with a number of new developments in the area including the Gateway Motorway duplication and the TradeCoast Central business park. TradeCoast Central is a master planned commercial and industrial community located on the former Brisbane Airport site, directly adjacent to the existing Gateway Arterial Motorway and the current Brisbane Airport.

TradeCoast Central requires a single point of supply into site from ENERGEX's network. The electricity reticulation network is a private electricity network within the confines of the site and owned by the Body Corporate. The electricity demand and supply requirements of the TradeCoast Central business park are summarised below:

Stage 1: Commissioning Supply

- 2 x 11 kV dedicated feeders.

Stage 2: Full Operational Supply

- 33/11 kV zone substation – up to 17 MV.A of capacity by end 2012.

At present supply is provided to SSTCC from SSHTL via a dedicated 11 kV feeder (increasing to 2 x 11 kV feeders under WR555577). An additional 11 kV supply is available from SSHTN.

Figures 1, 2 and 3 provide geographic and schematic views of the network area under study.

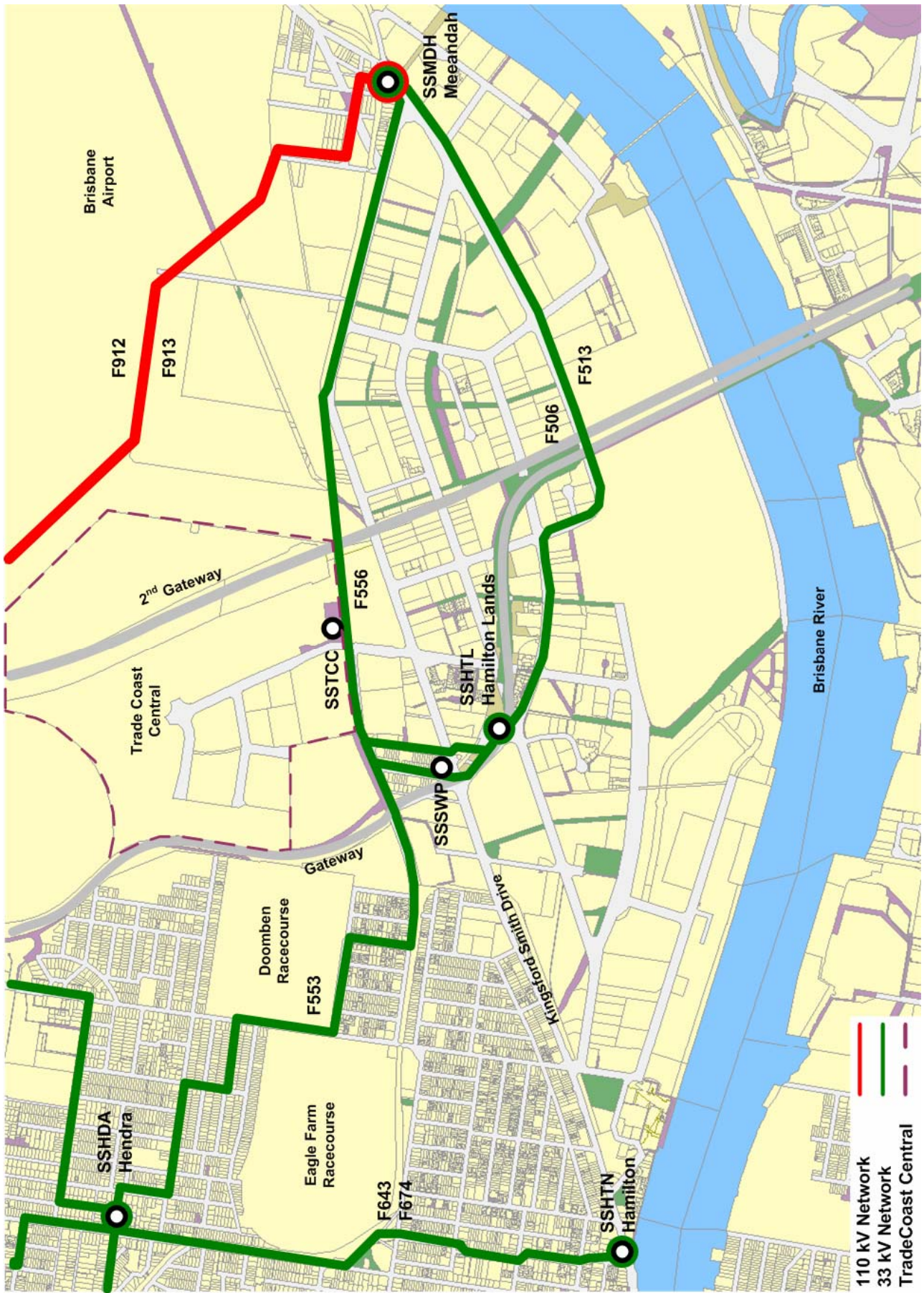


Figure 1 : Existing 33 kV Network Arrangement (Geographic View)

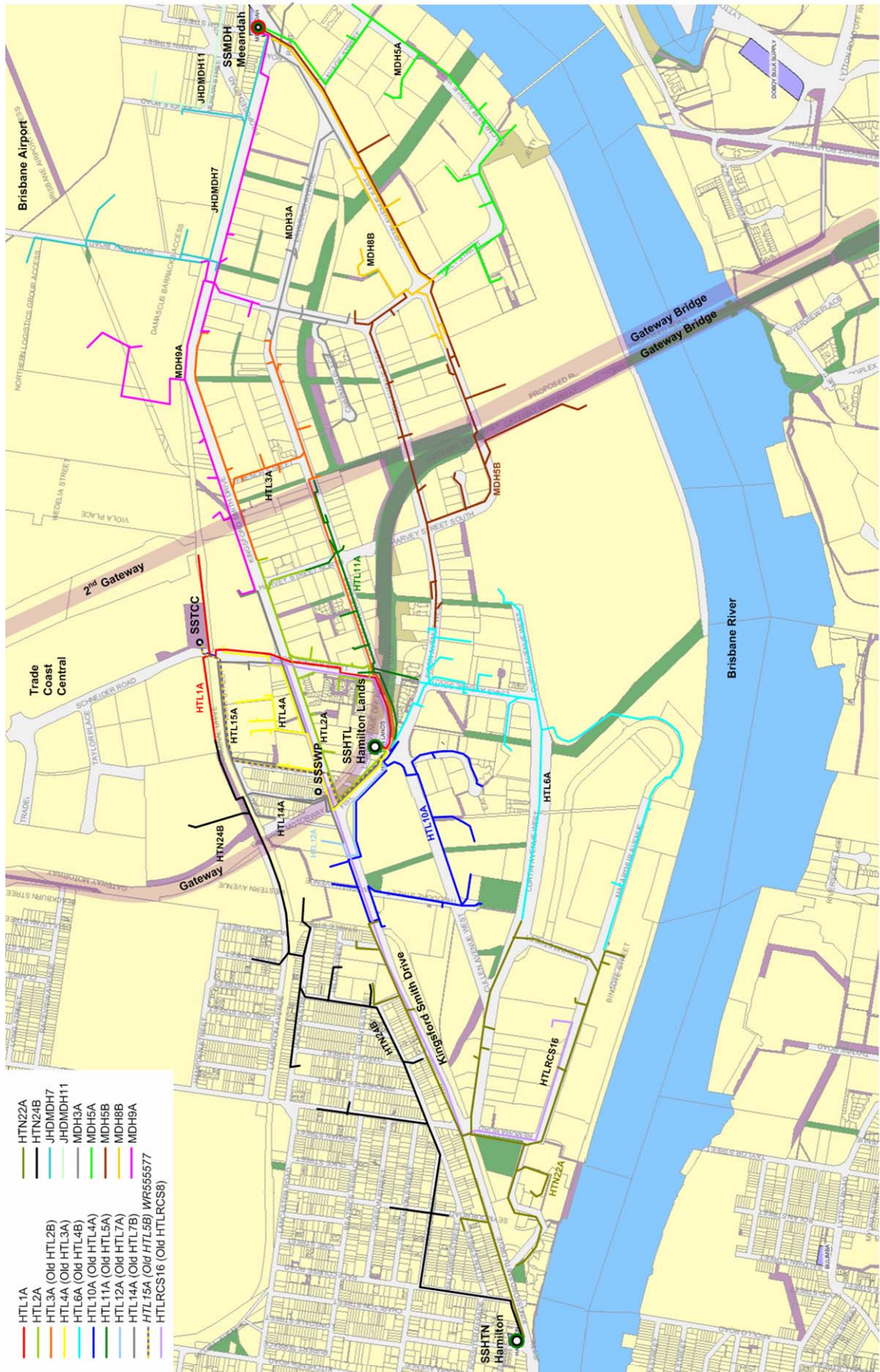


Figure 2: Existing 11 kV Network Arrangement (Geographic View)

