



Hawke's Bay Network

Supplementary Information – Substation Load Characteristics

EECA

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Document History & Status

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A	31/01/2024	C Bergervoet	K Morison	K Morison	Draft
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A	Draft – Not issued
B	Final

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1. Executive Summary

The following figures illustrate the characteristics of the major electrical substations (both GXPs and Zone Substations) in the Hawke's Bay region. This document supplements the main report titled *"Hawke's Bay – Spare Capacity and Load Characteristics"*.

For each GXP, the January 2023 through December 2023 apparent (MVA) and reactive loadings (MVA_r) are presented. For each Zone Substation, the apparent power (MVA) or real power (MW) loadings only are presented. The data is presented in graphs of:

- The load profile for the entire year.
- The maximum and minimum loads for each of the 365 days.
- Load profiles for two weeks in summer and two weeks in winter.
- Typical daily summer and winter load profiles.
- A load duration curve for the entire year.

2. Transmission/GXP Substations

The characteristics of the transmission substation **apparent and reactive power loadings** are shown in the following:

- **Fernhill GXP**
 - Figure 1. Fernhill: Apparent power (MVA) load characteristics.
 - Figure 2. Fernhill: Reactive power (MVar) load characteristics.
- **Redclyffe GXP**
 - Figure 3. Redclyffe: Apparent power (MVA) load characteristics.
 - Figure 4. Redclyffe: Reactive power (MVar) load characteristics.
- **Tuai GXP**
 - Figure 5. Tuai: Apparent power (MVA) load characteristics.
 - Figure 6. Tuai: Reactive power (MVar) load characteristics.
- **Waipawa GXP**
 - Figure 7. Waipawa: Apparent power (MVA) load characteristics.
 - Figure 8. Waipawa: Reactive power (MVar) load characteristics.
- **Whakatu GXP**
 - Figure 9. Whakatu: Apparent power (MVA) load characteristics.
 - Figure 10. Whakatu: Reactive power (MVar) load characteristics.

Fernhill MVA

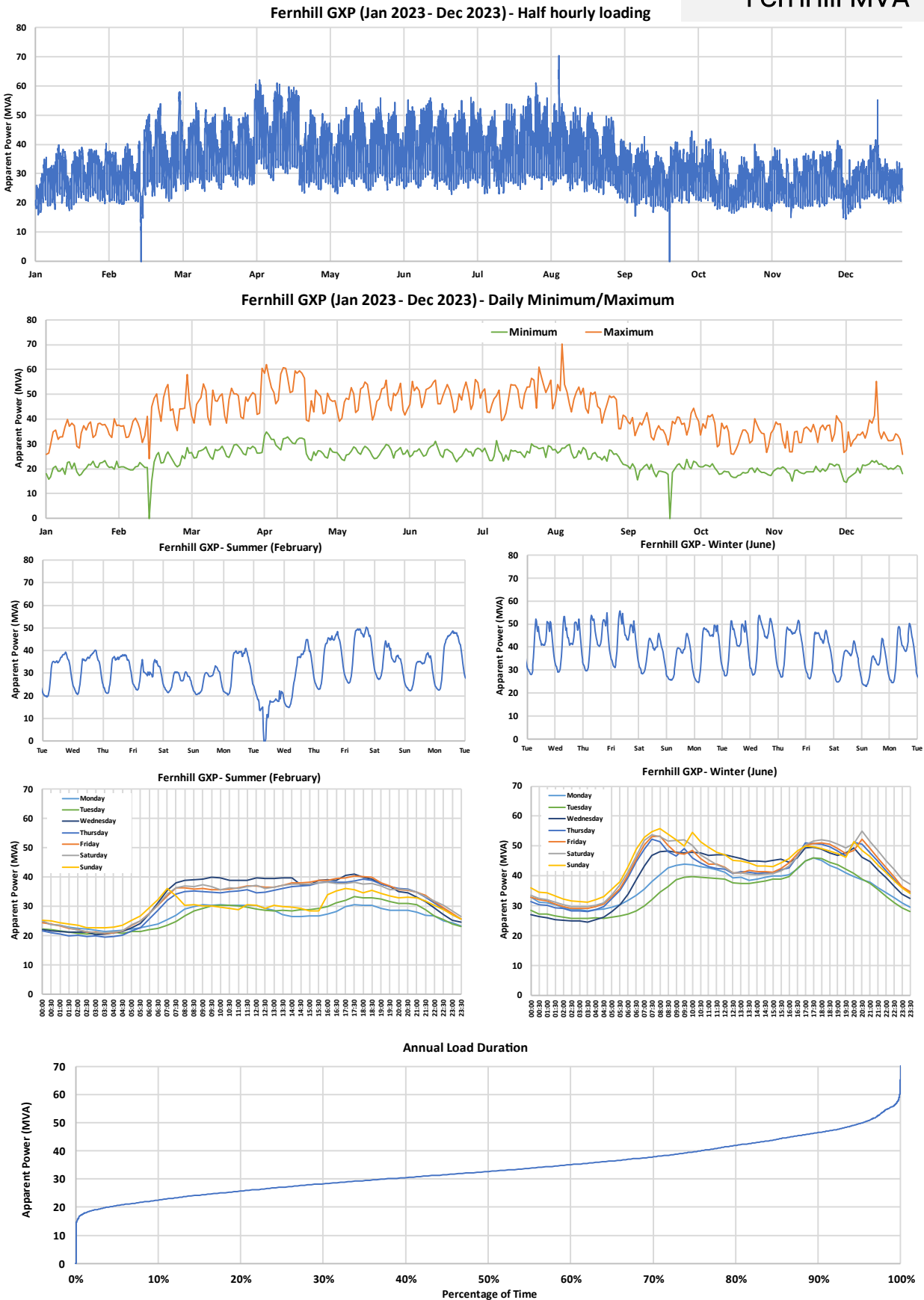


Figure 1. Fernhill: Apparent power (MVA) load characteristics.

Fernhill MVar

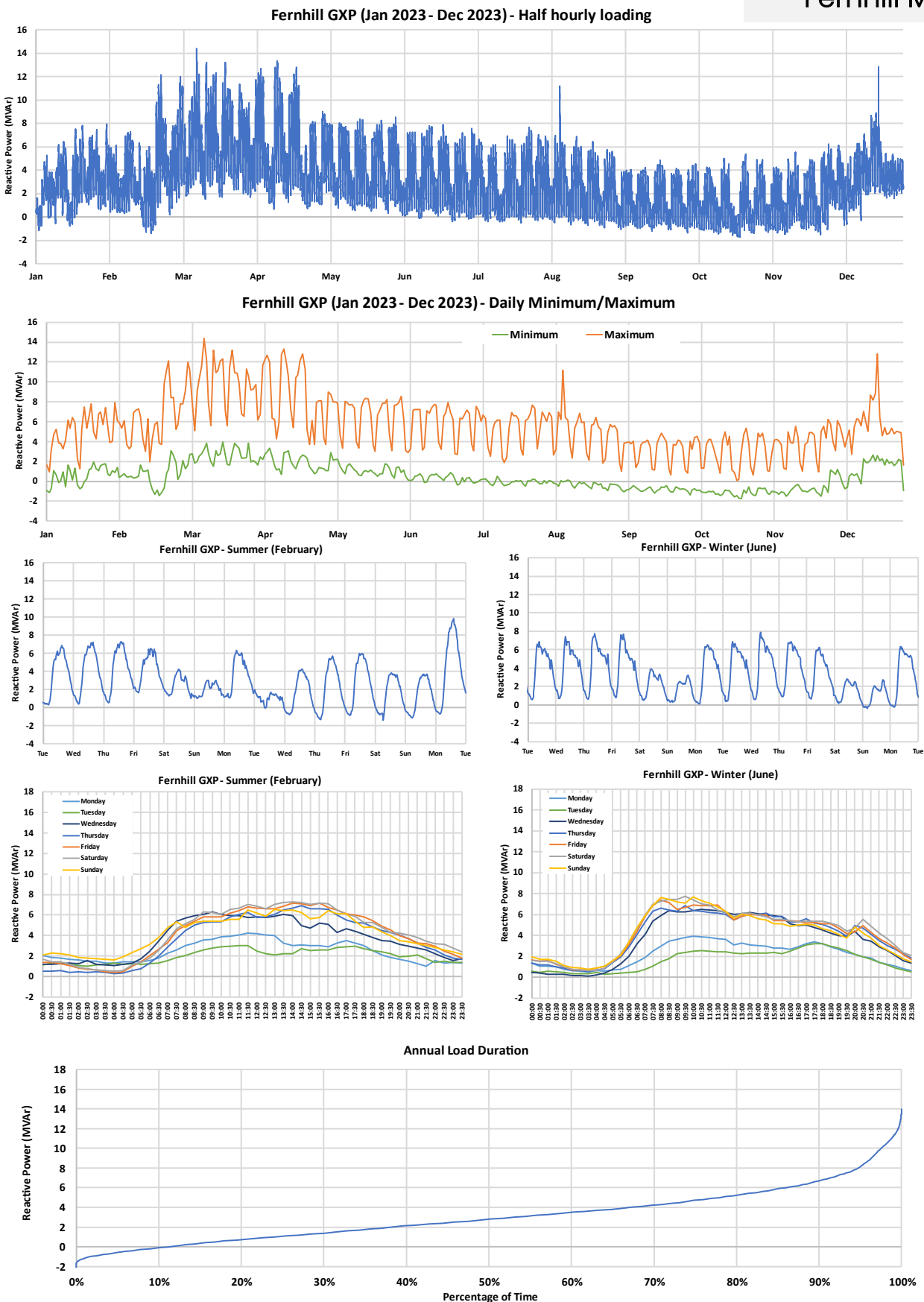


Figure 2. Fernhill: Reactive power (MVar) load characteristics.

Redclyffe MVA

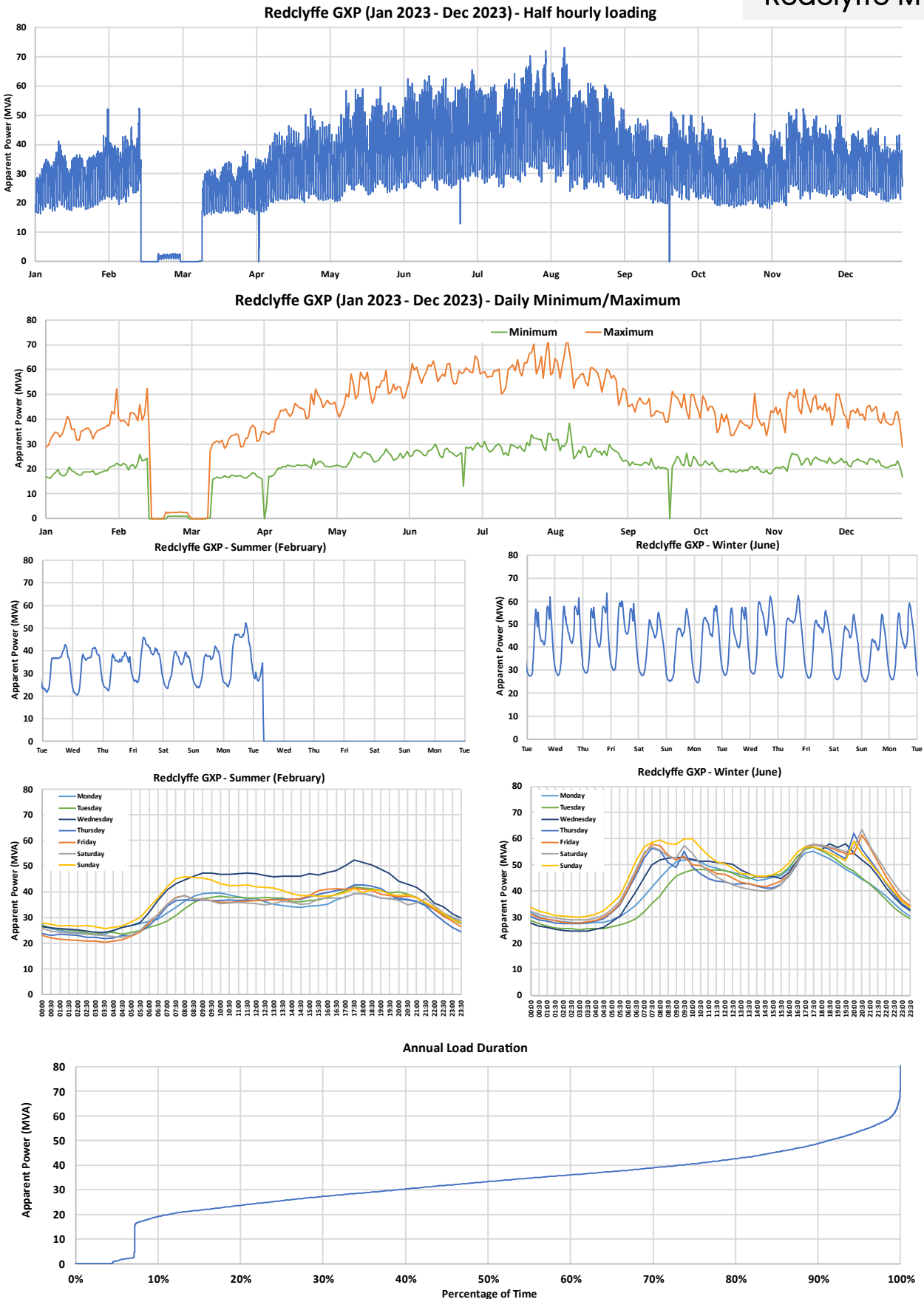


Figure 3. Redclyffe: Apparent power (MVA) load characteristics.

Redclyffe MVar

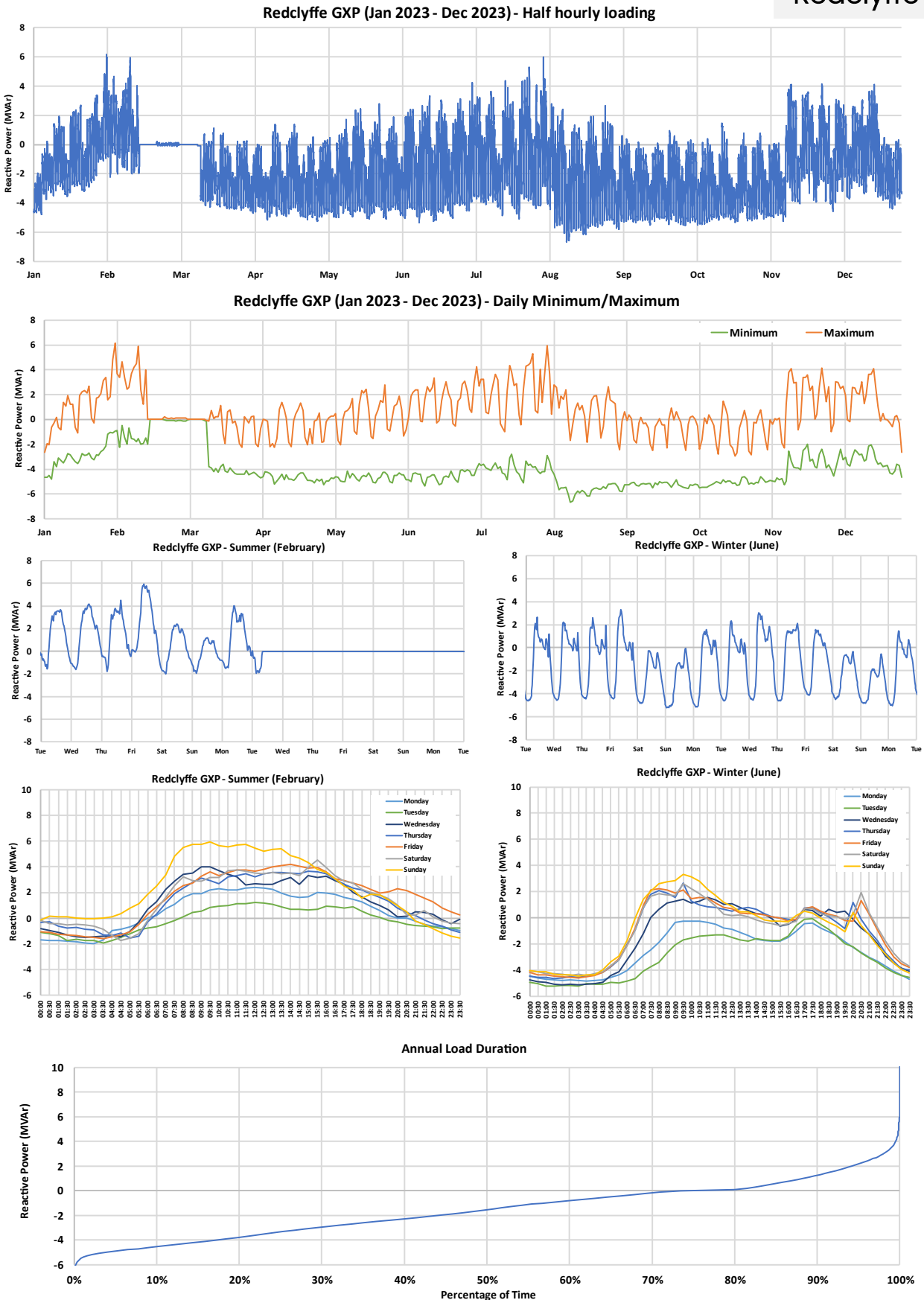


Figure 4. Redclyffe: Reactive power (MVar) load characteristics.