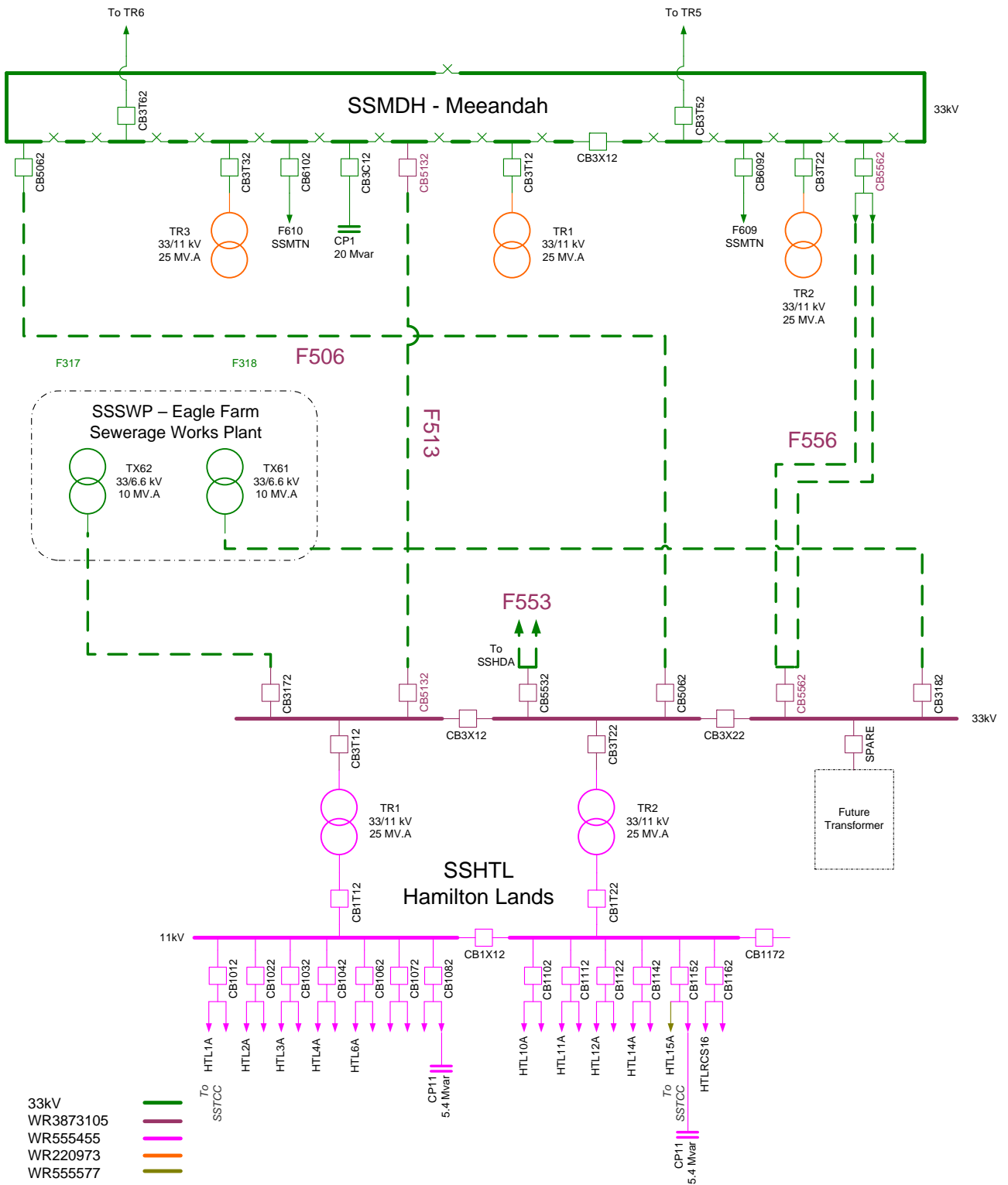


Figure 3: Existing 33 kV Network Arrangement (Schematic View)

2.2 Approved Capex / Opex Works

Approved works not yet commissioned within the study area include:

- WR3326893 HDA Hendra – Replace existing 7.5/10 MV.A 33/11 kV transformer with 1 x 25 MV.A unit by September 2010.

This project replaces the existing 7.5/10 MV.A 33/11 kV transformer with a new 25 MV.A 33/11 kV unit. The 33 kV feeder tails on F636 and F643 will be rearranged on the 33 kV ring bus. The recommended works will address ECC and RLAR limitations present at SSHDA and the N-1 limitations on the 33 kV network.
- WR555455 HTL Hamilton Lands – Replace existing 33/11 kV transformers with 2 x 25 MV.A units and install new 11 kV switchgear by January 2011.

This project replaces the existing 2 x 12.5/15 MV.A 33/11 kV transformers with 2 x 25 MV.A 33/11 kV units, installs new 11 kV switchgear, 1 x 5.4 Mvar 11 kV capacitor bank and establishes new 11 kV feeders. The recommended works will address forecast NCC, 2HEC, RLAR, unsatisfactory 11 kV power factor, and 11 kV feeder limitations at SSHTL.
- WR555577 HTL Hamilton Lands – Establish 1 x 11 kV feeder to Trade Coast Central by October 2009.

This project establishes a new 11 kV feeder supply from SSHTL to SSTCC (HTL15A). The recommended works will supply forecast block loads at SSTCC.
- WR3873105 HTL Hamilton Lands – Replace 33 kV switchgear with indoor 33 kV switchgear by October 2010.

This project addresses the requirement from the Department of Main Roads (DMR) for future Gateway Motorway upgrades by recovering the 33 kV outdoor bus that is located on reclaimed land and installing a new 33 kV indoor bus. The recommended works will address the LAR and RLAR limitation on the 33 kV network supplying SSHTL by splitting F506A&B.
- WR220973 MDH Meeandah – Replace 33/11 kV transformers with 3 x 25 MV.A units and install 2 x 5.4 Mvar 11 kV capacitor banks by December 2010.

This project replaces the existing 3 x 12.5 MV.A 33/11 kV transformers with 3 x 25 MV.A 33/11 kV units and installs 2 x 5.4 Mvar 11 kV capacitor banks. The recommended works will address the NCC, ECC and RLAR limitations and the unsatisfactory 11 kV power factor at SSMDH.

2.3 Applied Service Standards

The service standards that are applicable to a consideration of supply constraints affecting this area of study are summarised below:

- As per ENERGEX Supply Security Standard, no transmission, subtransmission or distribution network asset is planned to be operated above its normal cyclic capacity for a forecast 10% POE load under network normal conditions.
- Zone Substations and Subtransmission network
 - As per ENERGEX Supply Security Standard, for an urban mixed/significant C&I zone substation supplying greater than or equal to 5 MV.A of load, there shall be no interruption of supply during a single contingency event.
- Distribution Network
 - As per ENERGEX Supply Security Standard, no distribution feeder is planned to be operated above 75% of its normal cyclic capacity for a forecast 50% POE load under network normal conditions.

2.4 Limitations of the Existing Network

The existing network limitations are as follows:

2.4.1 Subtransmission Network Limitations

The subtransmission network in the vicinity of the TradeCoast Central business park needs to provide up to 17 MV.A of capacity from the end of 2012 onwards.

Substation Capacity

Hamilton Lands zone substation is equipped with 2 x 25 MV.A 33/11 kV transformers. The substation capacity is limited by transformers, providing a normal cyclic capacity of 52.5 MV.A. The 10 year 10% POE and 50% POE load forecasts, and the existing normal cyclic capacity (NCC), emergency cyclic capacity (ECC), 2 hour emergency capacity (2HEC), load at risk (LAR) and residual load at risk (RLAR) of Hamilton Lands zone substation, are shown below:

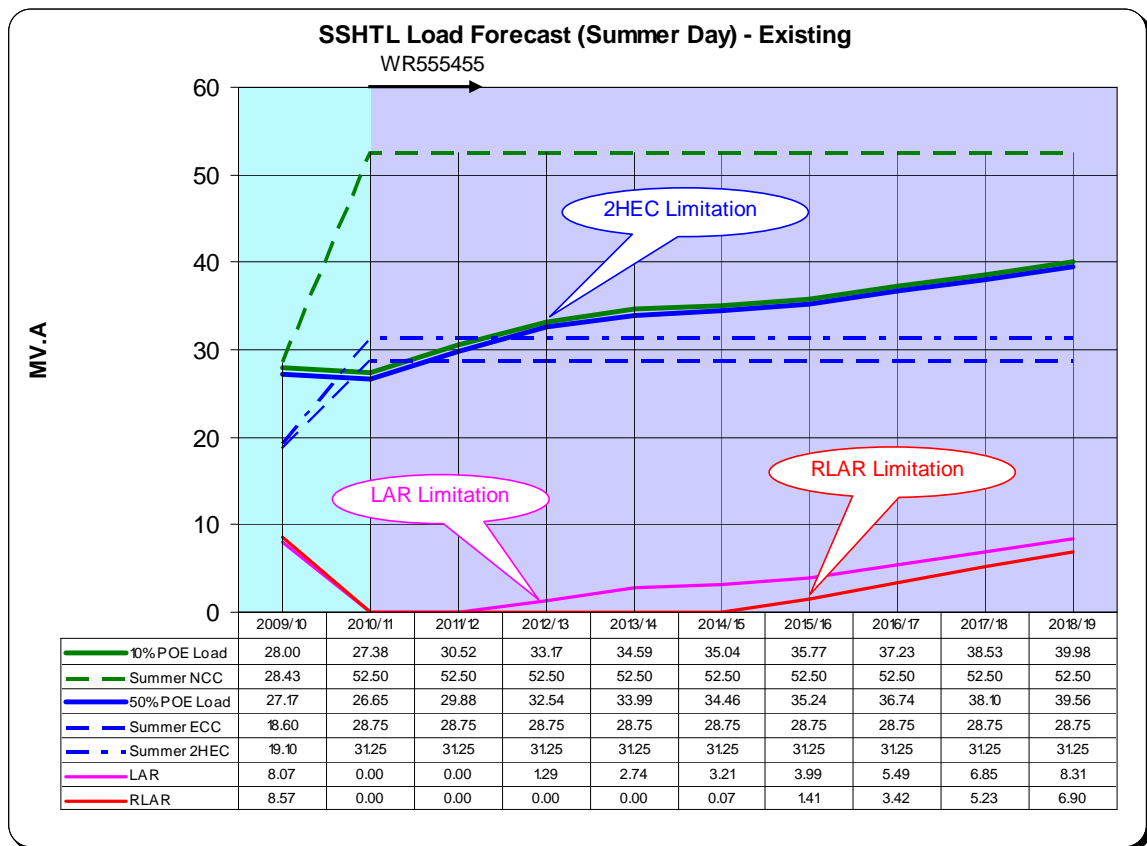


Figure 4: Substation Load Forecast (Existing Network)

As outlined above:

- The 50% POE load at SSHTL is forecast to exceed ECC in summer 2011/12.
- The 50% POE load at SSHTL is forecast to exceed 2HEC in summer 2012/13.
- There is a forecast of 1.29 MV.A LAR after 60 seconds (required security standard restoration time) in summer 2012/13 for an outage of a 33/11 kV transformer.
- There is a forecast of 0.07 MV.A RLAR after all load transfers in summer 2014/15 for an outage of a 33/11 kV transformer.

A plant overload protection scheme (POPS) is not installed at SSHTL to automatically reduce load to below 2HEC in the event of a contingency condition.

Distribution Network Limitations

11 kV Feeder Utilisation

The calculated worst case feeder utilisations based on a 50% POE load forecast of the SSHTL 11 kV feeders, along with the existing normal cyclic ratings are shown below:

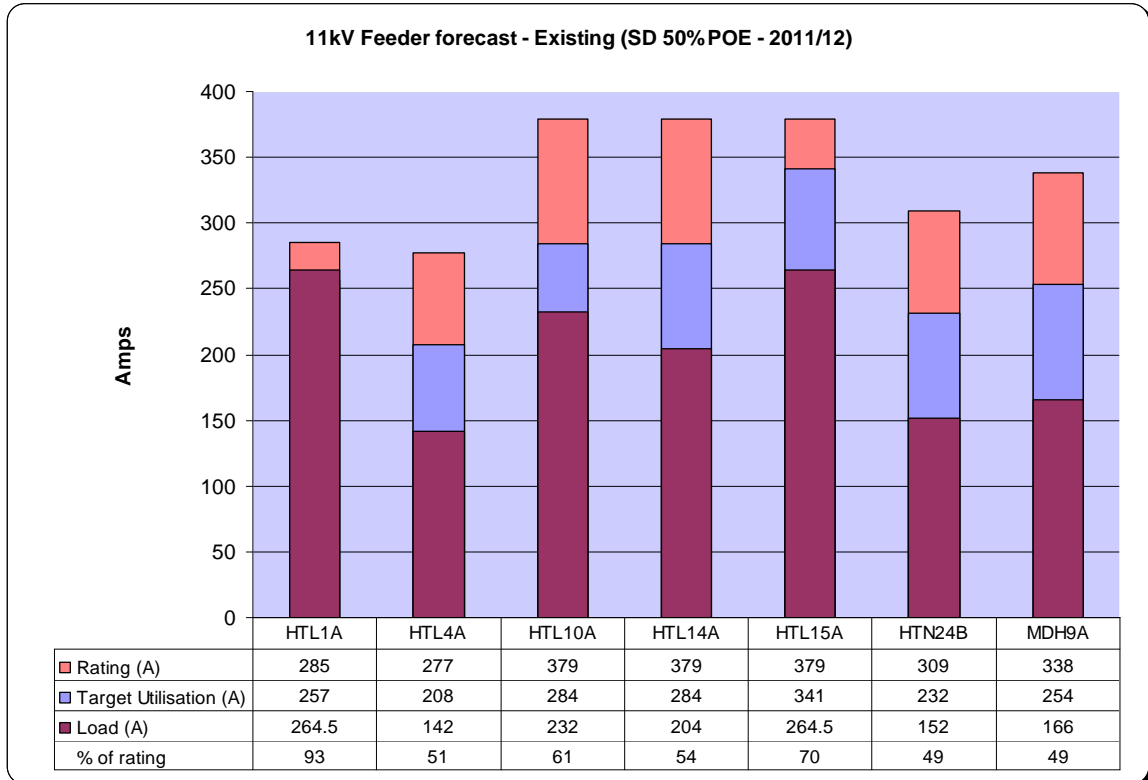


Figure 5: 11 kV Feeder Load Forecast (Existing Network)

As outlined above,

- Forecast load will exceed 75% utilisation on 11 kV feeder HTL1A in summer 2011/12.

In addition to this,

- Forecast load will exceed NCC under network normal conditions on HTL1A in summer 2012/13.
- Forecast load will exceed 75% utilisation on 11 kV feeder HTL15A in summer 2012/13.

Please note that the loads on the dedicated feeders to SSTCC HTL1A and HTL15A (WR555577) are a result of SSTCC forecast block loads (loads spread between the feeders).

3.0 OPTIONS ANALYSIS

In the process of determining the most cost effective solution to address the identified network limitations, ENERGEX has sought to identify a practicable range of technically feasible, alternative options that could satisfy the network requirements in a timely and efficient manner. Those options considered include network solutions, generation options, demand side initiatives and fuel substitution.

As a result of this process, ENERGEX has identified a range of options that represent practical alternatives to address the network limitations.

The alternative options identified through this process are examined below:

3.1 Network Options

The following options have been assessed as meeting the applied service standards.

3.1.1 Option 1: Establish Whinstanes Zone Substation

This option involves establishing a new zone substation at Whinstanes with 2 x 25 MV.A 33/11 kV transformers, 2 x 33 kV buses, 2 x 11 kV buses, establishing 5 x 11 kV feeders (2 to SSTCC) and reconfiguration of the SSHTL, SSHTN and SSMDH 11 kV networks. The substation is to be supplied by F556 from SSMDH to SSHTL (cut in and out).

3.1.2 Option 2: Establish Whinstanes C&I Substation

This option involves establishing a new C&I substation at Whinstanes with 2 x 25 MV.A 33/11 kV transformers, 2 x 33 kV buses, 2 x 11 kV buses, establishing 2 x 11 kV feeders to SSTCC and cutting in the 2 existing 11 kV feeders from SSHTL into the 11 kV network. The substation is to be supplied by F556 from SSMDH to SSHTL (cut in and out).

3.1.3 Option 3: Install a 3rd Transformer at Hamilton Lands Zone Substation

This option involves installing a 3rd 25 MV.A 33/11 kV transformer at SSHTL, an additional 11 kV switchboard, establishing 2 x 11 kV feeders to SSTCC and reconfiguration of the SSHTL 11 kV network.

3.1.4 Option 4: Establish HTE Hamilton Lands East Zone Substation

This option involves establishing a new zone substation Hamilton Lands East with 1 x 25 MV.A 33/11 kV transformer, and a single modular 33/11 kV pre-fabricated building. Establish 5 x 11 kV feeders from SSHTL and reconfigure the SSHTL and SSMDH 11 kV networks. Establish 2 x 11 kV feeders from SSHTL to SSTCC.

3.2 Non-network Options / Network Combinations

In order to satisfy the Regulatory Test, ENERGEX sought to identify non-network / demand side or demand side/network combinations that address the network limitations at a lower total present value than the proposed network solution.

To be considered an alternative demand side option, the proposed solution was required to:

- have the capacity to defer the proposed network solution by reducing demand below the identified constraint limits,
- cost less than the savings gained by deferring or removing the proposed network solution, and
- meet all applied service standard requirements.

This analysis did not identify feasible demand side alternative options. Options investigated were:

- curtailable loads that are available at time of area peak,

- customer backup generation which can be used at time of area peak, and
- installation of small scale generation.