Tuai MVA

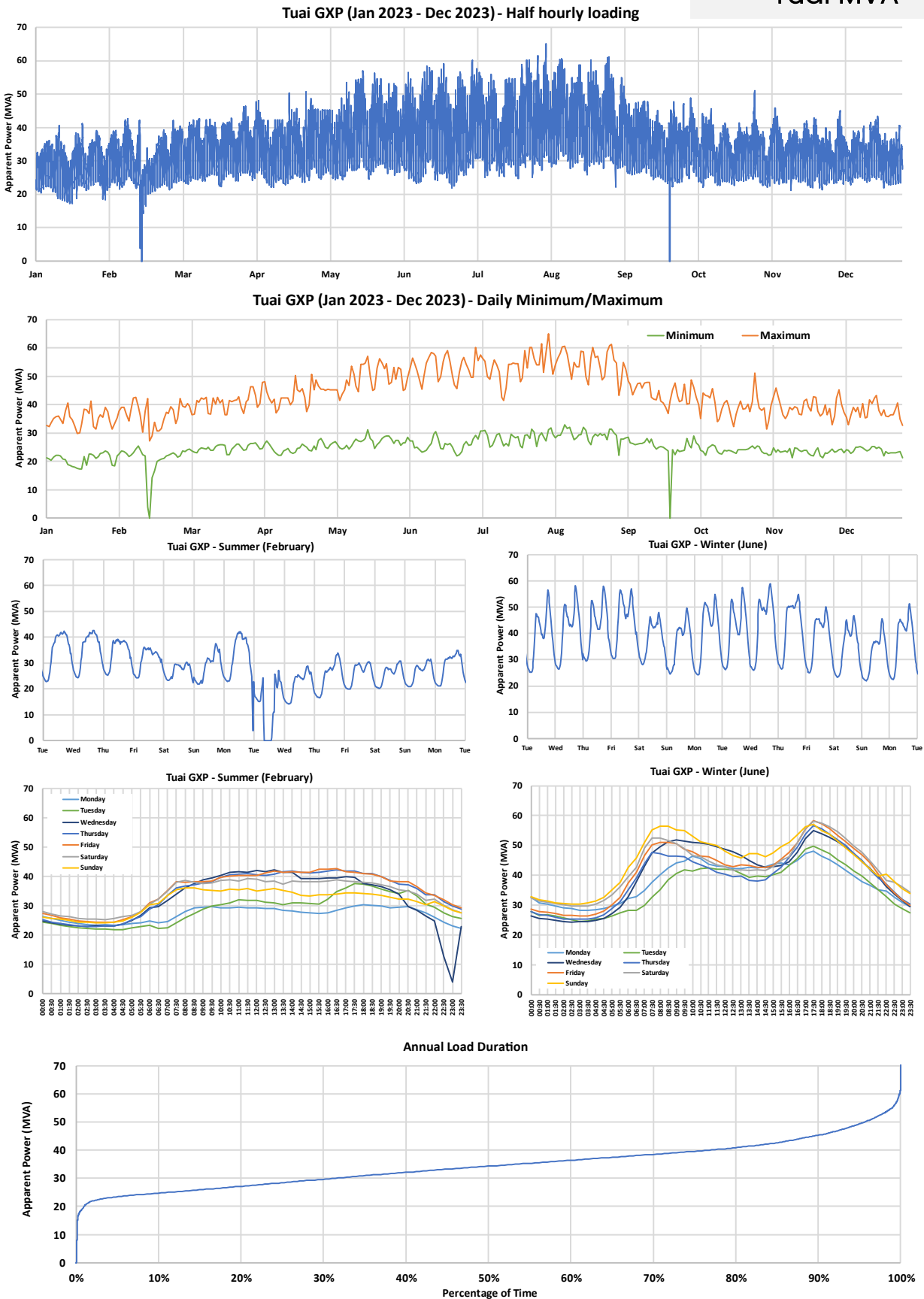


Figure 5. Tuai: Apparent power (MVA) load characteristics.

Tuai MVar

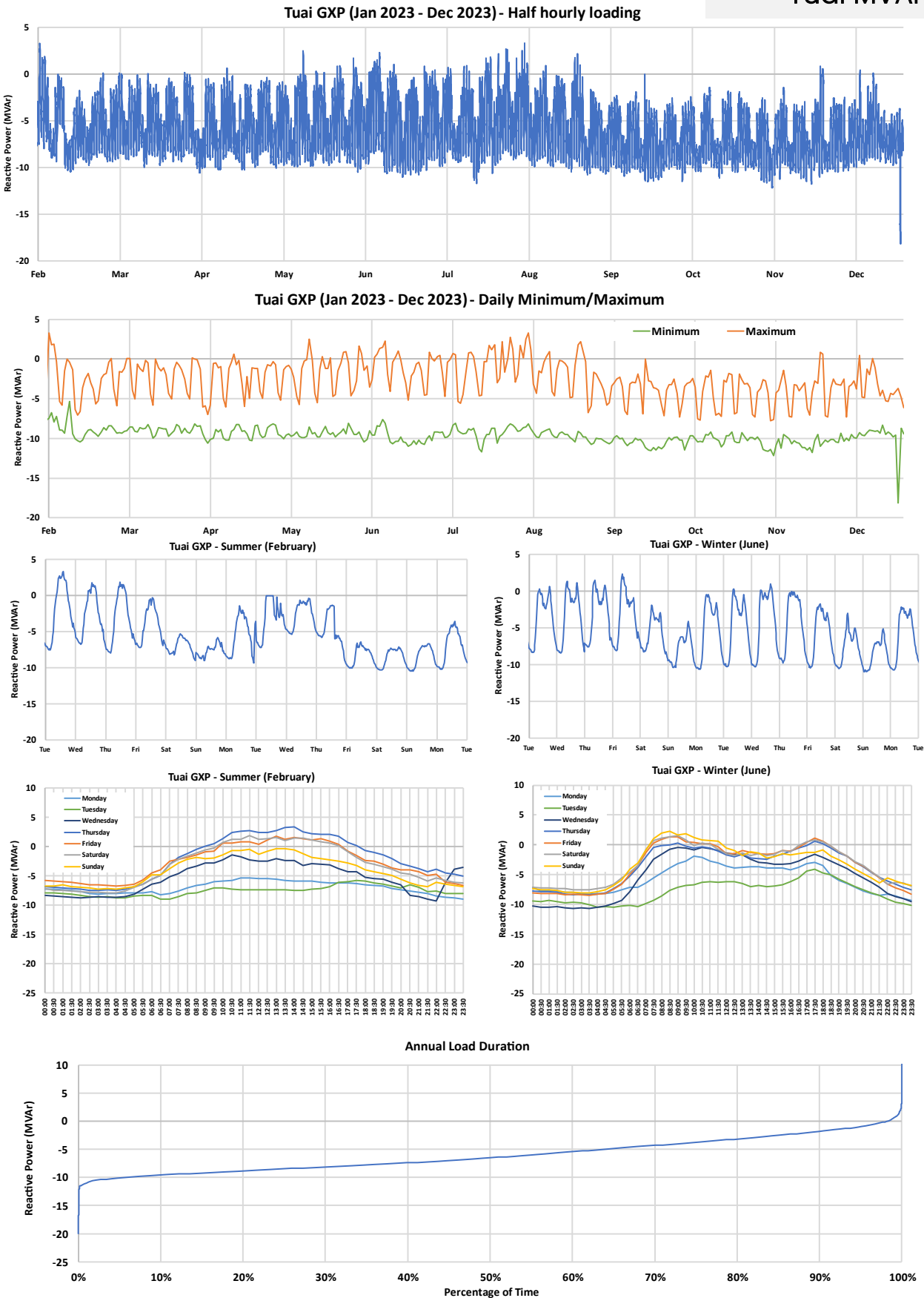


Figure 6. Tuai: Reactive power (MVar) load characteristics.

Waipawa MVA

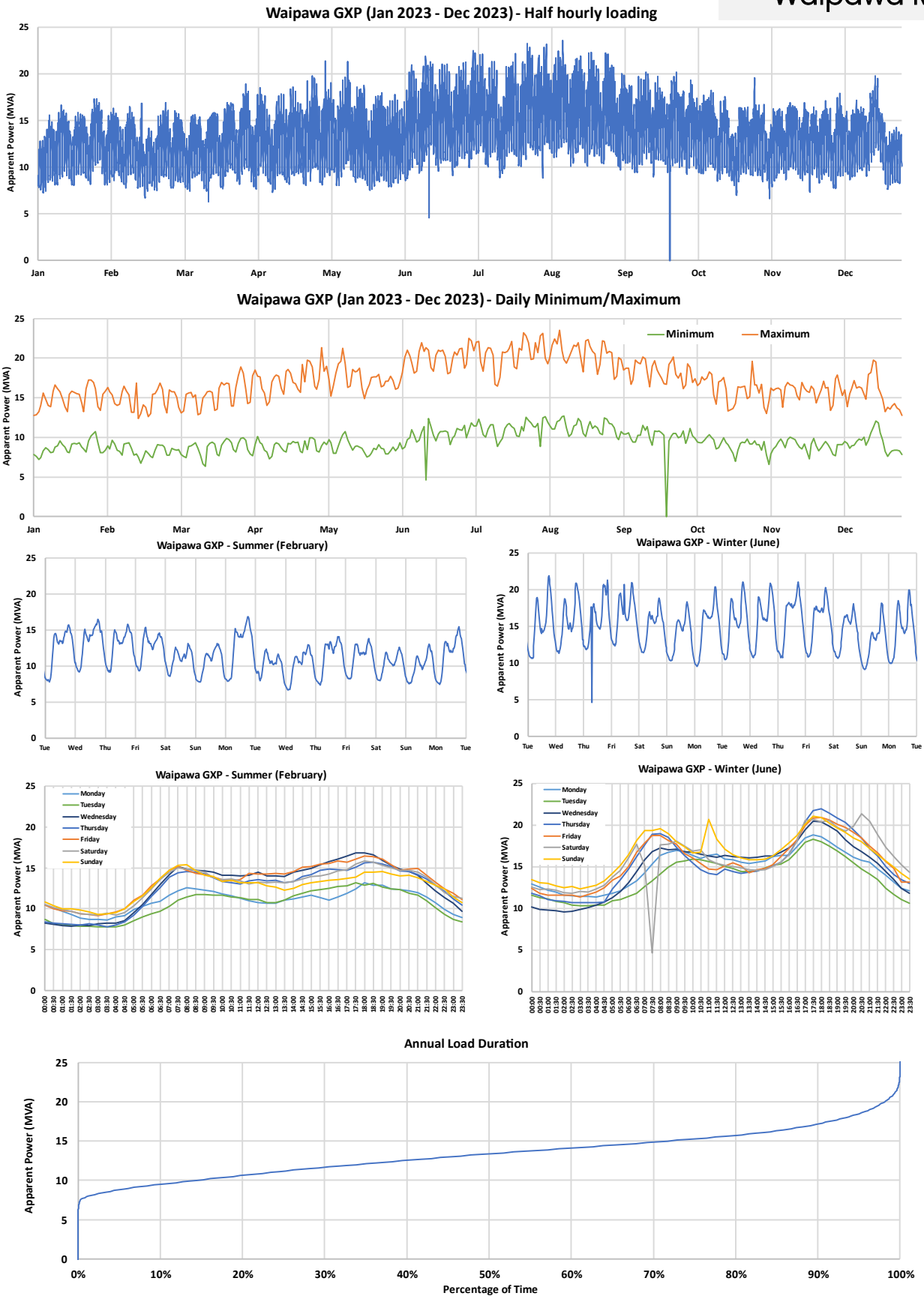


Figure 7. Waipawa: Apparent power (MVA) load characteristics.

Waipawa MVar

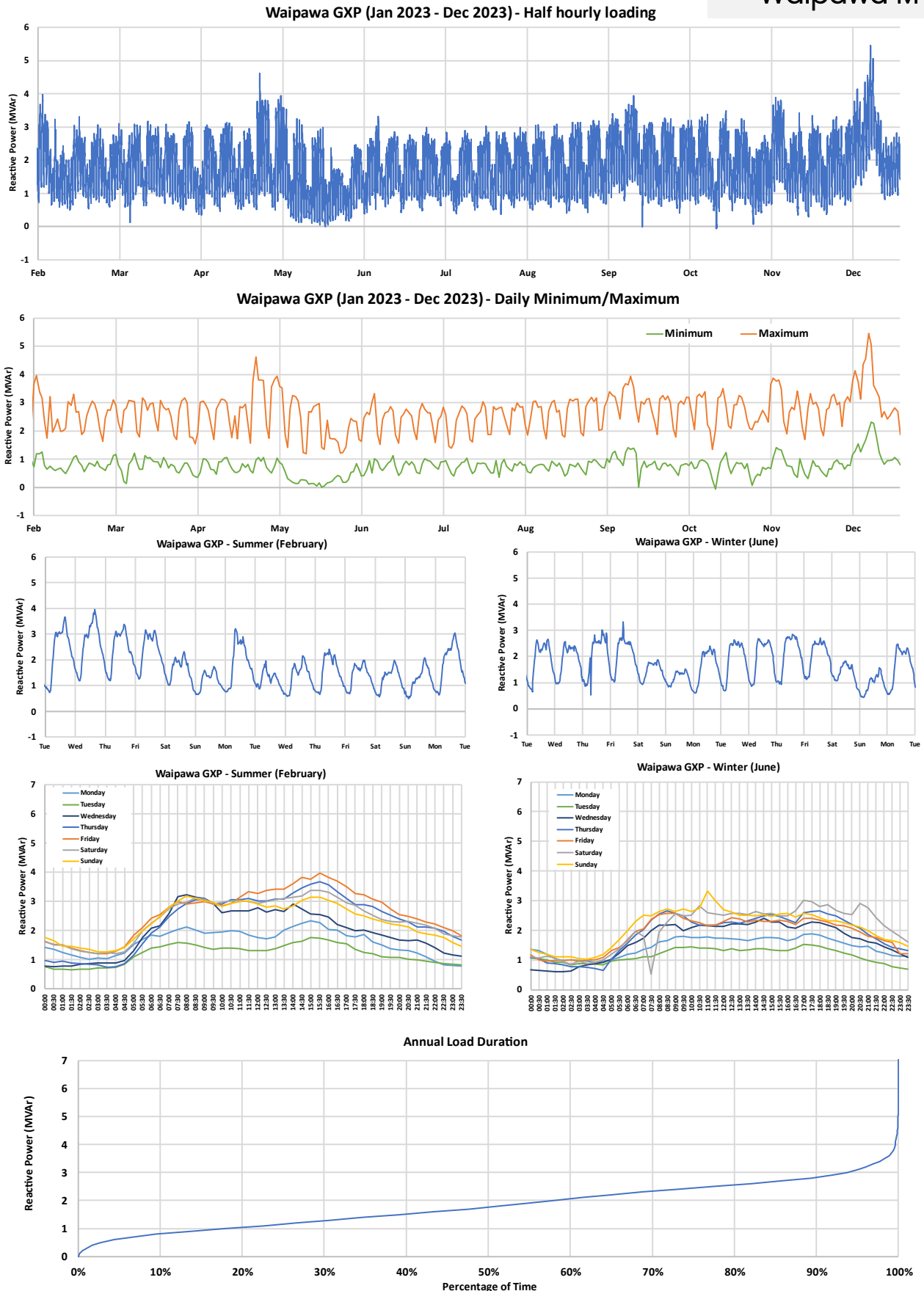


Figure 8. Waipawa: Reactive power (MVar) load characteristics.

Whakatu MVA

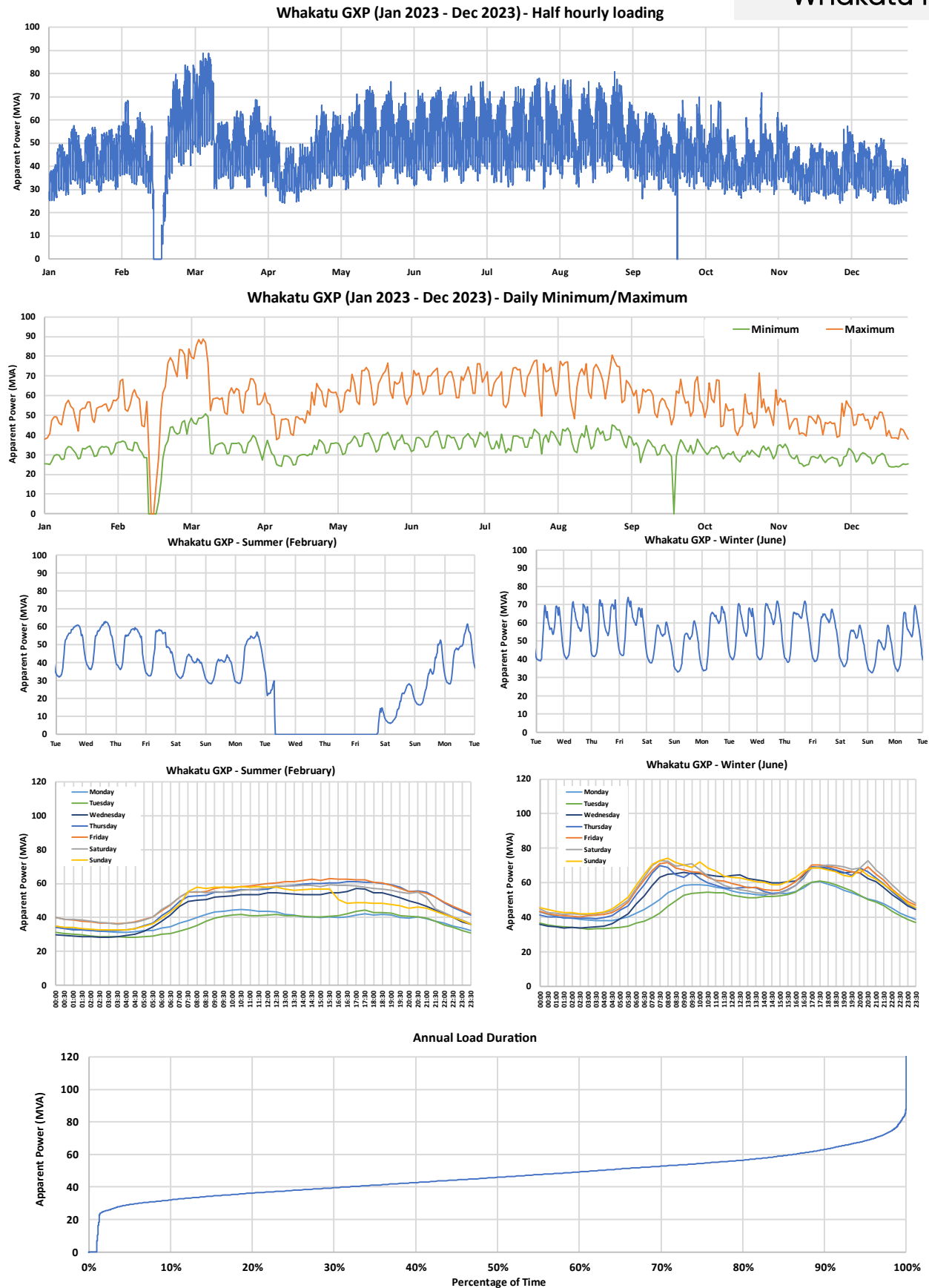


Figure 9. Whakatu: Apparent power (MVA) load characteristics.