3.3 Comparison of Options

3.3.1 Technical Comparison

A summarised comparison of the advantages and disadvantages of the alternative development options is given in the following table:

Option	Advantages	Disadvantages
Network Options		
Option 1 “Establish WSS Whinstanes Zone Substation”	<ul style="list-style-type: none"> + Establishes a substation NCC of 52.5 MV.A at Whinstanes. + Highest operational flexibility. + Introduces new transfer capability within the 11 kV network. + Consistent with network development plan. + Optimally utilises existing 33 kV and 11 kV network assets. + Greatest loss improvement. + Mitigates RLAR at SSHTL until 2024/25. + ENERGEX substation site land allocated within TCC development. 	<ul style="list-style-type: none"> – No obvious disadvantages.
Option 2 “Establish WSS Whinstanes C&I Substation”	<ul style="list-style-type: none"> + Establishes a substation NCC of 52.5 MV.A at Whinstanes. + Substation site land allocated within the TCC development. + Mitigates LAR at SSHTL until 2018/19. + Good loss improvement. 	<ul style="list-style-type: none"> – Advances SSHTTE development. – No new transfer capability within the 11 kV network. – Solely supplies SSTCC, no supply to the ENERGEX distribution network. – Better operational flexibility than option 3.
Option 3 “Install a 3 rd Transformer at Hamilton Lands Zone Substation”	<ul style="list-style-type: none"> + Increases substation NCC to 78.75 MV.A at SSHTL. + Mitigates LAR at SSHTL until 2020/21. 	<ul style="list-style-type: none"> – Not consistent with network development plan. – Additional spatial requirements, site modifications/extensions may be required. – Kingsford Smith Dr works required for 11 kV feeder routes. – Advances SSHTTE development. – Availability period of preferred substation site in TCC surpassed. – Highest losses. – Worst operational flexibility.
Option 4 “Establish HTE Hamilton Lands East Zone Substation”	<ul style="list-style-type: none"> + Establishes a substation NCC of 26.25 MV.A at Hamilton Lands East. + Mitigates LAR at SSHTL until 2023/24. + Introduces new transfer capability within the 11 kV network. 	<ul style="list-style-type: none"> – 33 kV augmentation required at SSMDH, which has limited free space. – Substation site has not been selected. – Availability period of preferred substation site in TCC surpassed. – Higher losses than option 1. – Better operational flexibility than option 3.

Table 1: Technical Comparison of Alternative Development Options

Based on the above technical comparison of options, Option 1 is considered to provide the optimum solution to address the forecast limitations.

3.3.2 Cost Comparison

The Regulatory Test requires ENERGEX to identify the option that minimises the present value of costs when compared with alternative options in the majority of reasonable scenarios.

Accordingly a base case net present value comparison of the alternative development options has been undertaken. The financial analysis contained anticipated costs of providing, operating and maintaining the options as well as expected costs of compliance and administration associated with each option. The costs of network losses were excluded from the analysis. The table below provides an overview of the initial capital cost and net present value cost over the period of study for each of the development options.

Option	Description	Initial Capital Cost	Total Capital Cost	PV of Costs	Rank
NETWORK OPTION 1	Establish WSS Whinstanes Zone Substation	\$11,719,988	\$41,468,986	\$17,159,192	1
NETWORK OPTION 2	Establish WSS Whinstanes C&I Substation	\$9,347,908	\$39,096,906	\$21,744,444	3
NETWORK OPTION 3	Install a 3 rd Transformer at Hamilton Lands Zone Substation	\$7,389,503	\$41,679,230	\$18,445,224	2
NETWORK OPTION 4	Establish HTE Hamilton Lands East Zone Substation	\$18,749,293	\$41,679,230	\$25,878,084	4

Table 2: Base Case Net Present Value Comparison

The NPV comparison above includes all direct costs associated with constructing & providing the option. This includes the cost of land/easements currently owned, but not yet utilised for network augmentation.

3.3.3 Sensitivity Comparison

A sensitivity analysis was conducted on this base case to establish the option that remained the lowest cost option in the majority of scenarios considered. The table below provides the results of this analysis.

	Scenario	NETWORK OPTION 1	NETWORK OPTION 2	NETWORK OPTION 3	NETWORK OPTION 4
1	High WACC	\$14,007,236	\$18,194,779	\$14,958,546	\$22,277,999
	<i>ranking</i>	1	3	2	4
2	Low WACC	\$28,237,458	\$32,503,220	\$29,898,236	\$36,850,336
	<i>ranking</i>	1	3	2	4
3	Network CAPEX overspend	\$18,875,111	\$23,918,888	\$20,289,746	\$28,465,892
	<i>ranking</i>	1	3	2	4
4	Network CAPEX underspend	\$15,443,273	\$19,569,999	\$16,600,702	\$23,290,276
	<i>ranking</i>	1	3	2	4
5	Network OPEX over budget	\$17,564,144	\$22,224,853	\$18,862,266	\$26,460,053
	<i>ranking</i>	1	3	2	4
6	Network OPEX under budget	\$16,754,240	\$21,264,034	\$18,028,182	\$25,296,115
	<i>ranking</i>	1	3	2	4
7	Low growth scenario	\$18,100,017	\$17,769,017	\$16,379,499	\$23,705,958
	<i>ranking</i>	3	2	1	4
8	High growth scenario	\$21,640,263	\$27,937,783	\$23,859,141	\$30,511,033
	<i>ranking</i>	1	3	2	4

Table 3: Sensitivity Analysis - Comparison of Options

Option 1 is clearly the lowest cost option in the majority of scenarios considered and is therefore the recommended development option.

4.0 RECOMMENDED DEVELOPMENT (OPTION 1)

4.1 Scope of Proposed Works

Description of Works

To address the limitations at Hamilton Lands, it is proposed to establish Whinstanes zone substation, works include:

- Cutting in and out of 33 kV feeder F556 from SSMDH to SSHTL and renaming as follows:
 - F3374: SSHTL to SSWSS;
 - F556: SSMDH to SSWSS.
- Installing 2 x 25 MV.A 33/11 kV transformers.
- Installing 1 x 5.4 Mvar 11 kV capacitor bank.
- Constructing a new indoor switchroom including:
 - 3 x 33 kV feeder circuit breakers;
 - 2 x 33 kV transformer circuit breakers;
 - 1 x 33 kV bus section circuit breaker;
 - 8 x 11 kV feeder circuit breakers;
 - 2 x 11 kV transformer circuit breakers;
 - 1 x 11 kV bus section circuit breaker.
- Establishing 7 x 11 kV feeders and reconfiguring the distribution network as follows:
 - 4 x 11 kV feeders to SSTCC;
 - 2 x 11 kV feeders to the ENERGEX distribution network;
 - 1 x 11 kV bus tie feeder to SSHTL.

The network requirement date for completion of the recommended development is October 2012.

The target completion date for the recommended development is October 2013.

Figures 6, 7 and 8 provide proposed geographic and schematic views of the network area under study.

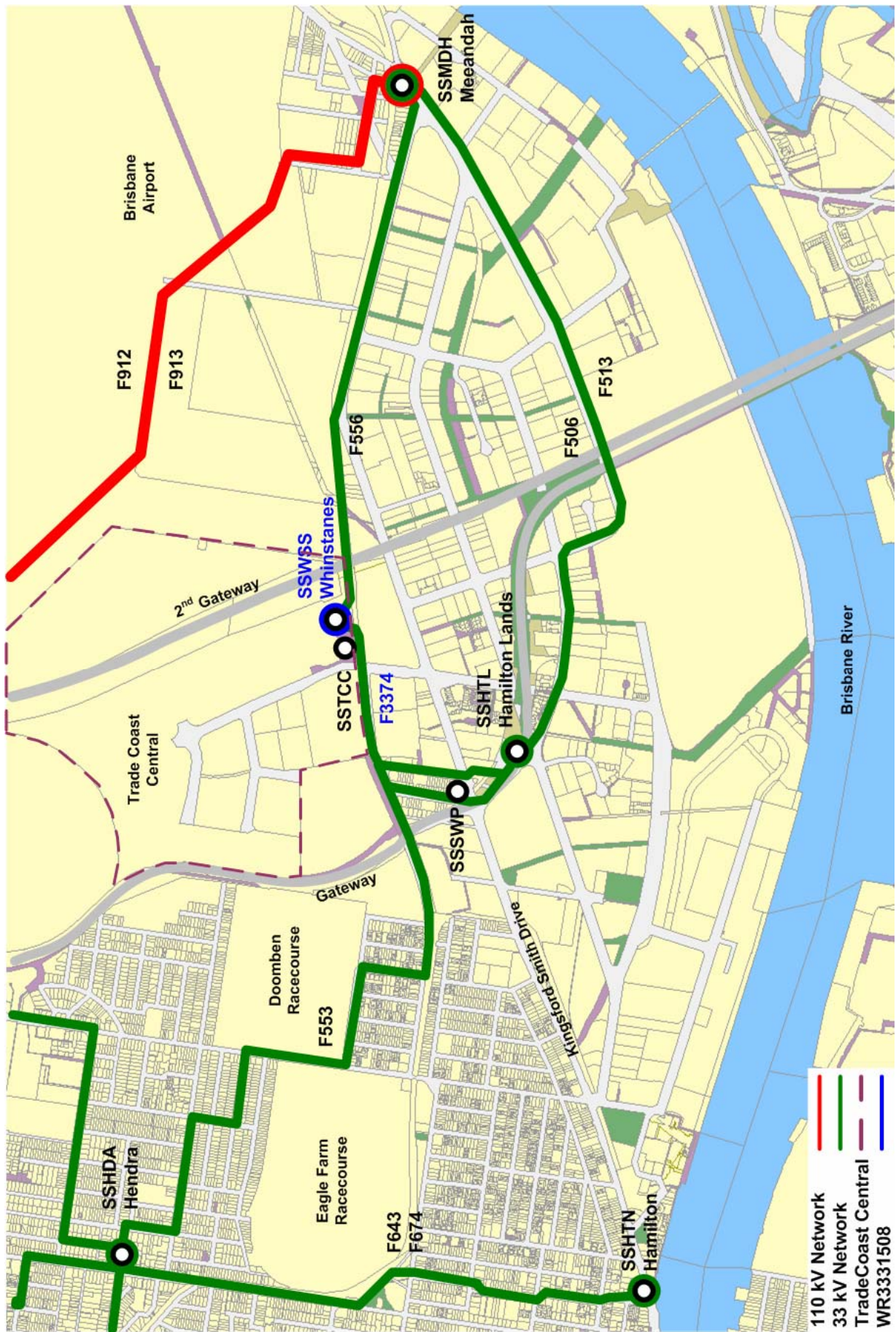


Figure 6: Proposed 33 kV Network Arrangement (Geographic View)

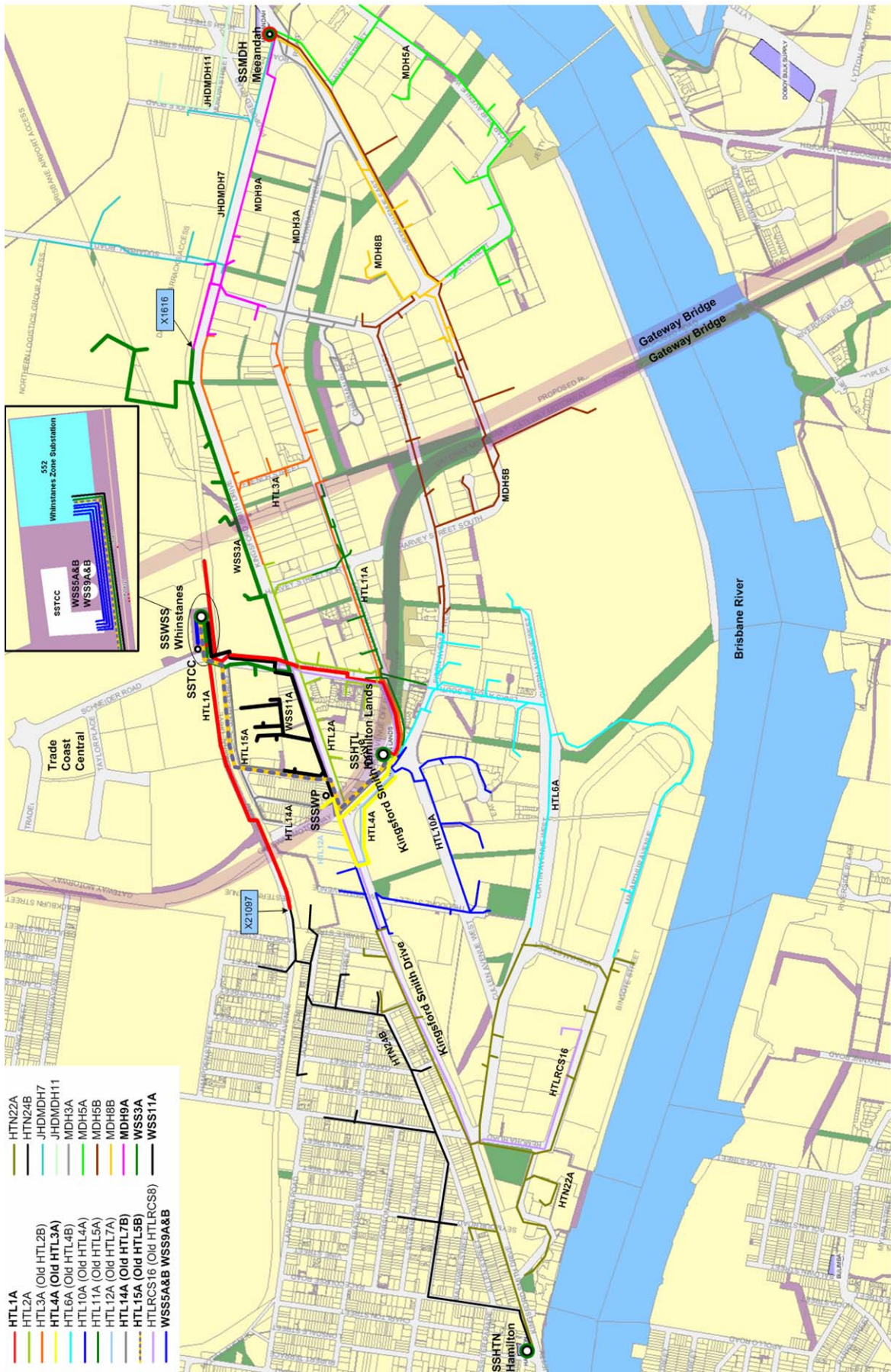


Figure 7: Proposed 11 kV Network Arrangement (Geographic View)

4.2 Impact of Proposed Works

The recommended works will have the following impact:

4.2.1 Subtransmission Network

Substation Capacity – Hamilton Lands zone substation

The 10 year 10% POE and 50% POE load forecasts, and the normal cyclic capacity (NCC), emergency cyclic capacity (ECC), 2 hour emergency capacity (2HEC), load at risk (LAR) and residual load at risk (RLAR) of Hamilton Lands zone substation, are shown below:

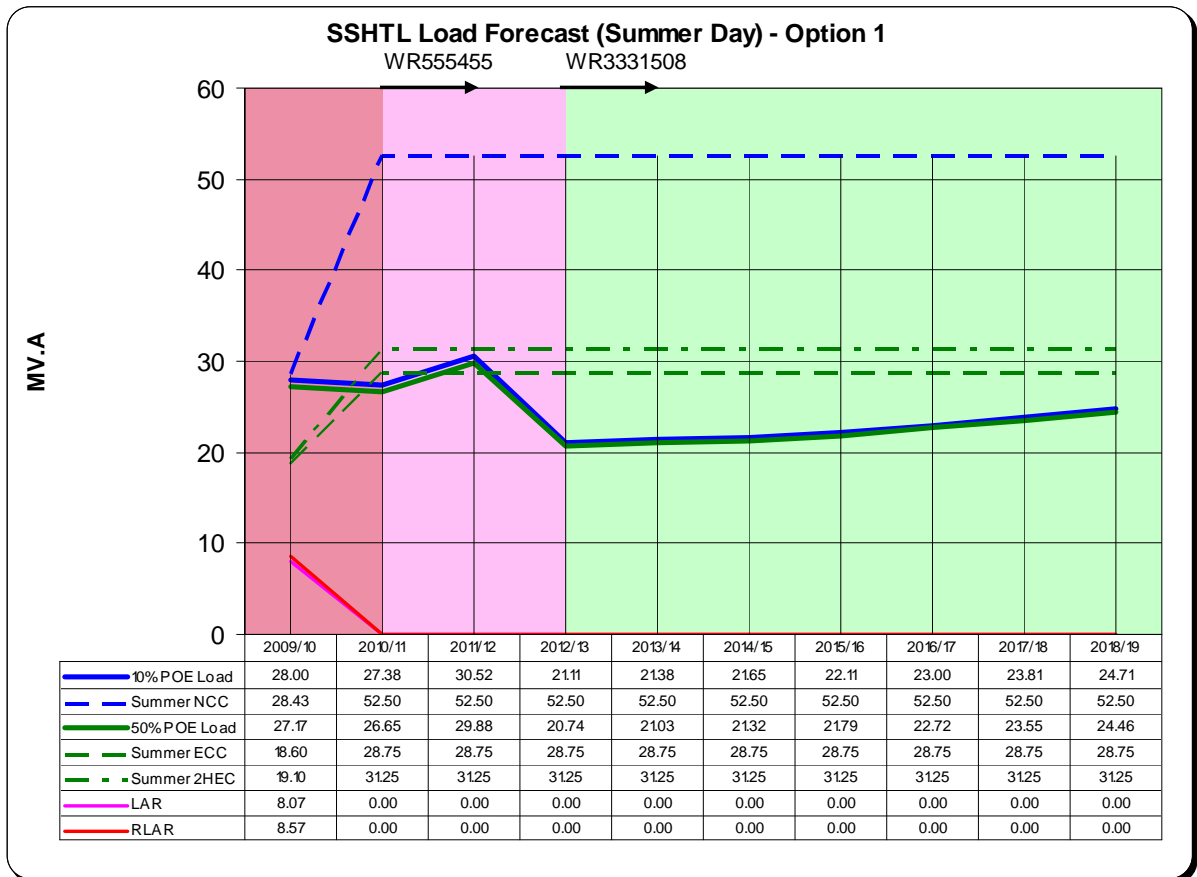


Figure 9: Substation Load Forecast (Proposed Network)

As outlined above, there are no limitations within the study period following project completion.