Whakatu MVar

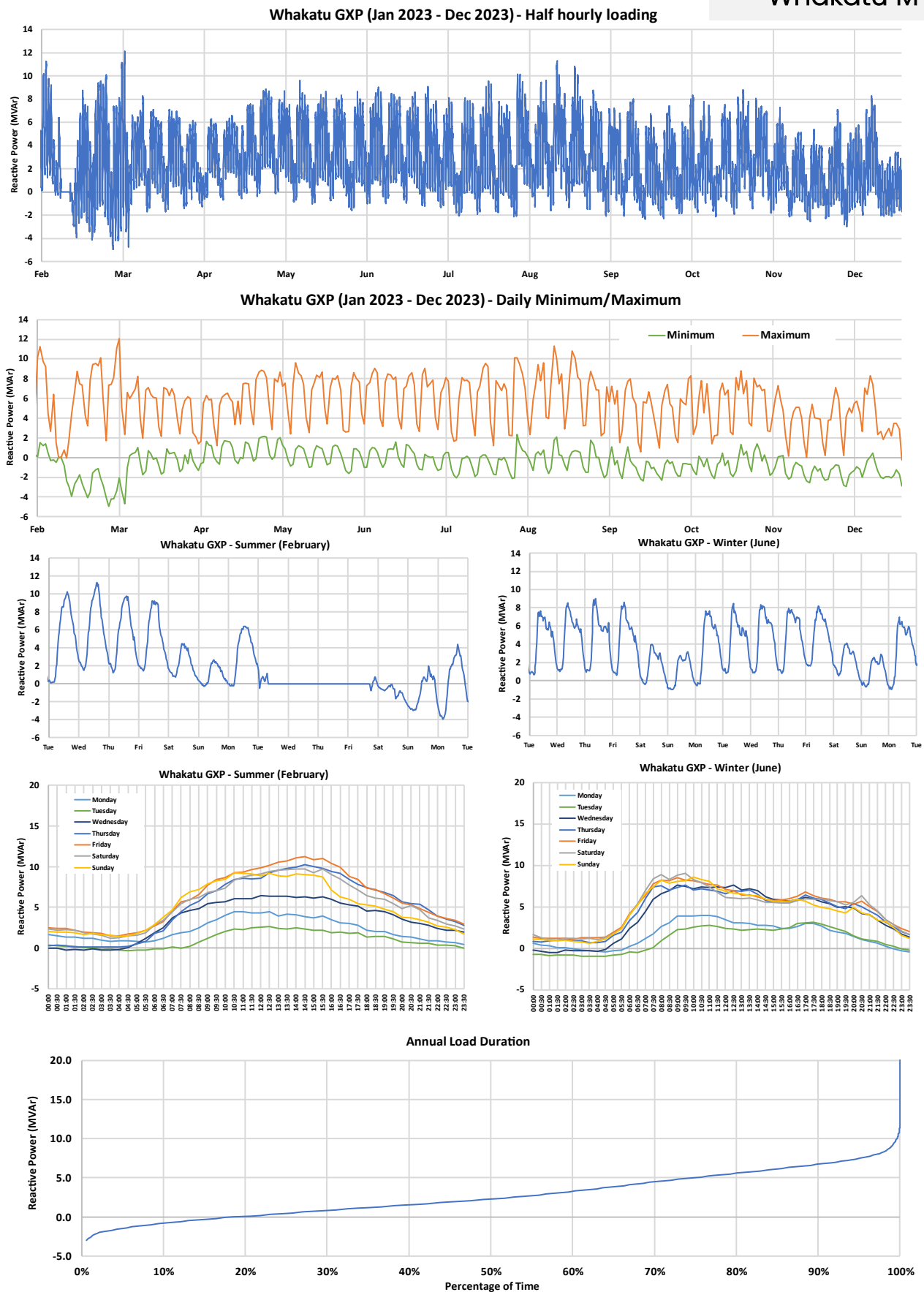


Figure 10. Whakatu: Reactive power (MVar) load characteristics.

3. Zone Substations

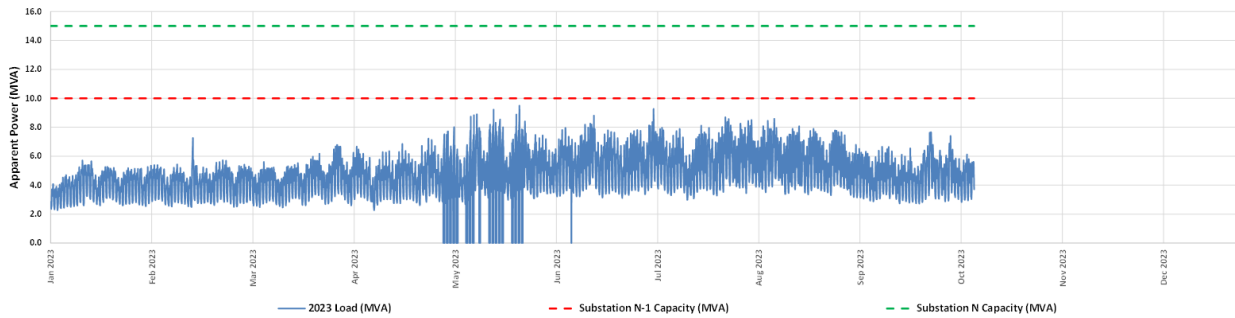
3.1 Centralines

The characteristics of the zone substation **apparent power loadings** within Centralines' network are shown in the following:

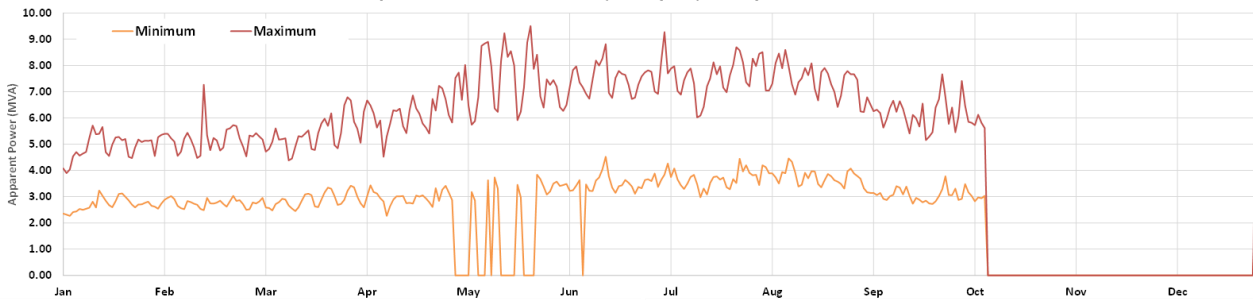
- Figure 11. Waipukurau 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 12. Waipawa 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 13. Takapau 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 14. OngaOnga 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 15. Wilder Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Waipukurau MVA

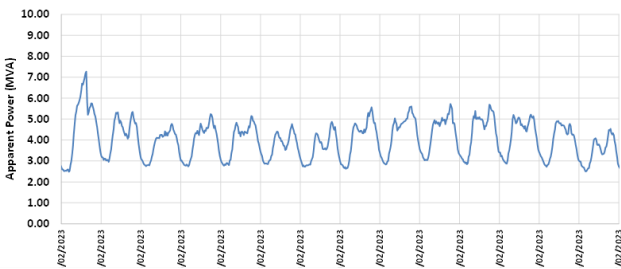
Waipukurau Zone Substation (2023 year) - Half hourly loading



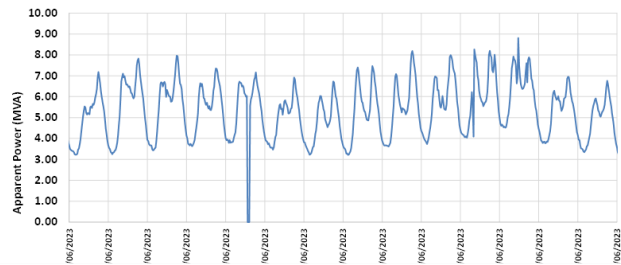
Waipukurau Zone Substation (2023 year) - Daily Maximum/Minimum



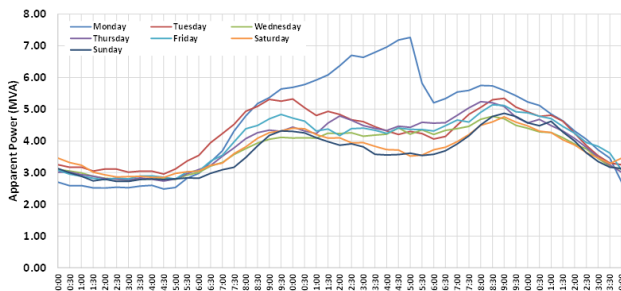
Waipukurau Zone Substation (2023 year) - Summer (February)



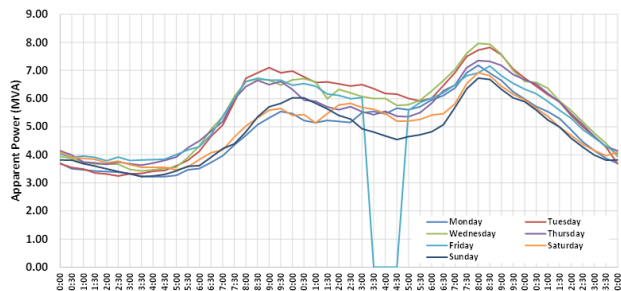
Waipukurau Zone Substation (2023 year) - Winter (June)



Waipukurau Zone Substation (2023 year) - Summer (February)



Waipukurau Zone Substation (2023 year) - Winter (June)



Waipukurau Zone Substation (2023 year) - Load Duration Curve

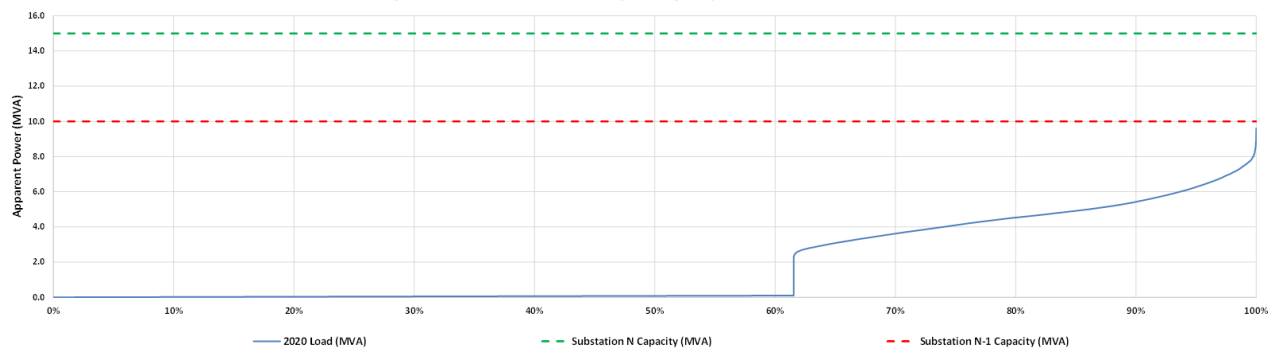
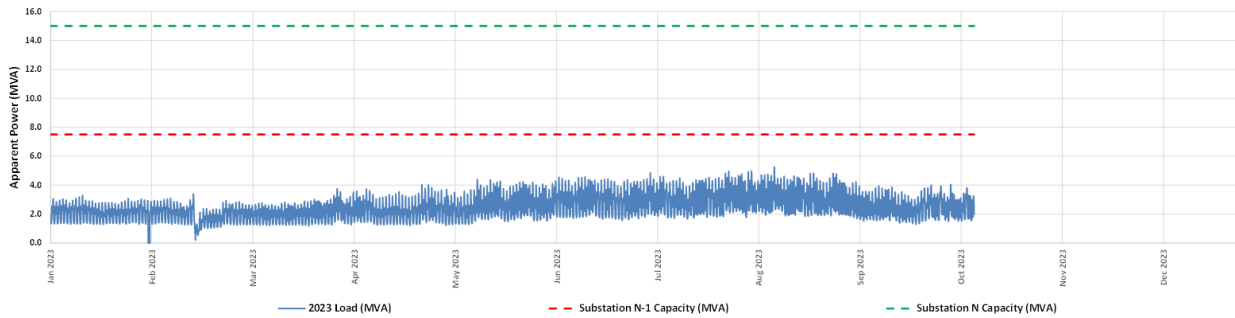


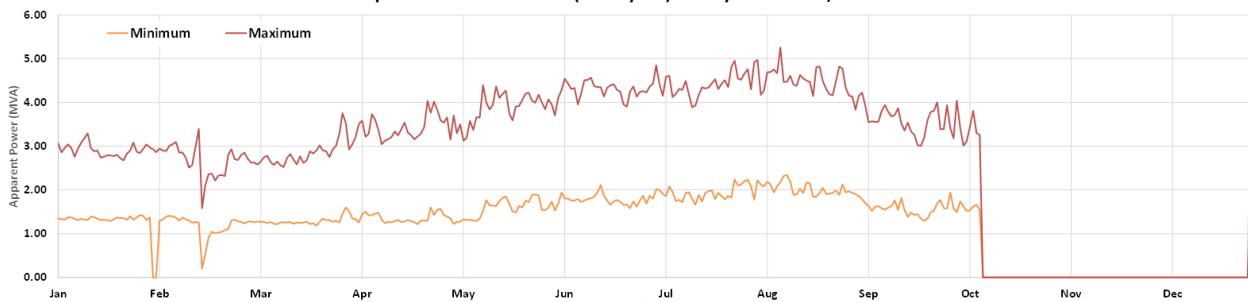
Figure 11. Waipukurau 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Waipawa MVA

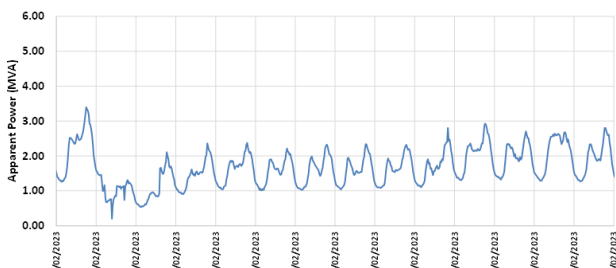
Waipawa Zone Substation (2023 year) - Half hourly loading



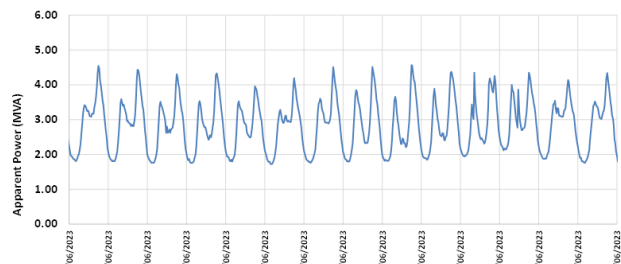
Waipawa Zone Substation (2023 year) - Daily Maximum/Minimum



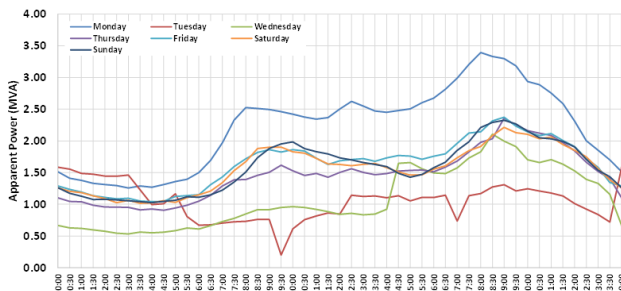
Waipawa Zone Substation (2023 year) - Summer (February)



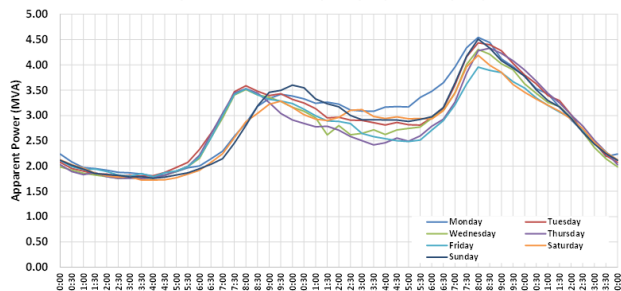
Waipawa Zone Substation (2023 year) - Winter (June)



Waipawa Zone Substation (2023 year) - Summer (February)



Waipawa Zone Substation (2023 year) - Winter (June)