Substation Capacity – Whinstanes zone substation

The 10 year 10% POE and 50% POE load forecasts, and the normal cyclic capacity (NCC), emergency cyclic capacity (ECC), 2 hour emergency capacity (2HEC), load at risk (LAR) and residual load at risk (RLAR) of Whinstanes zone substation, are shown below:

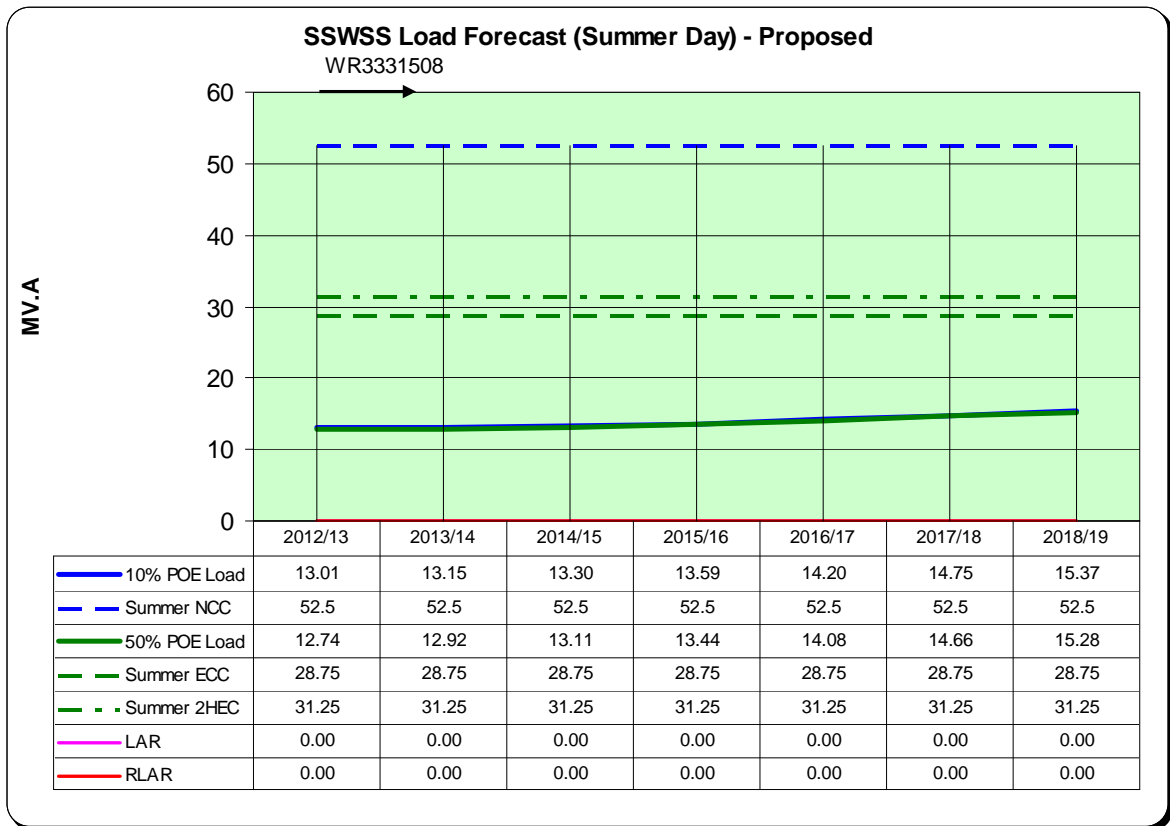


Figure 10: Substation Load Forecast (Proposed Network)

As outlined above, there are no limitations within the study period following project completion. Additional subtransmission network details are provided in Appendix 1.

Subtransmission Feeder Capacity

The 10 year 10% POE and 50% POE load forecasts, and the normal cyclic capacity (NCC), emergency cyclic capacity (ECC), 2 hour emergency capacity (2HEC), load at risk (LAR) and residual load at risk (RLAR) of the subtransmission feeders are shown below:

Note: F506 and F513 are identical and share load evenly, only F506 has been shown below.

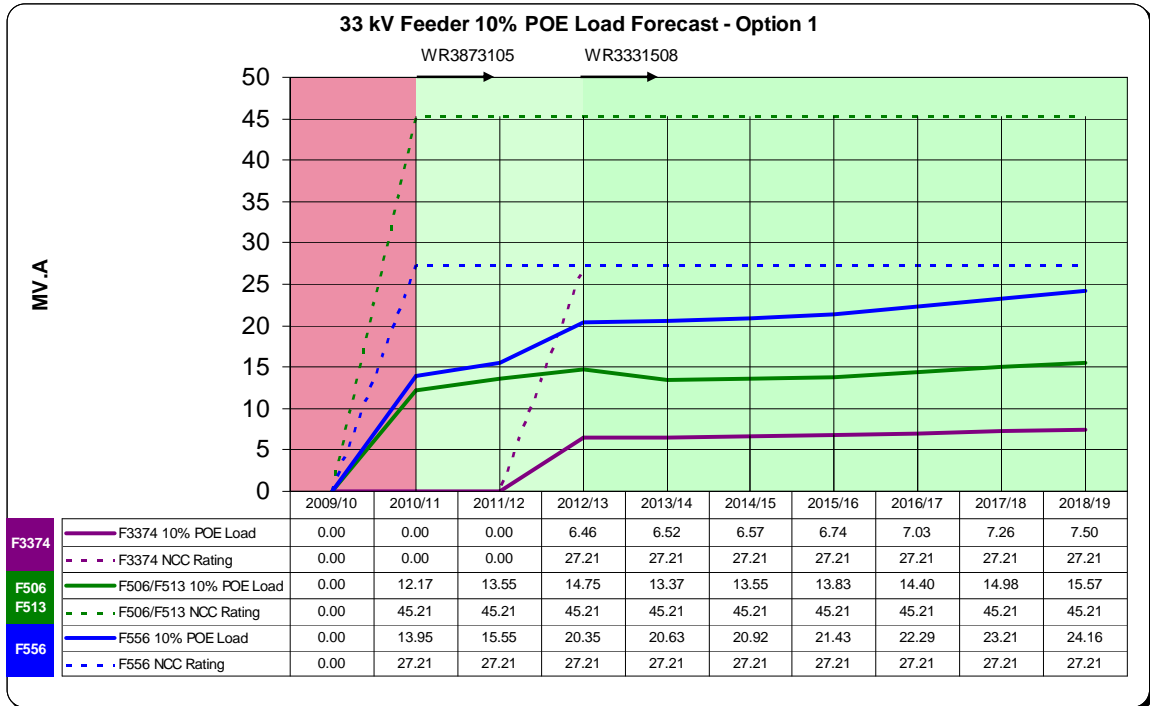


Figure 11: Subtransmission Feeder Load Forecast (Proposed Network)

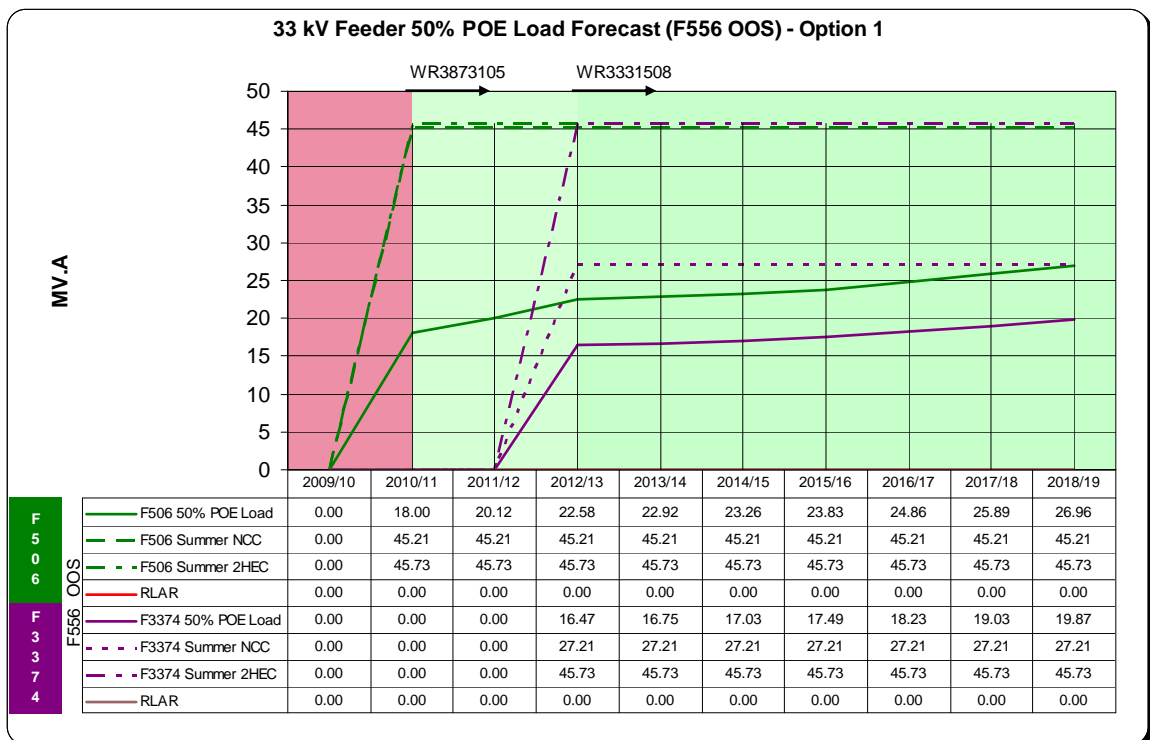


Figure 12: Subtransmission Feeder Load Forecast with F556 OOS (Proposed Network)