Waipawa Zone Substation (2023 year) - Load Duration Curve

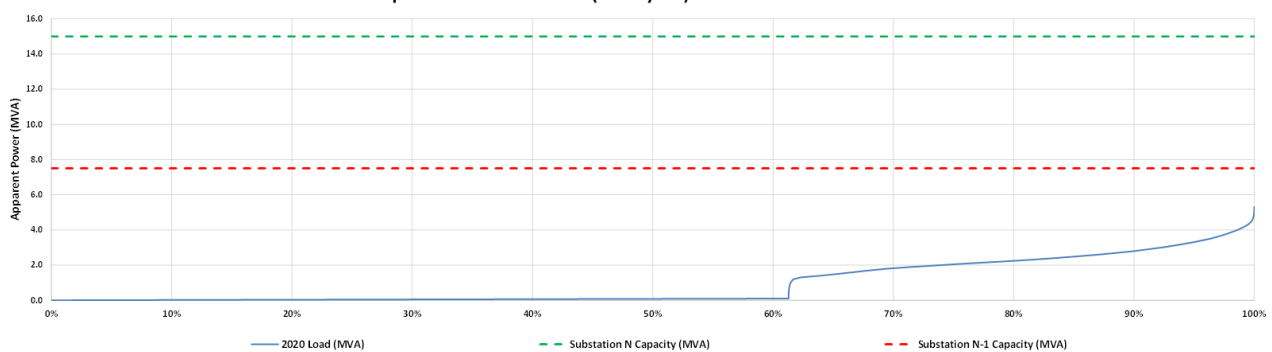
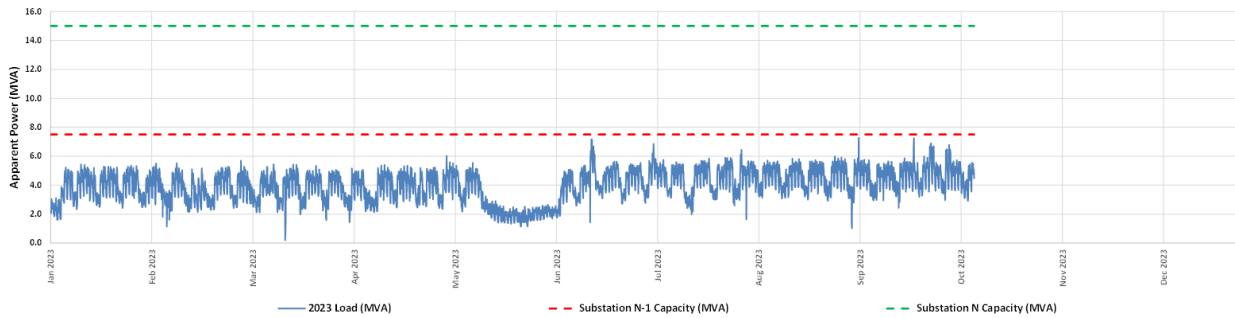


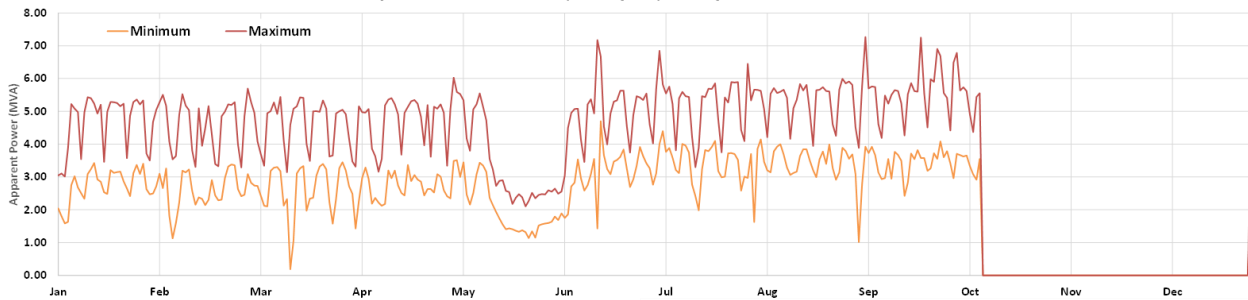
Figure 12. Waipawa 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Takapau MVA

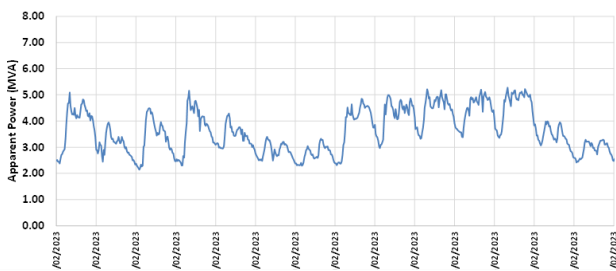
Takapau Zone Substation (2023 year) - Half hourly loading



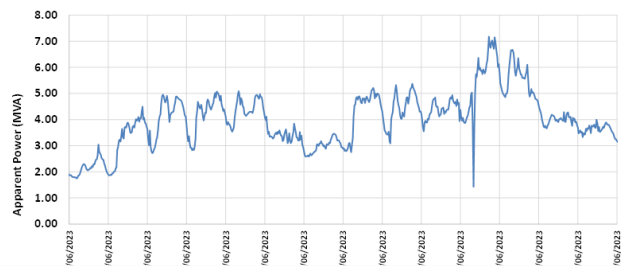
Takapau Zone Substation (2023 year) - Daily Maximum/Minimum



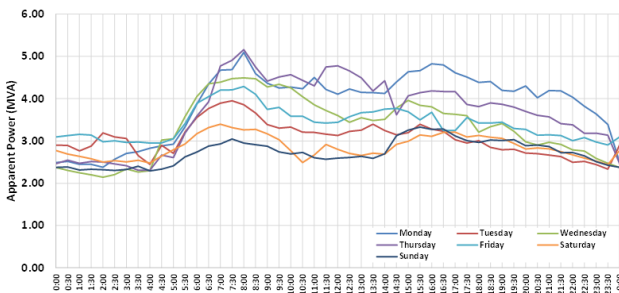
Takapau Zone Substation (2023 year) - Summer (February)



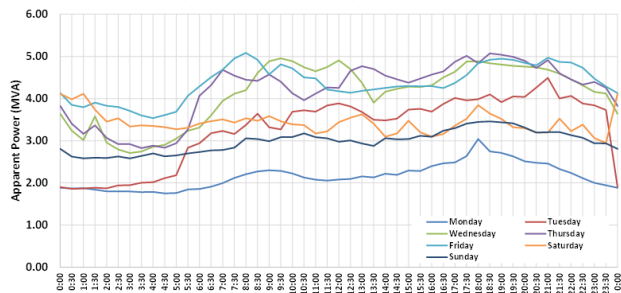
Takapau Zone Substation (2023 year) - Winter (June)



Takapau Zone Substation (2023 year) - Summer (February)



Takapau Zone Substation (2023 year) - Winter (June)



Takapau Zone Substation (2023 year) - Load Duration Curve

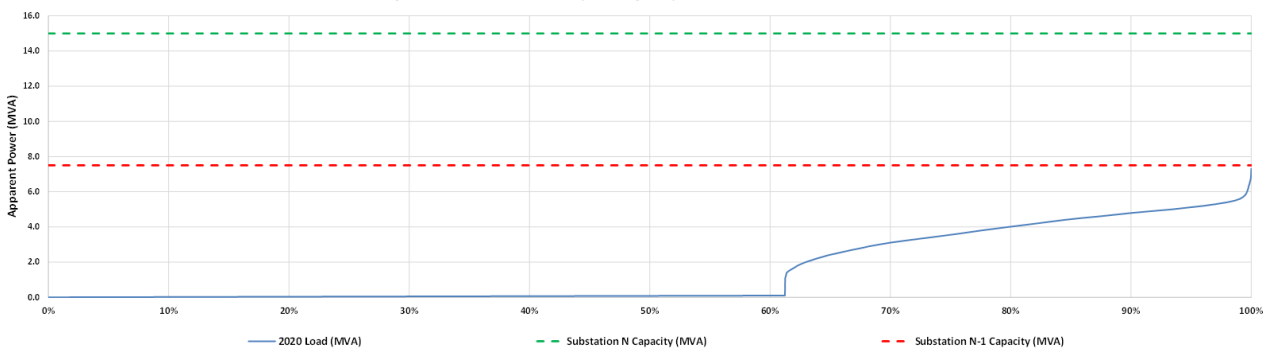


Figure 13. Takapau 33/11 kV zone substation: Apparent power (MVA) load characteristics.

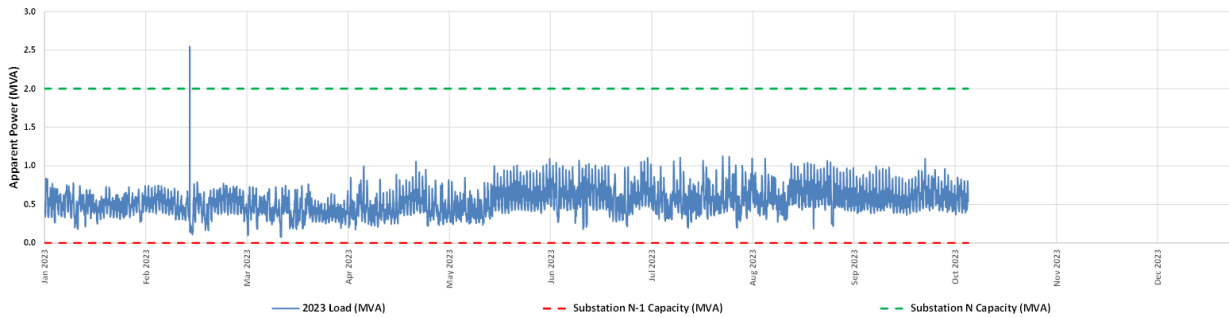
Not supplied

OngaOnga MVA

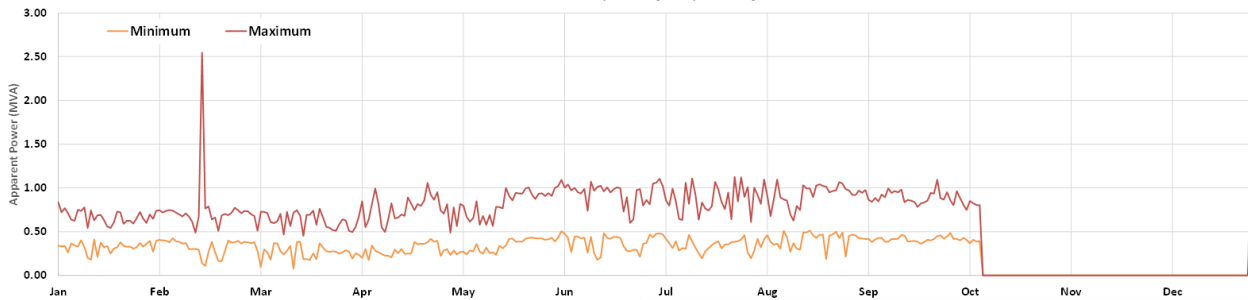
Figure 14. OngaOnga 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Wilder Road MVA

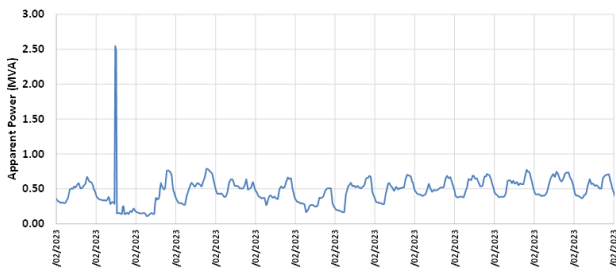
Wilder Road Zone Substation (2023 year) - Half hourly loading



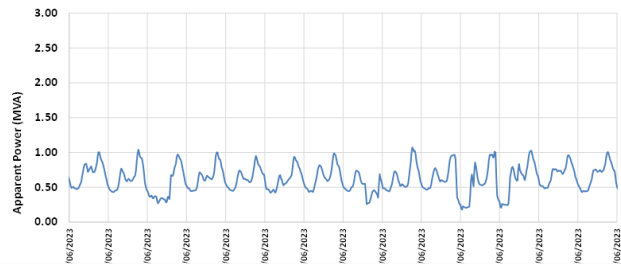
Wilder Road Zone Substation (2023 year) - Daily Maximum/Minimum



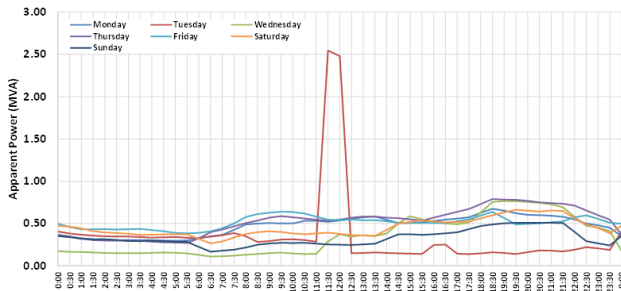
Wilder Road Zone Substation (2023 year) - Summer (February)



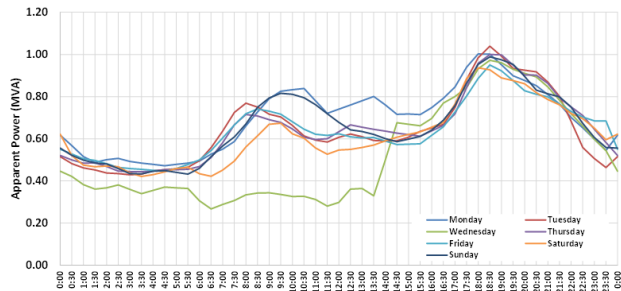
Wilder Road Zone Substation (2023 year) - Winter (June)



Wilder Road Zone Substation (2023 year) - Summer (February)



Wilder Road Zone Substation (2023 year) - Winter (June)



Wilder Road Zone Substation (2023 year) - Load Duration Curve

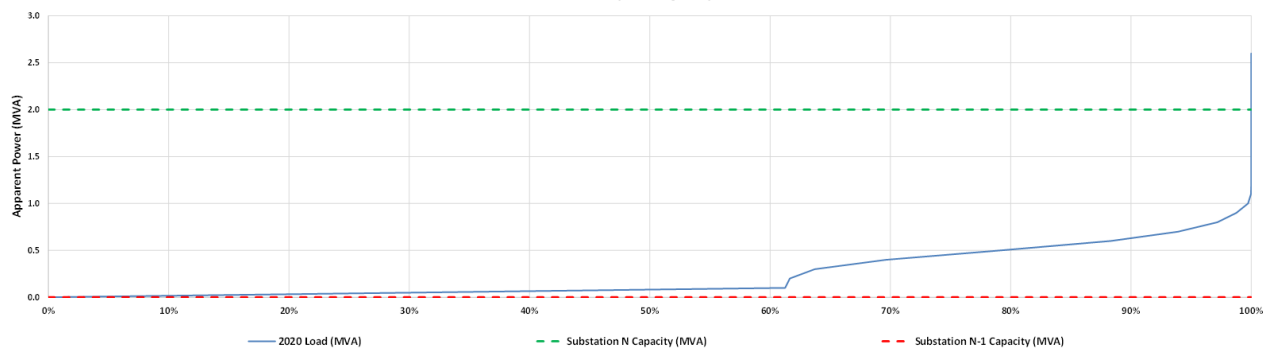


Figure 15. Wilder Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.

3.2 Firstlight

The characteristics of the zone substation **real power loadings** within Firstlight's network are shown in the following:

- Figure 16. Tuai 33/11 kV zone substation: Real power (MW) load characteristics.
- Figure 17. Kiwi 33/11 kV zone substation: Real power (MW) load characteristics.
- Figure 18. Wairoa 33/11 kV zone substation: Real power (MW) load characteristics.
- Figure 19. Blacks Pad 33/11 kV zone substation: Real power (MW) load characteristics.
- Figure 20. Tahaenui 33/11 kV zone substation: Real power (MW) load characteristics.
- Figure 21. Waihi 33/11 kV zone substation: Real power (MW) load characteristics.

Not Supplied

Tuai MW

Figure 16. Tuai 33/11 kV zone substation: Real power (MW) load characteristics.

Not Supplied

Kiwi MW

Figure 17. Kiwi 33/11 kV zone substation: Real power (MW) load characteristics.

Not Supplied

Wairoa MW

Figure 18. Wairoa 33/11 kV zone substation: Real power (MW) load characteristics.

Not Supplied

Blacks Pad MW

Figure 19. Blacks Pad 33/11 kV zone substation: Real power (MW) load characteristics.

Not Supplied

Tahaenui MW

Figure 20. Tahaenui 33/11 kV zone substation: Real power (MW) load characteristics.

Not Supplied

Waihi MW

Figure 21. Waihi 33/11 kV zone substation: Real power (MW) load characteristics.

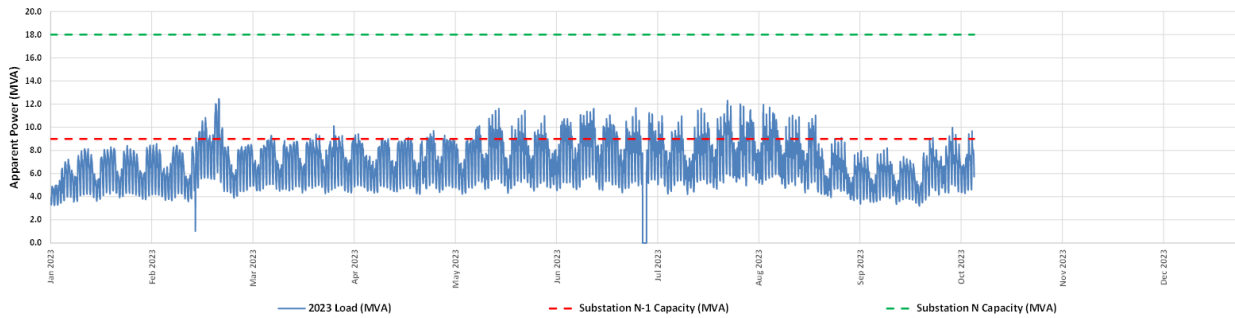
3.3 Unison

The characteristics of the zone substation **apparent power loadings** within Unison's network are shown in the following:

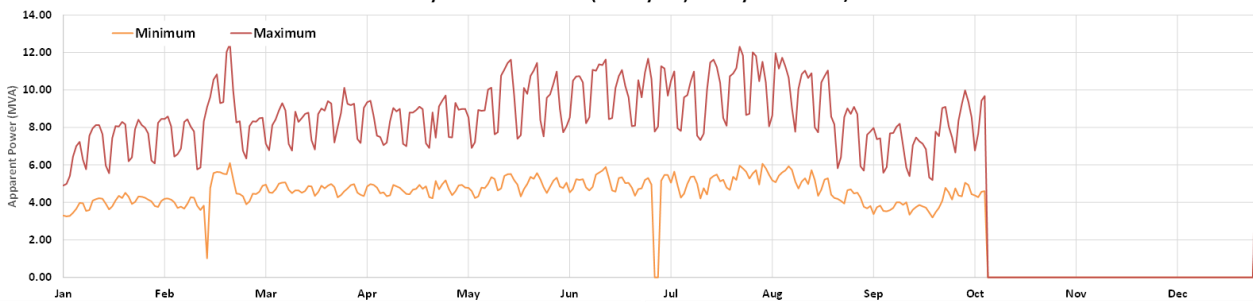
- Figure 22. Camberley 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 23. Fernhill 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 24. Flaxmere 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 25. Havelock North 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 26. Irongate 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 27. Maraekakaho 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 28. McCain 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 29. Sherenden 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 30. Awatoto 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 31. Church Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 32. Esk 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 33. Faraday Street 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 34. Patoka 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 35. Springfield 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 36. Tamatea 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 37. Tannery Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 38. Tutira 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 39. Arataki 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 40. Bluff Hill 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 41. Hastings 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 42. Mahora 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 43. Marewa 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 44. Rangitane 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 45. Tomoana 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 46. Windsor 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Camberley MVA

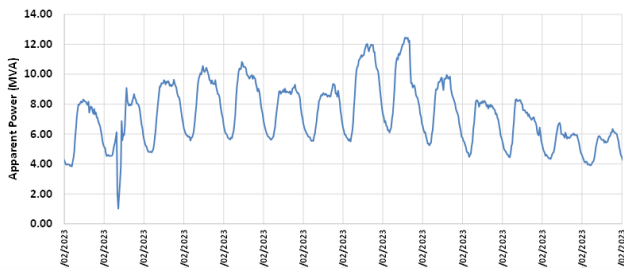
Camberley Zone Substation (2023 year) - Half hourly loading



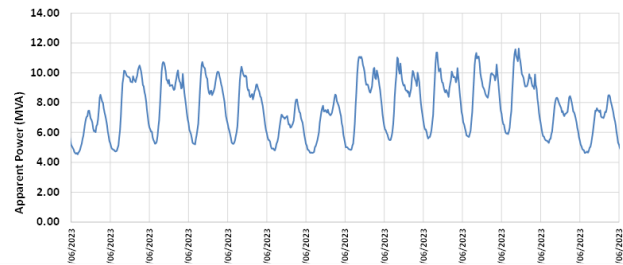
Camberley Zone Substation (2023 year) - Daily Maximum/Minimum



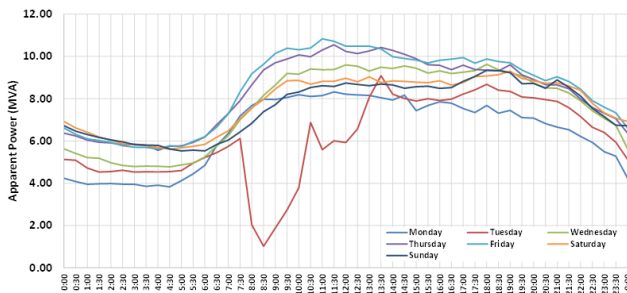
Camberley Zone Substation (2023 year) - Summer (February)



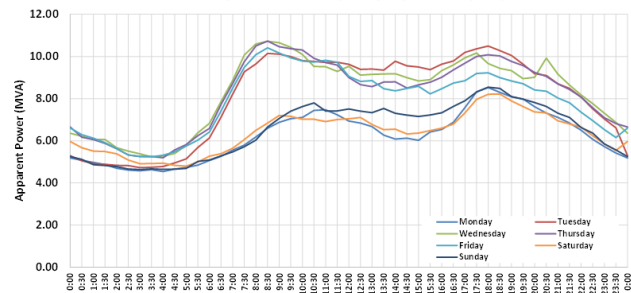
Camberley Zone Substation (2023 year) - Winter (June)



Camberley Zone Substation (2023 year) - Summer (February)



Camberley Zone Substation (2023 year) - Winter (June)



Camberley Zone Substation (2023 year) - Load Duration Curve

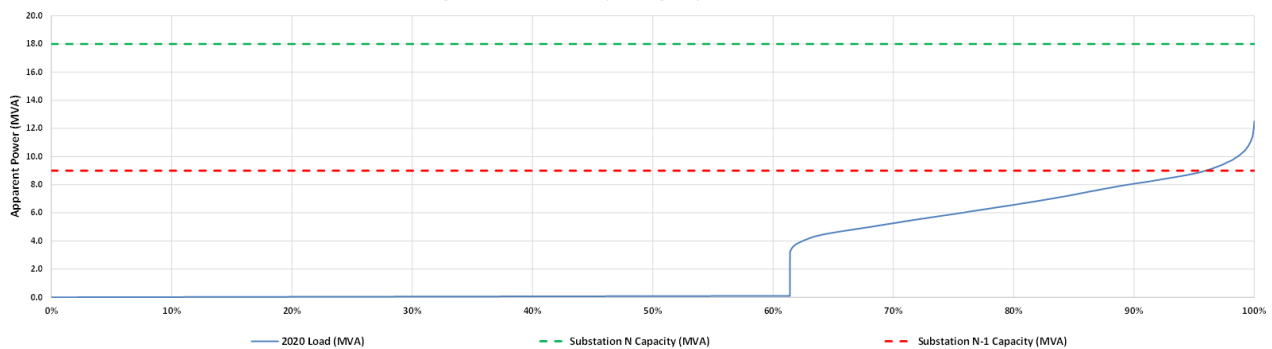
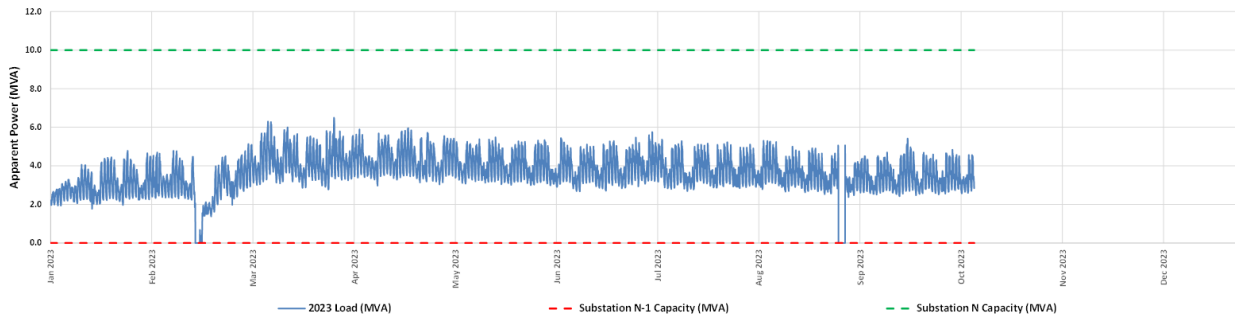


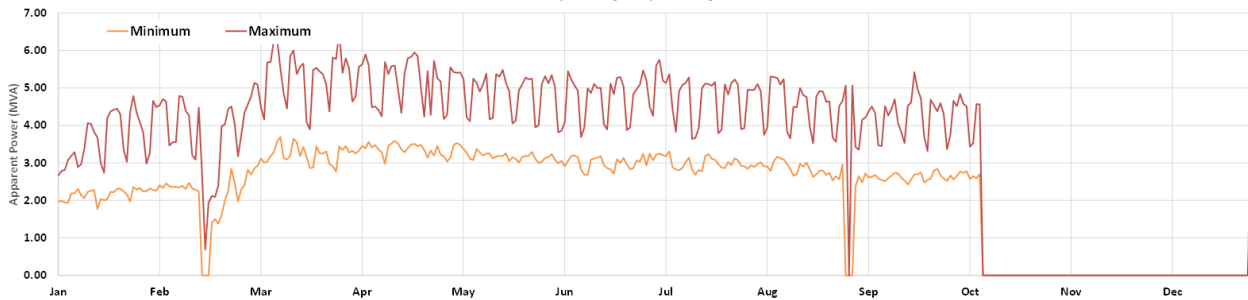
Figure 22. Camberley 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Fernhill MVA

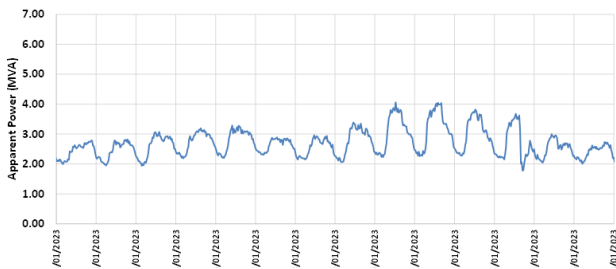
Fernhill Zone Substation (2023 year) - Half hourly loading



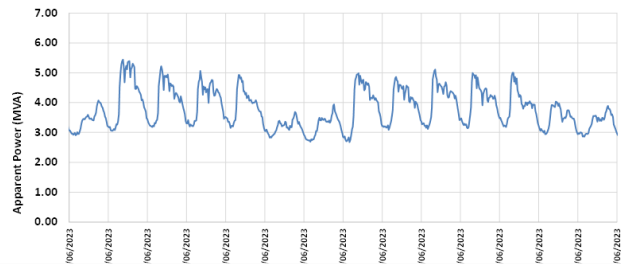
Fernhill Zone Substation (2023 year) - Daily Maximum/Minimum



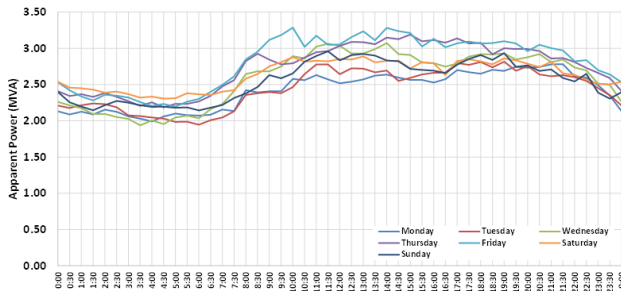
Fernhill Zone Substation (2023 year) - Summer (January)



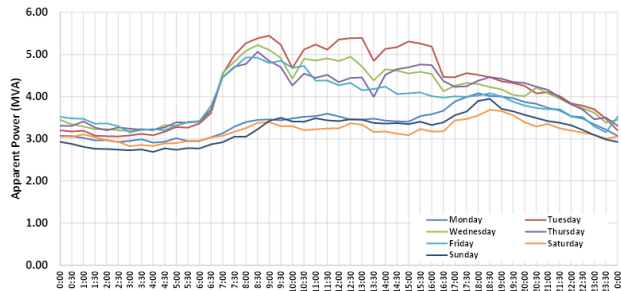
Fernhill Zone Substation (2023 year) - Winter (June)



Fernhill Zone Substation (2023 year) - Summer (January)



Fernhill Zone Substation (2023 year) - Winter (June)



Fernhill Zone Substation (2023 year) - Load Duration Curve

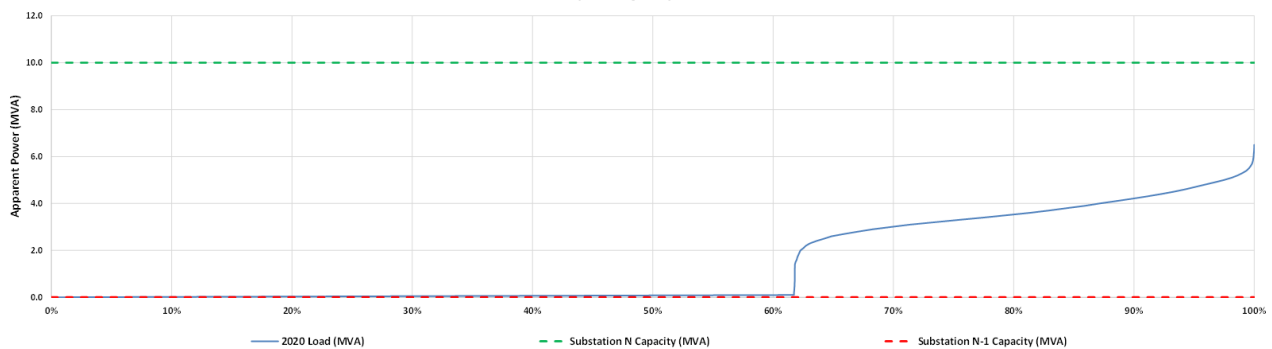
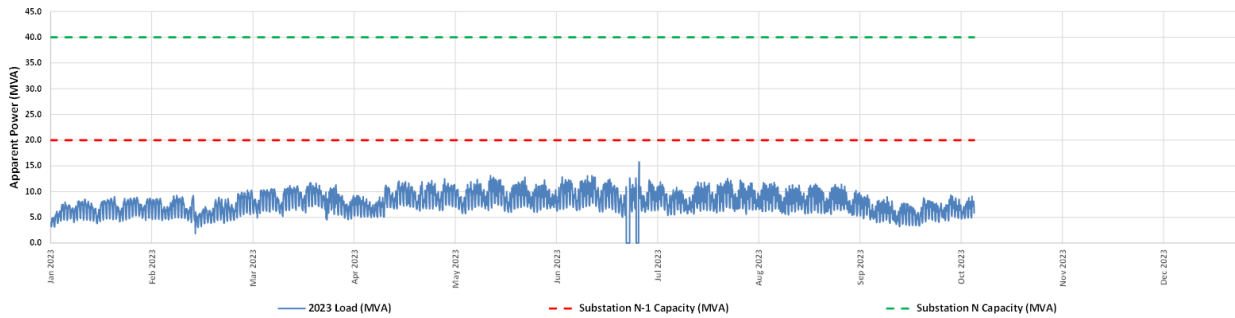


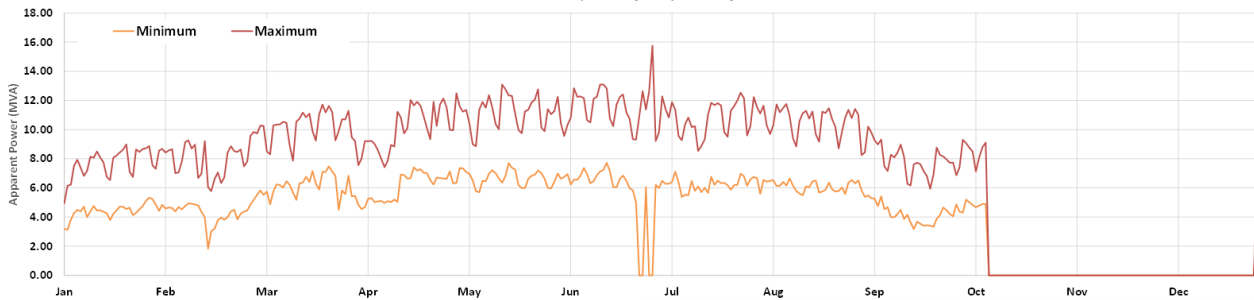
Figure 23. Fernhill 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Flaxmere MVA

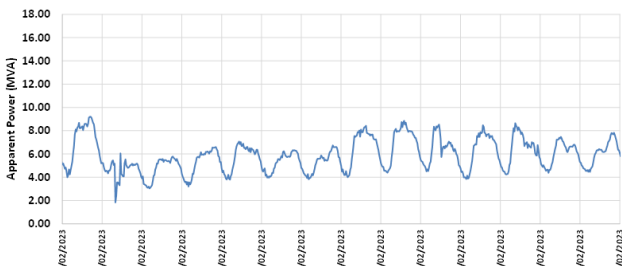
Flaxmere Zone Substation (2023 year) - Half hourly loading



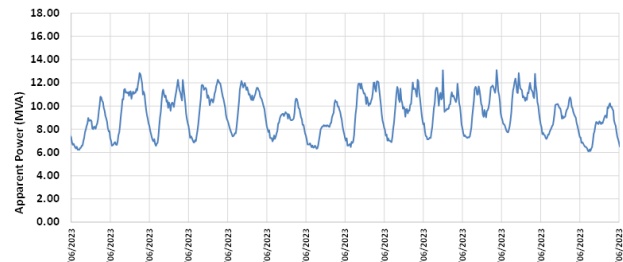
Flaxmere Zone Substation (2023 year) - Daily Maximum/Minimum



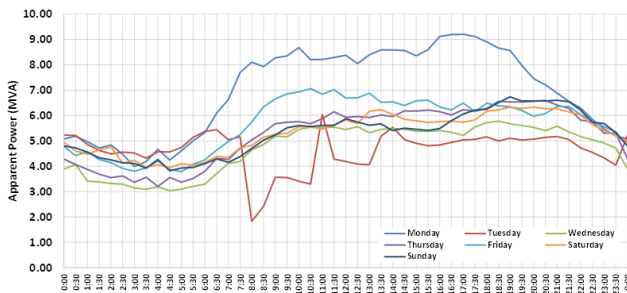
Flaxmere Zone Substation (2023 year) - Summer (February)



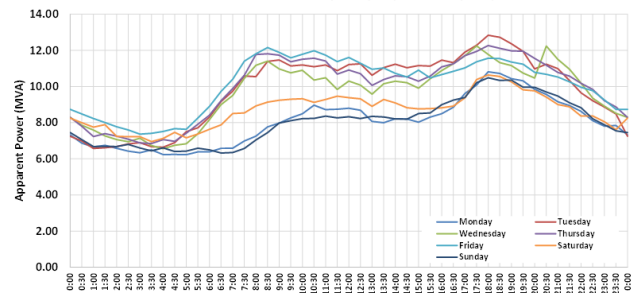
Flaxmere Zone Substation (2023 year) - Winter (June)