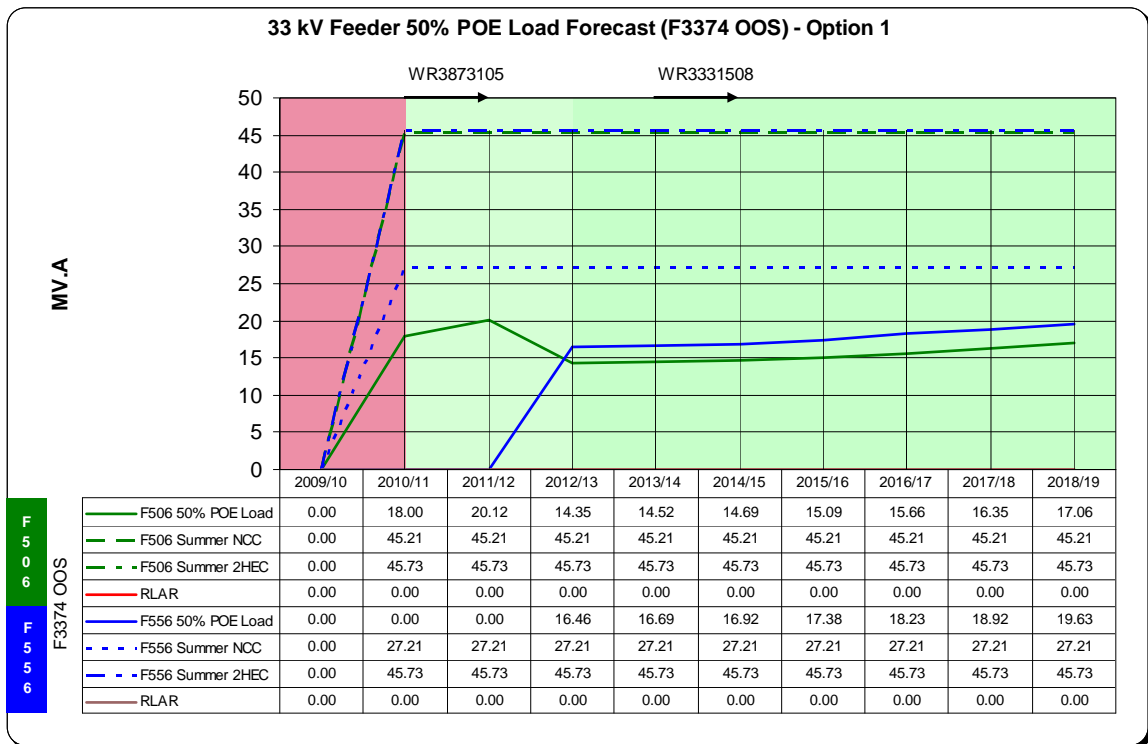


Figure 13: Subtransmission Feeder Load Forecast with F3374 OOS (Proposed Network)

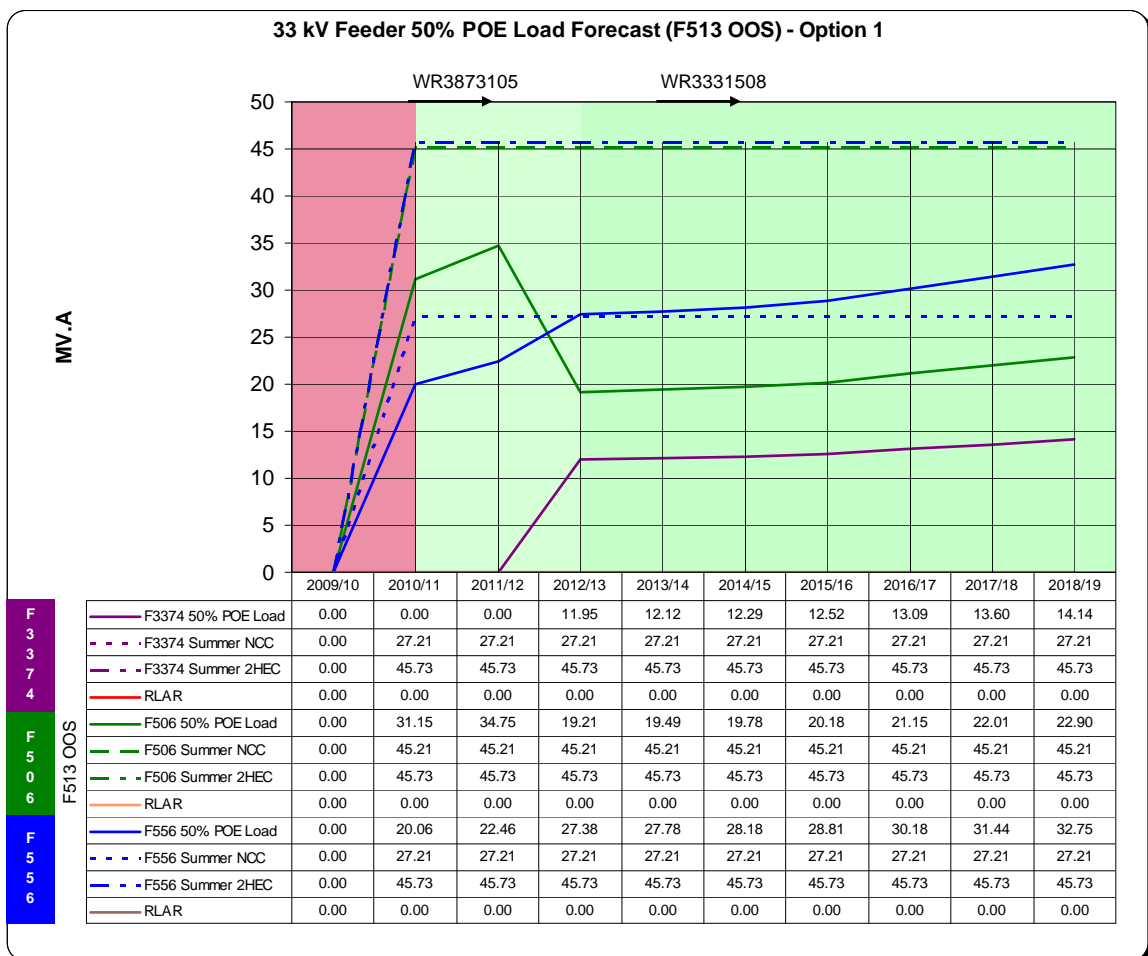


Figure 14: Subtransmission Feeder Load Forecast with F513 OOS (Proposed Network)

As outlined above, there are no limitations within the study period following project completion. Limitations beyond this period will be addressed by future projects or there are no limitations within the study period following project completion.

Additional subtransmission network details are provided in Appendix 1.

4.2.2 Distribution Network

11 kV Feeder Utilisation

The calculated worst case feeder utilisations based on a 50% POE load forecast of the Whinstanes 11 kV feeders, along with the normal cyclic ratings are shown below:

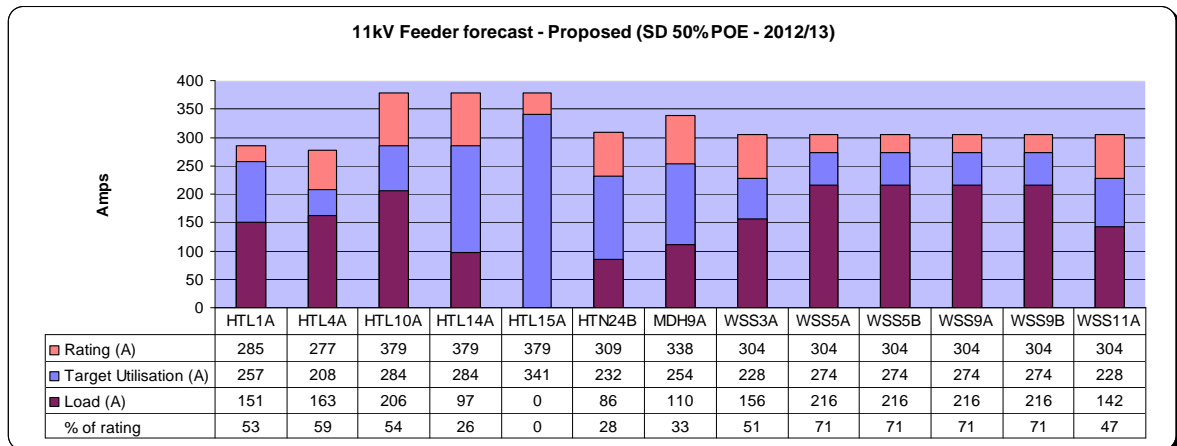


Figure 15: 11 kV Feeder Load Forecast (Proposed Network)

As outlined above, the 11 kV feeders are below target utilisation following project completion.

Additional distribution network details are provided in Appendix 1.

4.2.3 Network Losses

To date ENERGEX has voluntarily reported its greenhouse gas emissions under the Greenhouse Challenge. Commencing in 2008/09, ENERGEX was required, under the National Greenhouse and Energy Reporting Act 2007 to compulsorily report its contribution to the national greenhouse inventory. Network losses have been identified by quantification of greenhouse gas emissions as one of the significant control opportunities associated with reducing these emissions.