Flaxmere Zone Substation (2023 year) - Summer (February)



Flaxmere Zone Substation (2023 year) - Winter (June)



Flaxmere Zone Substation (2023 year) - Load Duration Curve

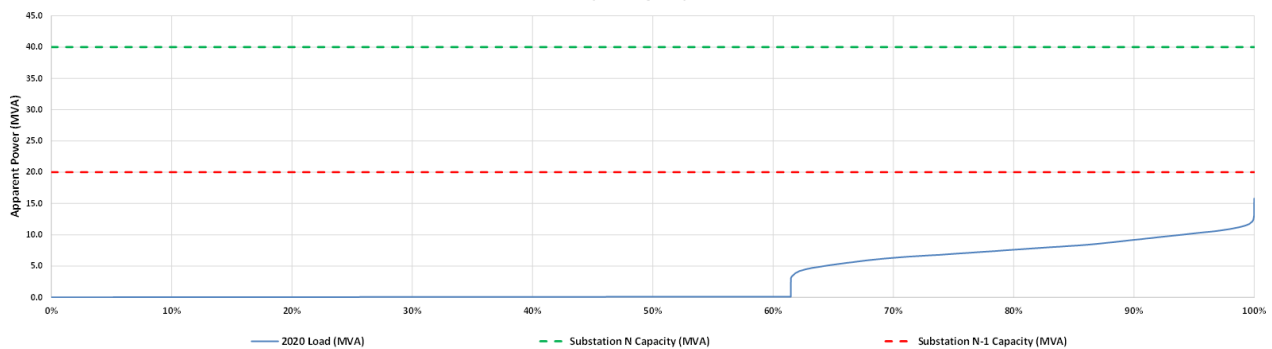
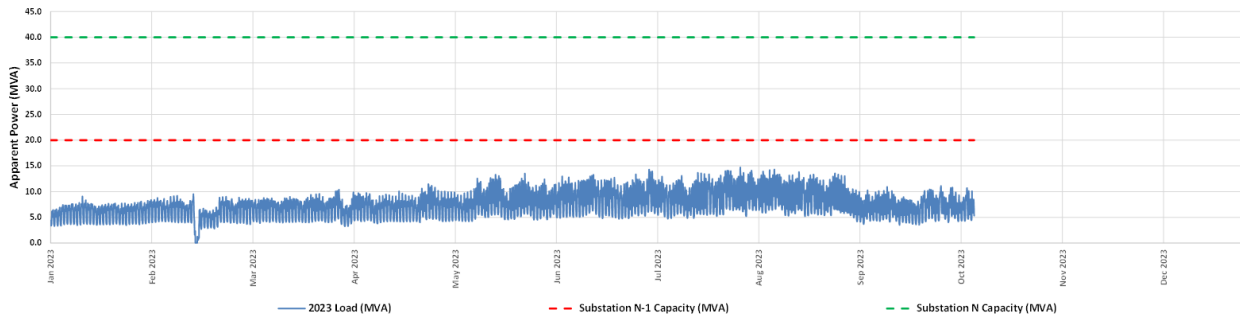


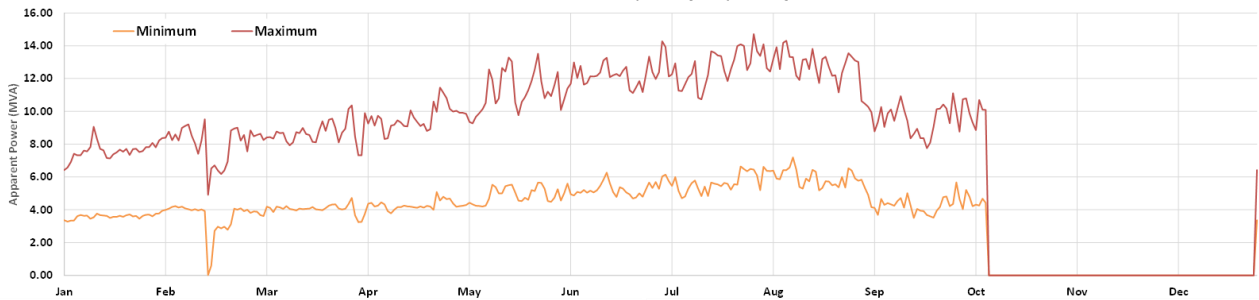
Figure 24. Flaxmere 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Havelock North MVA

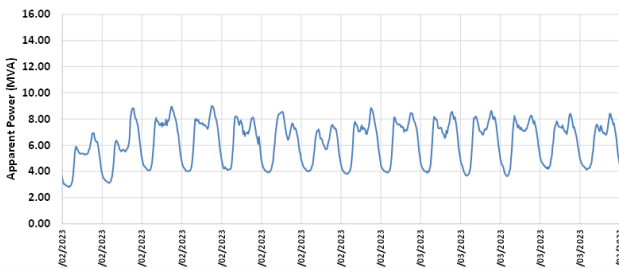
Havelock North Zone Substation (2023 year) - Half hourly loading



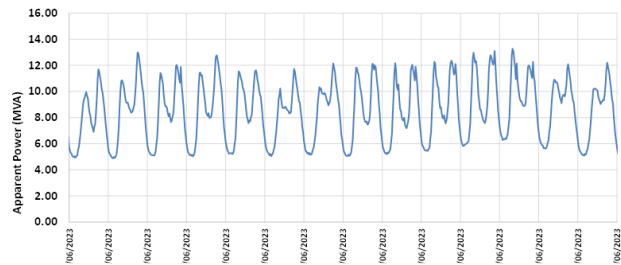
Havelock North Zone Substation (2023 year) - Daily Maximum/Minimum



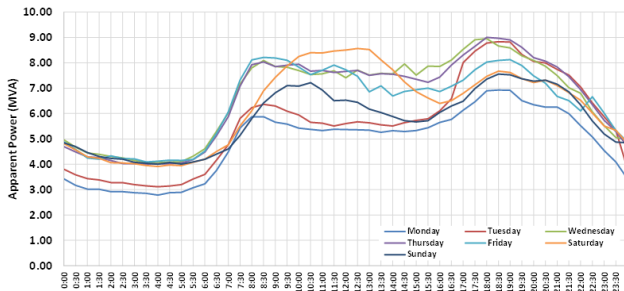
Havelock North Zone Substation (2023 year) - Summer (February)



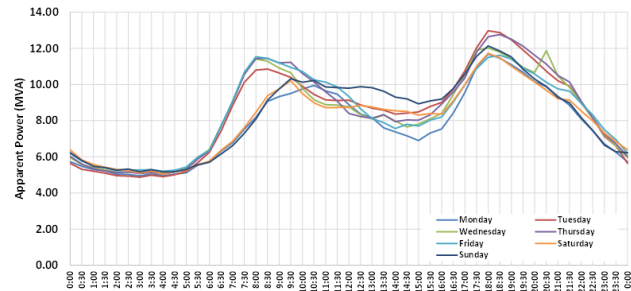
Havelock North Zone Substation (2023 year) - Winter (June)



Havelock North Zone Substation (2023 year) - Summer (February)



Havelock North Zone Substation (2023 year) - Winter (June)



Havelock North Zone Substation (2023 year) - Load Duration Curve

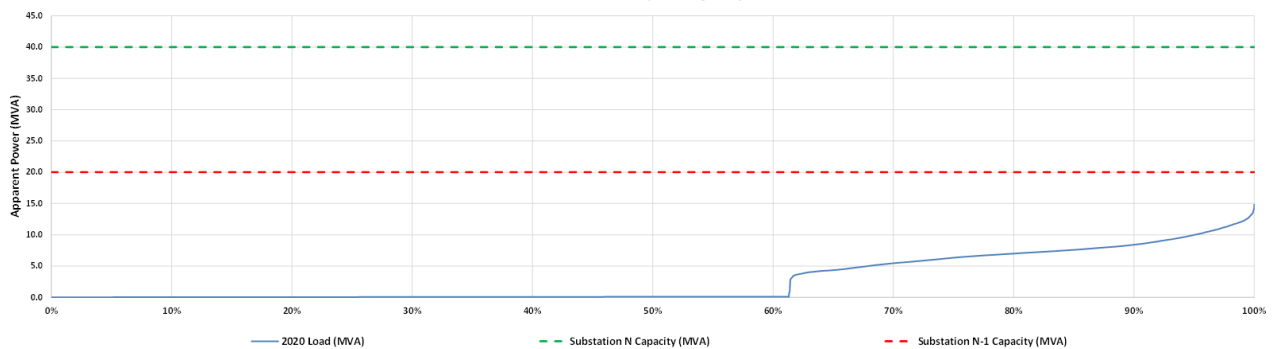
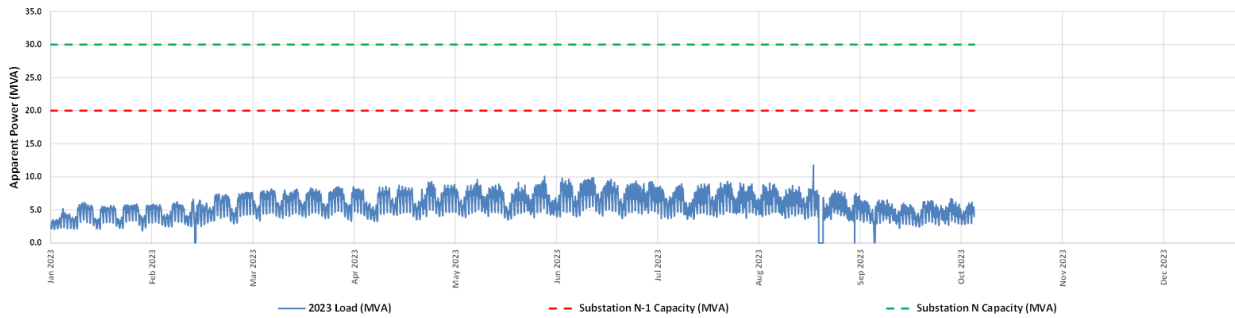


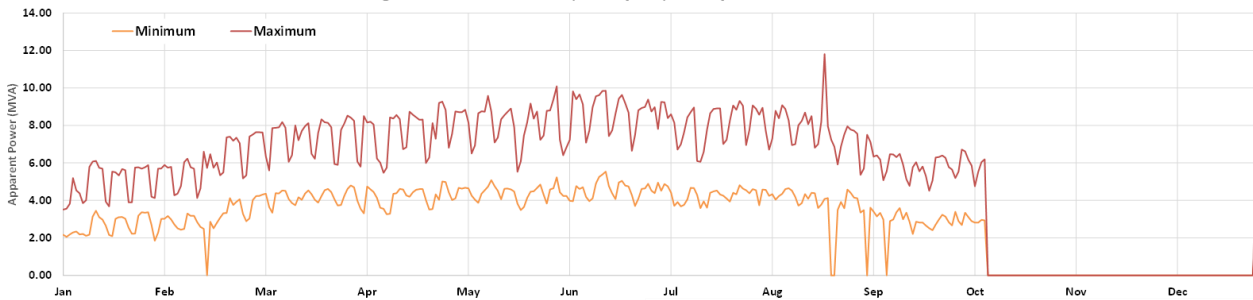
Figure 25. Havelock North 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Irongate MVA

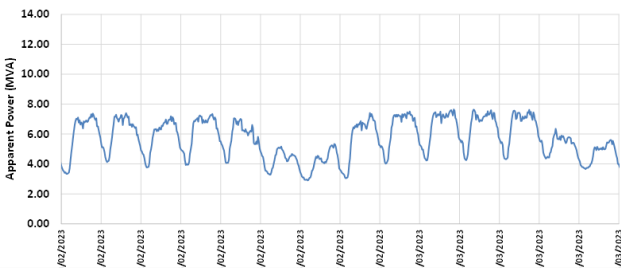
Irongate Zone Substation (2023 year) - Half hourly loading



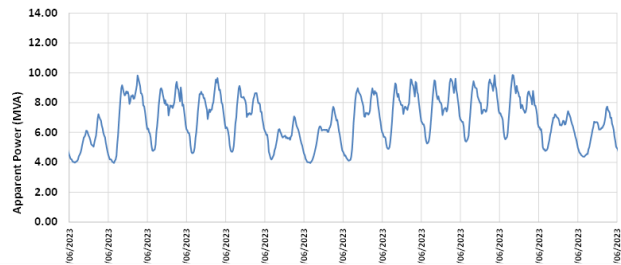
Irongate Zone Substation (2023 year) - Daily Maximum/Minimum



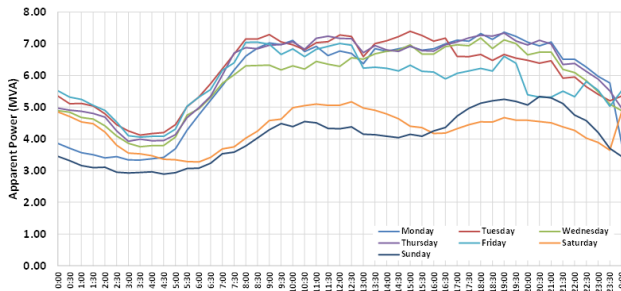
Irongate Zone Substation (2023 year) - Summer (February)



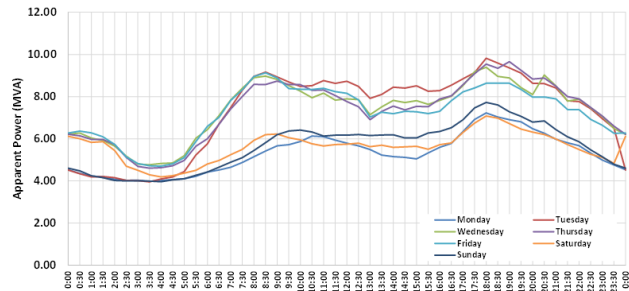
Irongate Zone Substation (2023 year) - Winter (June)



Irongate Zone Substation (2023 year) - Summer (February)



Irongate Zone Substation (2023 year) - Winter (June)



Irongate Zone Substation (2023 year) - Load Duration Curve

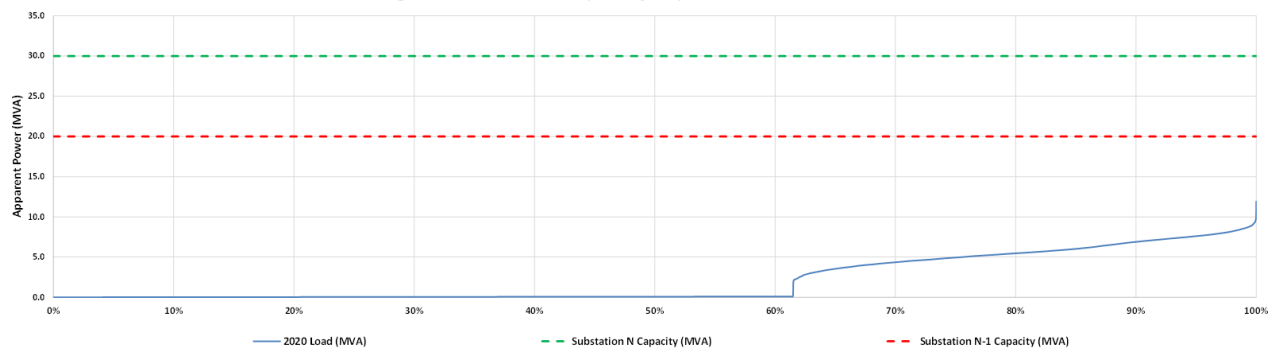
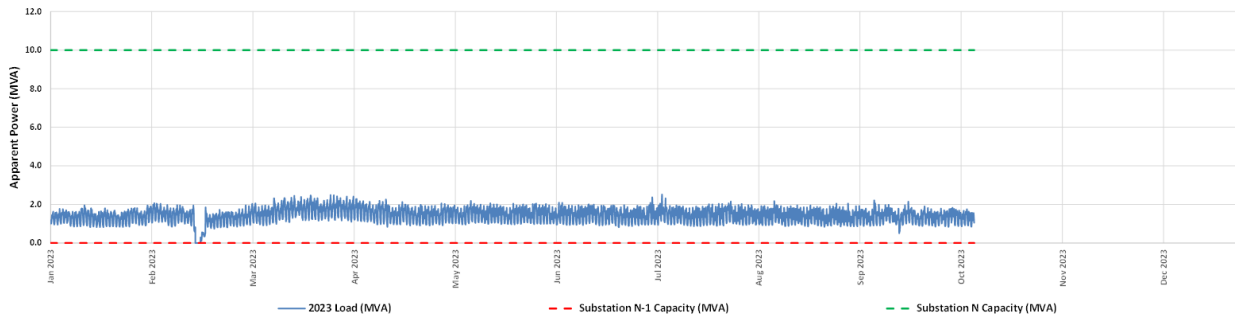


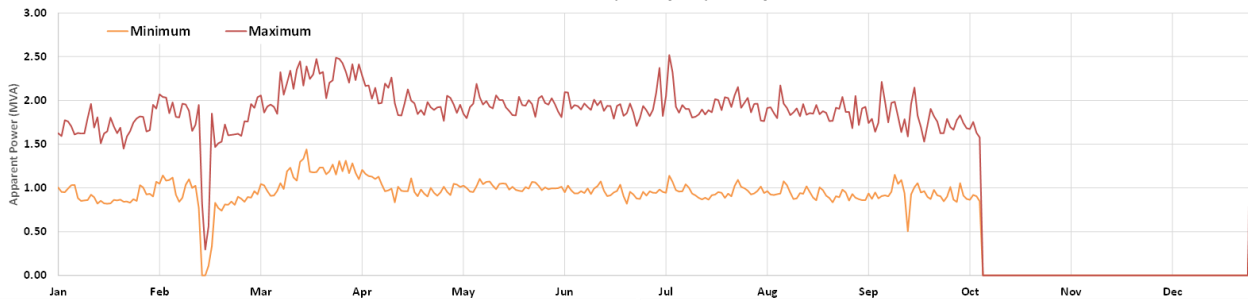
Figure 26. Irongate 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Maraekakaho MVA

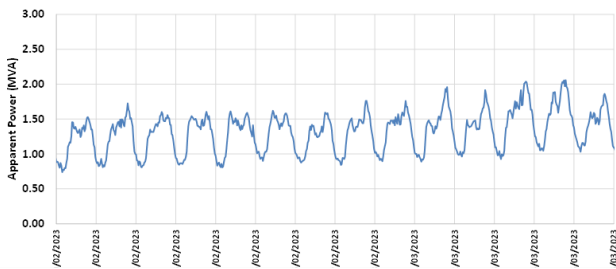
Maraekakaho Zone Substation (2023 year) - Half hourly loading



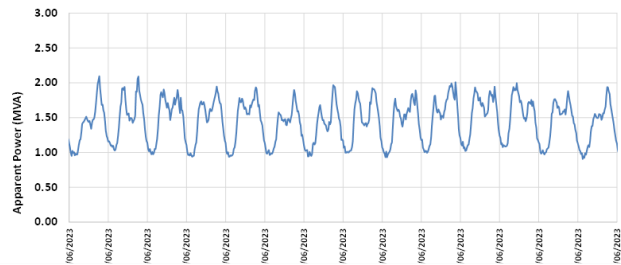
Maraekakaho Zone Substation (2023 year) - Daily Maximum/Minimum



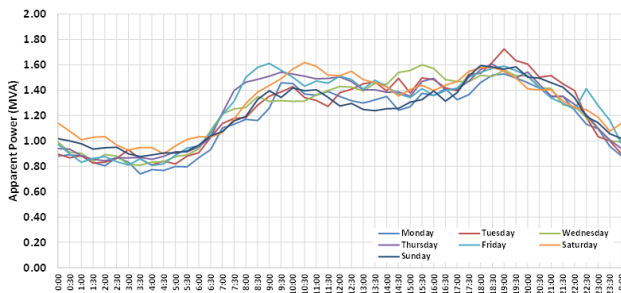
Maraekakaho Zone Substation (2023 year) - Summer (February)



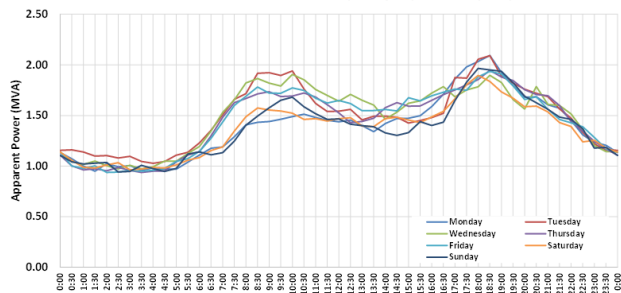
Maraekakaho Zone Substation (2023 year) - Winter (June)



Maraekakaho Zone Substation (2023 year) - Summer (February)



Maraekakaho Zone Substation (2023 year) - Winter (June)



Maraekakaho Zone Substation (2023 year) - Load Duration Curve

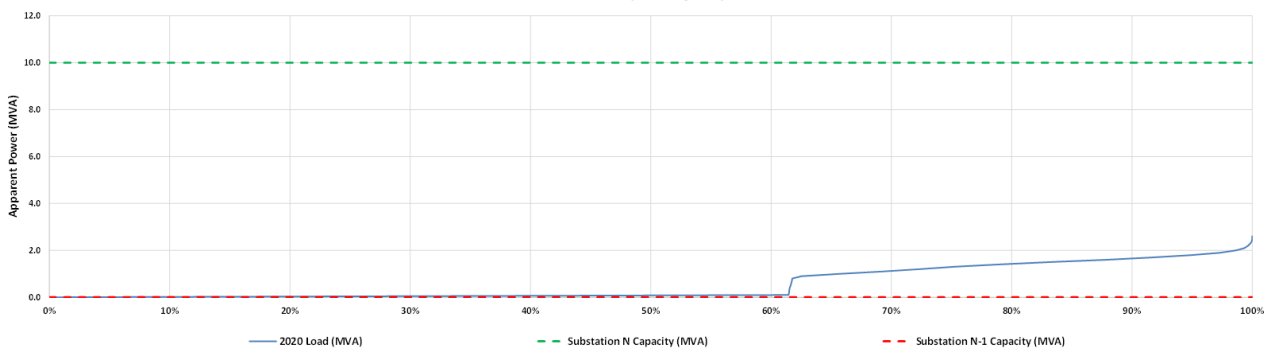


Figure 27. Maraekakaho 33/11 kV zone substation: Apparent power (MVA) load characteristics.

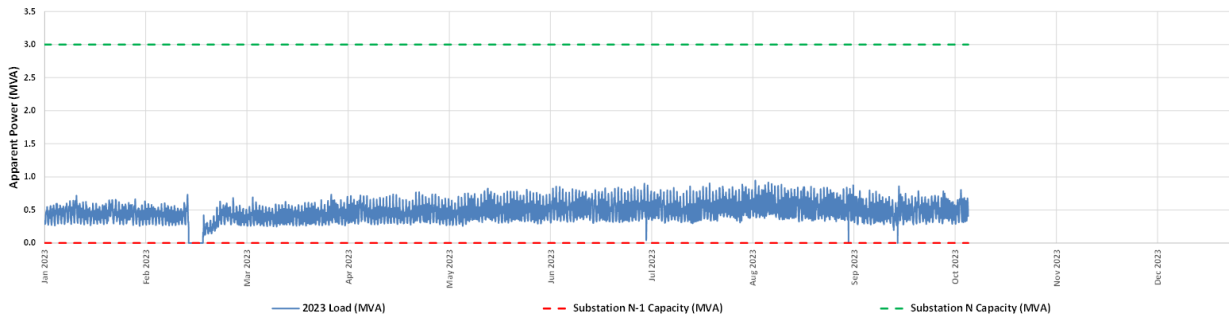
Not Supplied

McCain MW

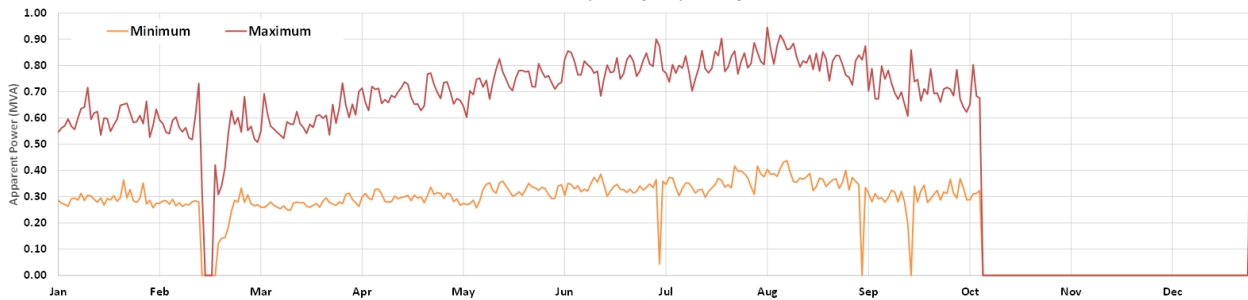
Figure 28. McCain 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Sherenden MVA

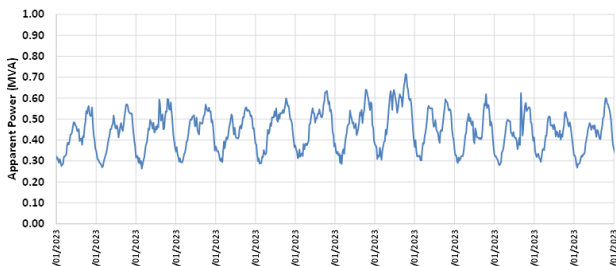
Sherenden Zone Substation (2023 year) - Half hourly loading



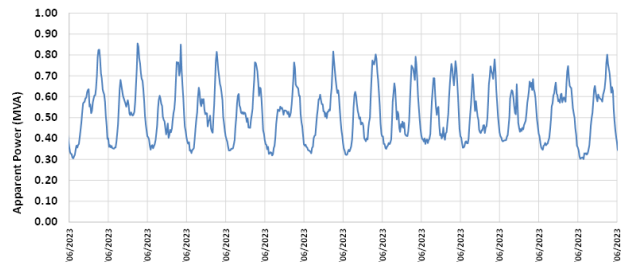
Sherenden Zone Substation (2023 year) - Daily Maximum/Minimum



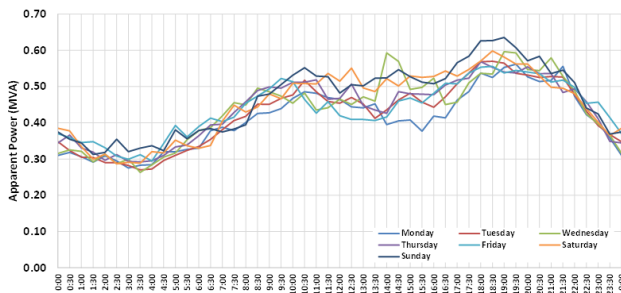
Sherenden Zone Substation (2023 year) - Summer (January)



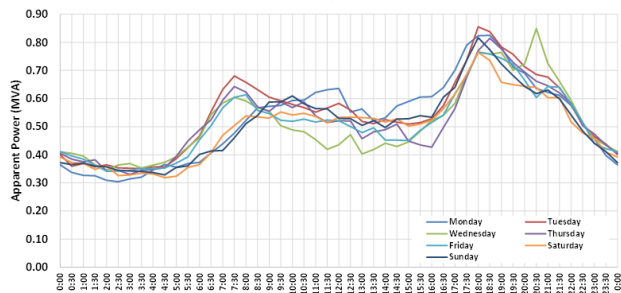
Sherenden Zone Substation (2023 year) - Winter (June)



Sherenden Zone Substation (2023 year) - Summer (January)



Sherenden Zone Substation (2023 year) - Winter (June)



Sherenden Zone Substation (2023 year) - Load Duration Curve

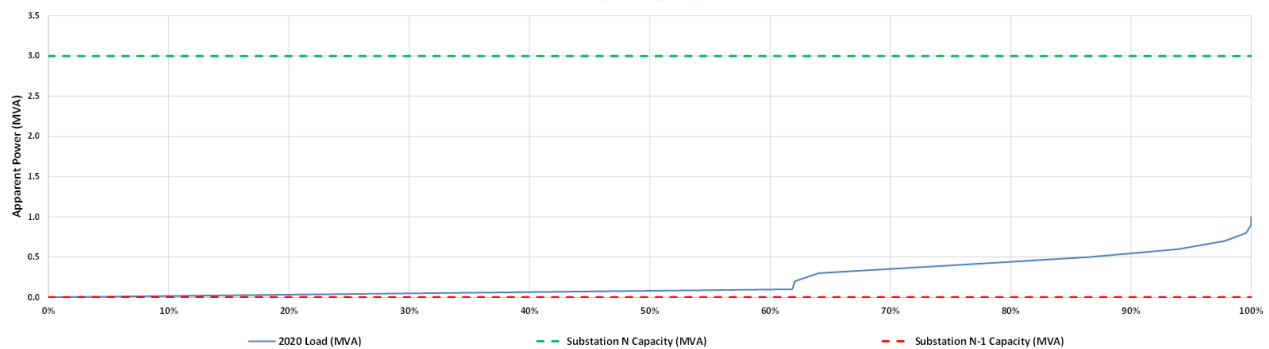


Figure 29. Sherenden 33/11 kV zone substation: Apparent power (MVA) load characteristics.

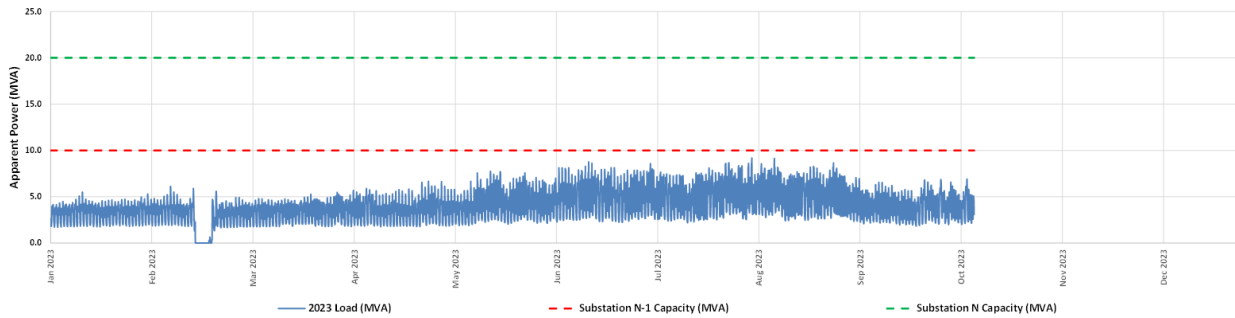
Not Supplied

Awatoto MW

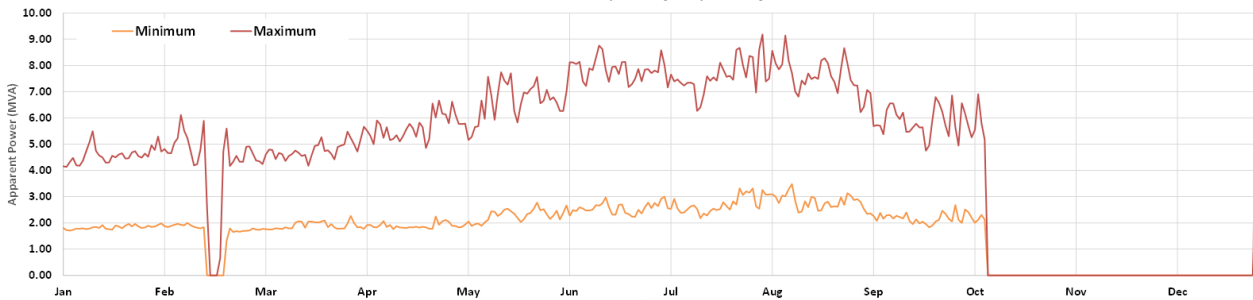
Figure 30. Awatoto 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Church Road MVA

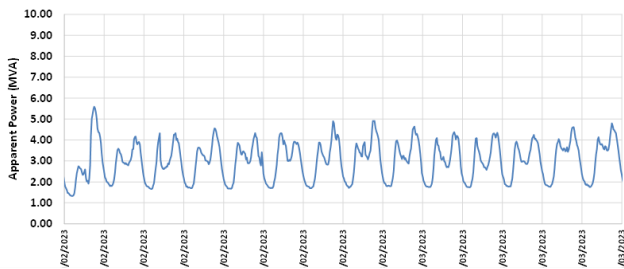
Church Road Zone Substation (2023 year) - Half hourly loading



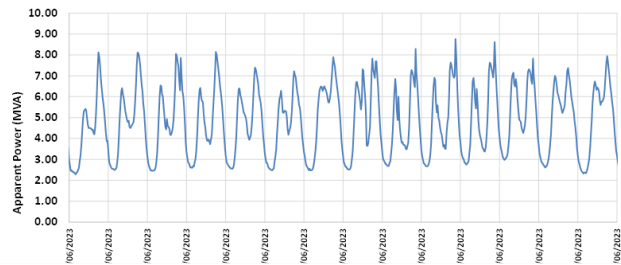
Church Road Zone Substation (2023 year) - Daily Maximum/Minimum



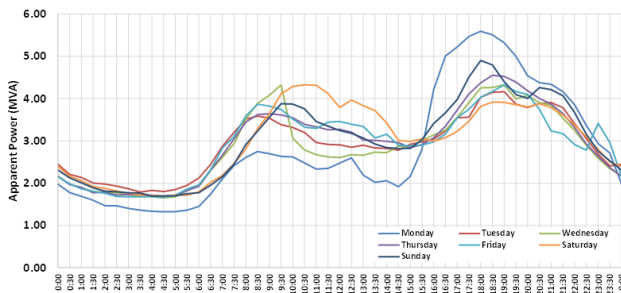
Church Road Zone Substation (2023 year) - Summer (February)



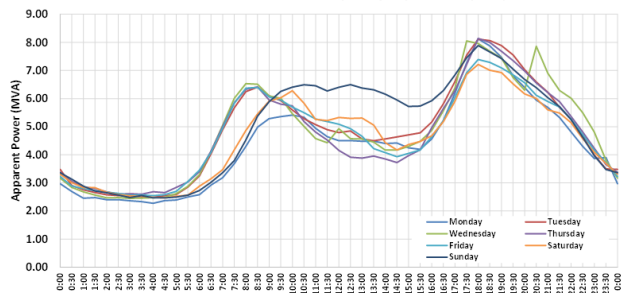
Church Road Zone Substation (2023 year) - Winter (June)



Church Road Zone Substation (2023 year) - Summer (February)



Church Road Zone Substation (2023 year) - Winter (June)