The expected savings in network losses is forecast to be 317 kW at time of peak load. This also represents an estimated reduction of 891 tonne CO₂-e (carbon dioxide equivalent) per annum based on emission factors consistent with the National Greenhouse Accounts (NGA) factors (version June 2009) for transmission and distribution network operators.

4.3 Project Timing Risk

Level of Risk Associated with the Date of Practical Completion

In accordance with the ENERGEX network risk based assessment framework, the level of risk associated with the date of practical completion has been determined. The results of the analysis are shown in the table below:

Scenario		2011/12	2012/13	2013/14	2014/15
11 kV feeder HTL1A forecast to exceed NCC	Consequence Rating	4	6	6	6
	Likelihood Rating	6	6	6	6
	Risk	High	Intolerable	Intolerable	Intolerable
11 kV feeder HTL15A forecast to exceed NCC	Consequence Rating	2	3	4	6
	Likelihood Rating	6	6	6	6
	Risk	Low	High	High	Intolerable
33/11 kV transformer outage at SSHTL	Consequence Rating	2	2	2	3
	Likelihood Rating	2	2	2	2
	Risk	Very Low	Very Low	Very Low	Low

Table 4: SSHTL Risk Rating

As outlined in the table above, it has been determined that it results in an **Intolerable** risk to defer the date of practical completion beyond the target completion date.

Risk Mitigation Strategy

As the date of practical completion is after the target completion date, the level of network risk associated with this project can be managed using the following risk mitigation strategy.

Normal Cyclic Risk

In order to prevent an overload in the period between the target completion date and the date of practical completion, the following risk mitigation strategy will be implemented:

- An additional supply from SSHTN is available (HTN24B) to supply SSTCC. Negotiations with the customer will be required to modify the configuration of the supplies at their board.

The strategy above reduces the load on HTL1A and HTL15A below rating. The residual risk of exceeding the rating of HTL1A after completing these load shifts remains as a High Risk.

Emergency Cyclic Risk

In the event of an N-1 contingency between the target completion date and the date of practical completion for the recommended development, the following risk mitigation strategies will be implemented:

1. 11 kV load shifts from Hamilton Lands zone substation. Based on forecast summer 2009/10 loads and power flow studies, the following transfers will be possible:

- SSHTL to SSMDH (1.29 MV.A up to 4 MV.A)

All load transfers are affected in 3 hours.

The following table summarises the level of risk associated with an N-1 contingency affecting the transformer at SSHTL between the target completion date and date of practical completion.

Mitigation	Peak Load at Risk (MV.A)	Period of Risk		Increase in maximum potential ENERGEX system SAIDI (Minutes)
		Total #Days	Average Hours/Day	
Initially	1.29	3	4	0.001
After 1	0	0	0	

Table 5: Load at Risk after Mitigation

Following mitigation, the risk remains **Very Low**.

4.4 Future Network Development

The following projects that affect SSHTL have been identified:

- WR221578 SSHTN Hamilton - Upgrade 33/11 kV Zone Substation by 2012.

This project will replace 2 x 12.5/16 MV.A 33/11 kV transformers at SSHTN with 2 x 25 MV.A 33/11 kV transformers, recover the outdoor 33 kV switchgear and install additional 11 kV switchgear. The recommended works will increase the NCC capacity of SSHTN and allow for future 11 kV feeders.

5.0 APPLICATION OF THE REGULATORY TEST

ENERGEX is required to apply a Regulatory Test in relation to new distribution network investments which have an augmentation component estimated to require a total capitalised expenditure in excess of \$1 million. The purpose of the Regulatory Test is to analyse and assess the efficiency of new network augmentation investments and non-network alternative options that address the projected network limitations.

Where an investment is a new large distribution network asset (i.e. where the augmentation component is estimated to require a total capitalised expenditure in excess of \$10 million), clause 5.6.2(f) of the NER requires ENERGEX to consult with Registered Participants, AEMO and interested parties on the possible options, including demand side, generation and market network service options, to address the projected limitations of its distribution system. Consultation is not required for a new small distribution network asset.

The recommended development option has an estimated total capitalised expenditure of \$10,219,988 and will be classified as a new large distribution network asset. As such it does require a Regulatory Test and consultation on options to address the projected network limitations.

6.0 BUDGET PROVISION

The Budget Provision is outlined in the following table in 2009/10 dollars:

Budget Composition		Financial Year Provision	
Component	Cost (in 09/10 dollars)	FY	Cost (in 09/10 dollars)
Transmission	\$8,485,029	Combined 2008/09 and 2009/10	\$239,068
Distribution	\$1,734,959	2010/11	\$96,773
TOTAL	\$10,219,988	2011/12	\$641,663
		2012/13	\$8,332,452
		2013/14	\$910,032
		Total Project Cost	\$10,219,988

Table 6: Budget Provision

7.0 DRAFT RECOMMENDATION

It is recommended that:

1. ENERGEX establish Whinstanes zone substation, for a total estimated cost of \$10,219,988, at 2009/10 prices. The target completion date for the recommended development is October 2013. The date of practical completion is October 2013. A risk mitigation strategy, for managing the forecast limitations during the period of risk, is outlined in Section 4.3 of this report.

8.0 CONSULTATION

In accordance with the Rules, ENERGEX invites submissions from Registered Participants and interested parties on this Consultation Report.

Submissions are due by Tuesday, 20 April 2010.

Please address submissions to:

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APPENDIX 1

Additional Network Data for Proposed Works

SUBTRANSMISSION NETWORK DATA

Subtransmission Network Load Transfers

The 10% POE substation load transfers incorporated in the recommended development are shown in the following table:

From Substation	To Substation	Estimated Peak Load Transfer (MV.A)	Estimated Reconciled Uncompensated Load Transfer (MV.A)
SSHTL	SSWSS	17.77	13.47
SSHTN	SSWSS	1.18	0.90
SSMDH	SSWSS	1.26	0.96

Table 7: Substation Load Transfers in 2013/14 (Proposed Network)

Substation Fault Level

The expected fault capacities of the limiting plant at the substation are shown below:

Substation	Busbar Voltage (kV)	Three Phase		Phase to Ground		Rating	
		(MV.A)	(A)	(MV.A)	(A)	(MV.A)	(A)
SSWSS	11	204	10727	37	1944	477	25000
SSWSS	33	768	13433	131	2286	1801	31500

Table 8: Fault Levels at Substation Busbars in 2013/14 (Proposed Network)

NETWORK LOSSES DATA

The network losses 33/11 kV networks are expected to reduce with the commissioning of this project as shown in the table below:

System (kV)	Existing (kW)	Proposed (kW)	Saving (kW)
33	3,903	3,622	281
11	157	121	36
Total	4,060	3,743	317

Table 9: Comparison between Existing and Proposed Network Losses

DISTRIBUTION NETWORK DATA

Distribution Feeder Load Forecast and Ratings

The existing and proposed 11 kV 50% POE feeder load forecast and ratings are provided in the following tables:

Feeder	Load Forecast (A)				Rating (A)			
	SD	SN	WD	WN	SD	SN	WD	WN
HTL1A	363	343	343	327	285	285	308	308
HTL4A	151	151	132	129	277	277	300	300
HTL10A	246	195	146	99	379	379	410	410
HTL14A	216	198	196	181	379	379	410	410
HTL15A	363	359	365	366	379	414	421	448
HTN24B	152	148	105	84	309	309	328	328
MDH9A	166	152	132	110	338	338	338	338

Table 10: 11 kV Feeder Load Forecast and Ratings in 2013/14 (Existing Network)

Feeder	Load Forecast (A)				Rating (A)			
	SD	SN	WD	WN	SD	SN	WD	WN
HTL1A	151	143	143	136	285	285	308	308
HTL4A	163	163	142	140	277	277	300	300
HTL10A	206	163	122	83	379	379	410	410
HTL14A	97	89	88	81	379	379	410	410
HTL15A	0	0	0	0	379	414	421	448
HTN24B	86	84	59	48	309	309	328	328
MDH9A	44	40	35	29	338	338	338	338
WSS3A	226	209	194	171	304	304	322	322
WSS5A	223	211	211	201	304	304	322	322
WSS5B	223	211	211	201	304	304	322	322
WSS9A	223	211	211	201	304	304	322	322
WSS9B	223	211	211	201	304	304	322	322
WSS11A	146	146	128	125	304	304	322	322

Table 11: 11 kV Feeder Load Forecast and Ratings in 2013/14 (Proposed Network)

Distribution Network Load Transfers

The 11 kV 50% POE load transfers incorporated in the proposed development are shown in the following table:

From Feeder	To Feeder	Estimated Load Transfer (A)			
		SD	SN	WD	WN
HTL1A	WSS5A&B	182	172	182	174
HTL4A	WNEW2	151	151	132	148
HTL10A	HTL4A	40	32	30	27
HTL14A	WSS11A	119	109	118	110
HTL15A	WSS9A&B	182	180	185	182
HTN24B	HTL1A	66	64	47	53
MDH9A	WSS3A	122	112	106	102

Table 12: 11 kV (Peak) Load Transfers in 2013/14 (Proposed Network)