Church Road Zone Substation (2023 year) - Load Duration Curve

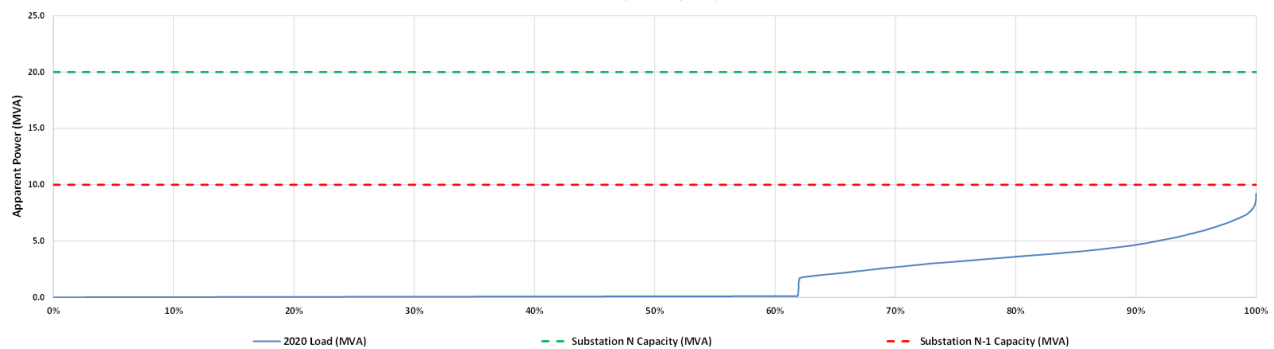
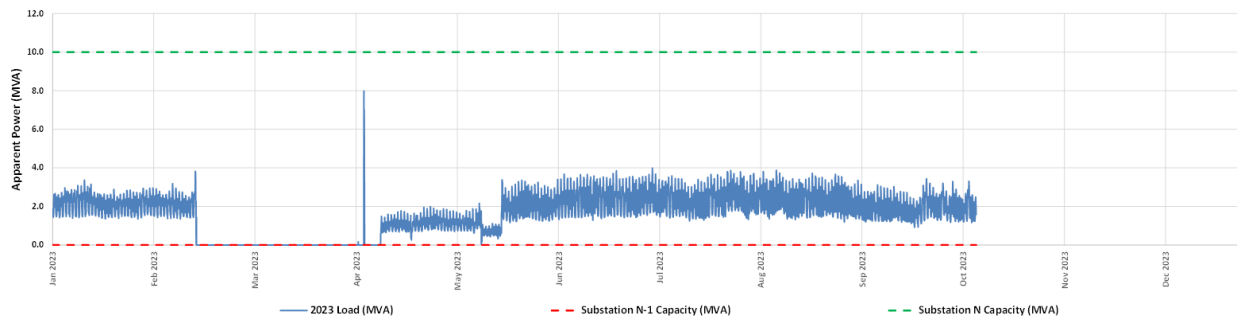


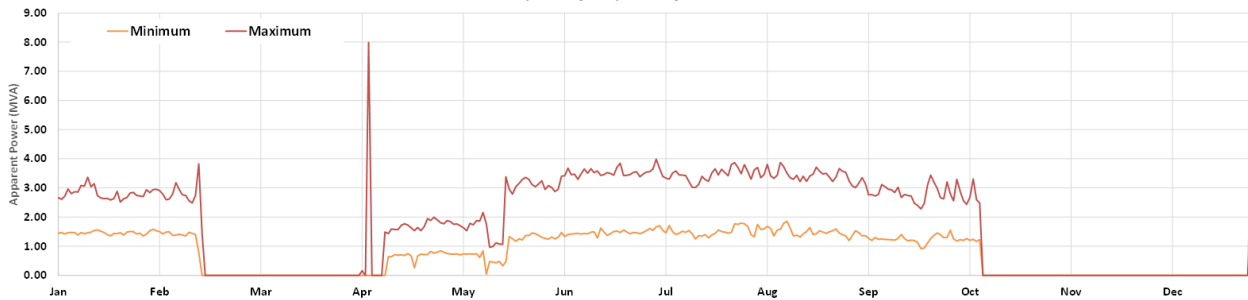
Figure 31. Church Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Esk MVA

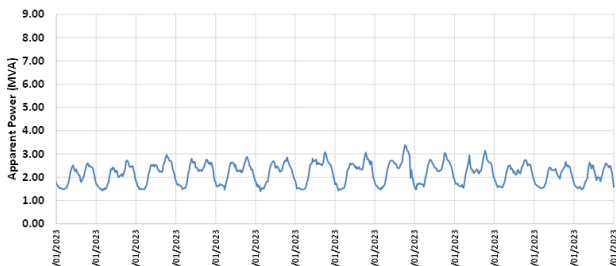
ESK Zone Substation (2023 year) - Half hourly loading



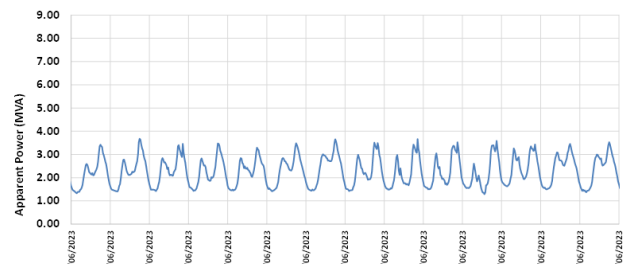
ESK Zone Substation (2023 year) - Daily Maximum/Minimum



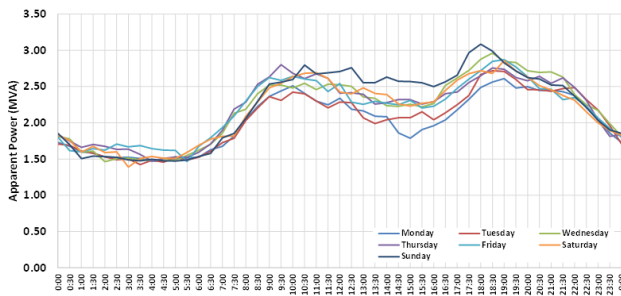
ESK Zone Substation (2023 year) - Summer (January)



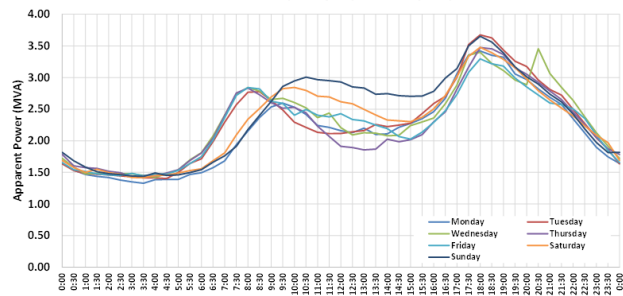
ESK Zone Substation (2023 year) - Winter (June)



ESK Zone Substation (2023 year) - Summer (January)



ESK Zone Substation (2023 year) - Winter (June)



ESK Zone Substation (2023 year) - Load Duration Curve

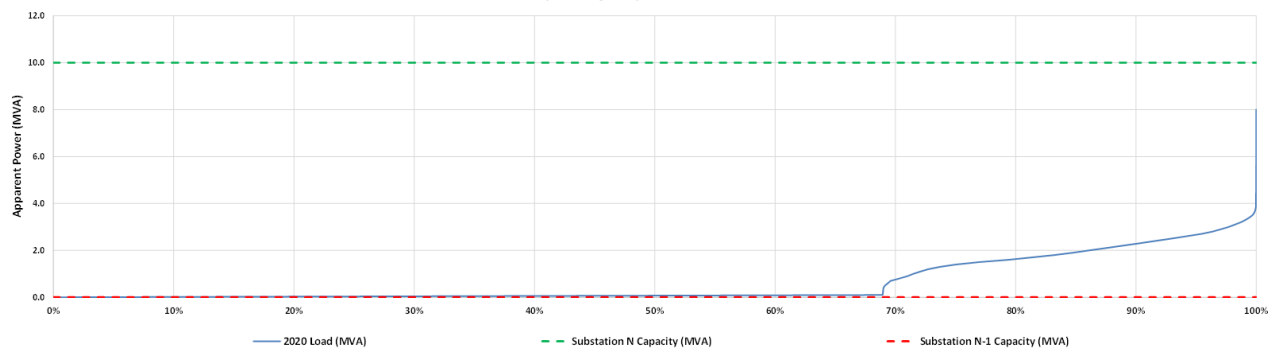
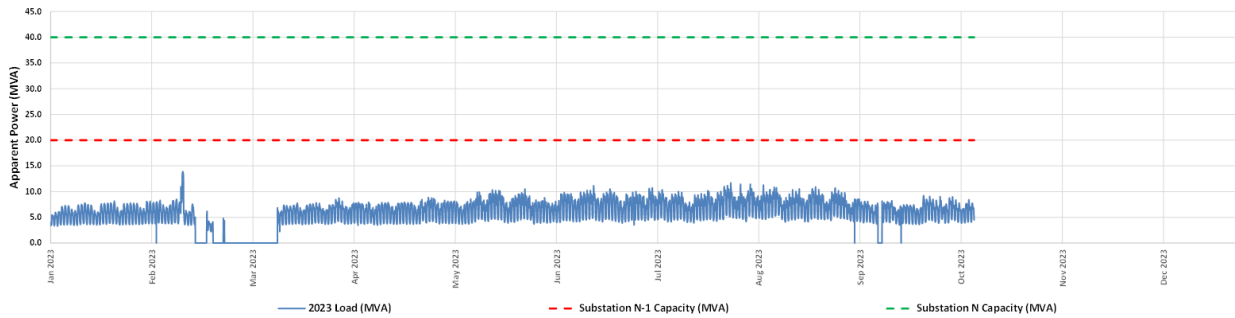


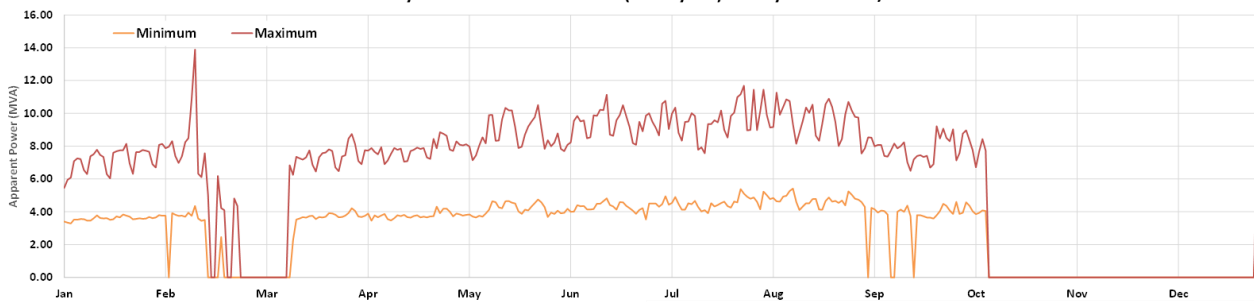
Figure 32. Esk 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Faraday Street MVA

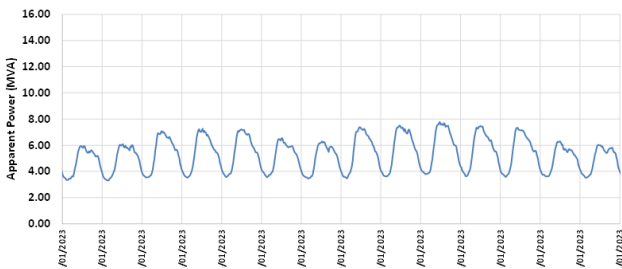
Faraday Street Zone Substation (2023 year) - Half hourly loading



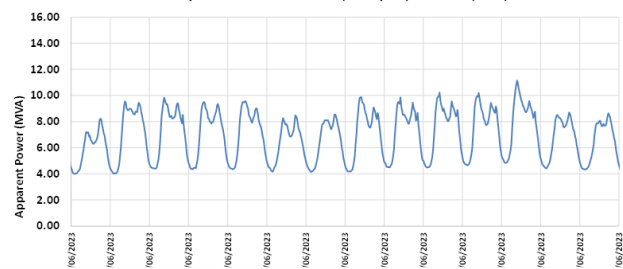
Faraday Street Zone Substation (2023 year) - Daily Maximum/Minimum



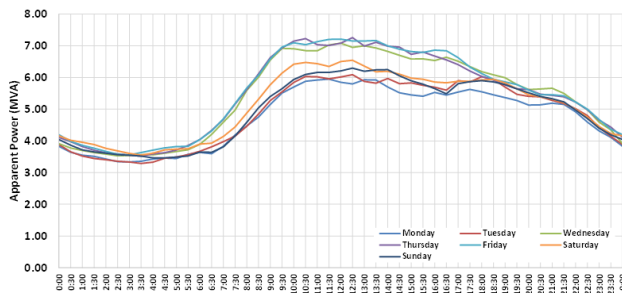
Faraday Street Zone Substation (2023 year) - Summer (January)



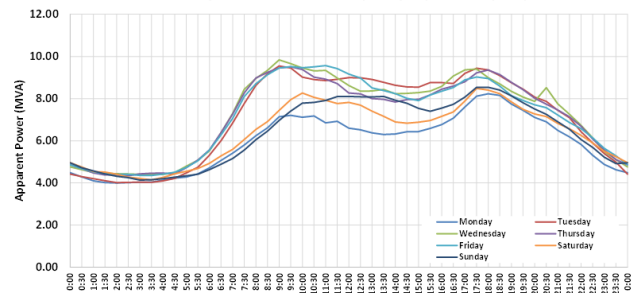
Faraday Street Zone Substation (2023 year) - Winter (June)



Faraday Street Zone Substation (2023 year) - Summer (January)



Faraday Street Zone Substation (2023 year) - Winter (June)



Faraday Street Zone Substation (2023 year) - Load Duration Curve

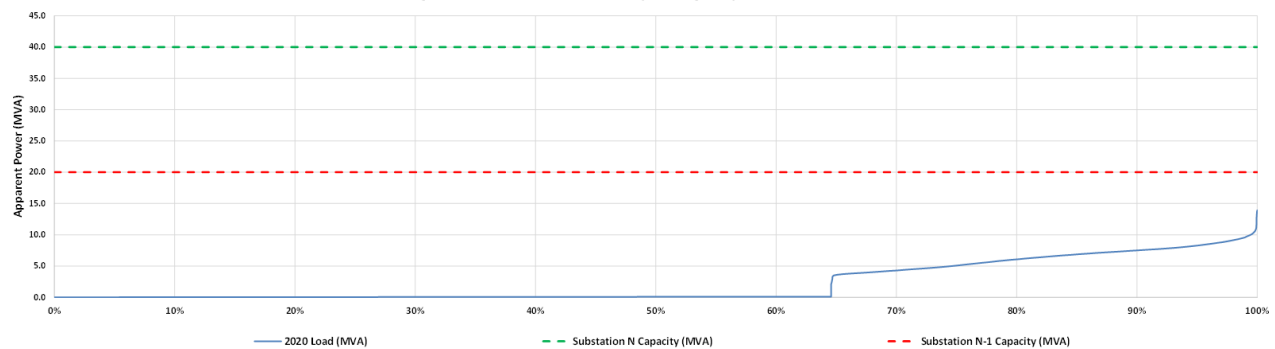


Figure 33. Faraday Street 33/11 kV zone substation: Apparent power (MVA) load characteristics.

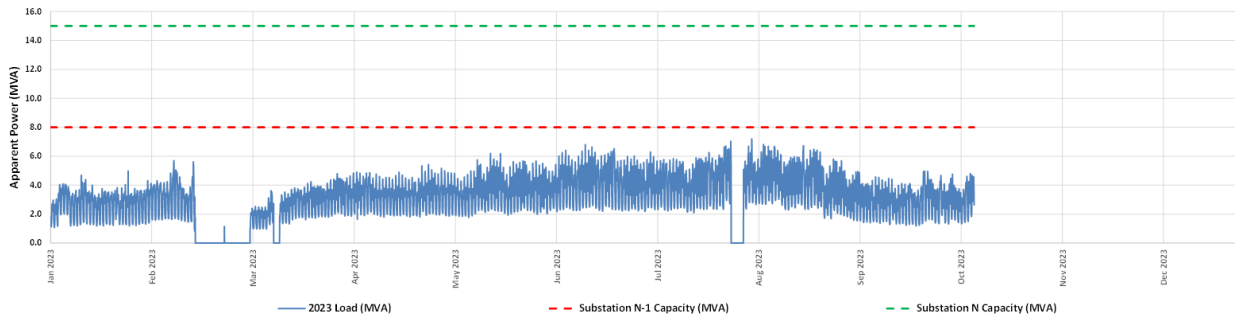
Not Supplied

Patoka MW

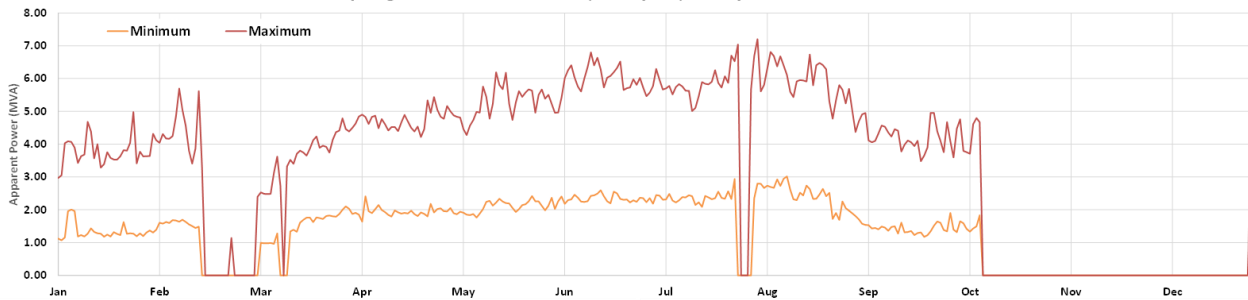
Figure 34. Patoka 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Springfield MVA

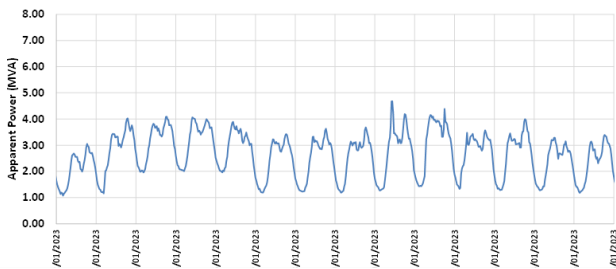
Springfield Zone Substation (2023 year) - Half hourly loading



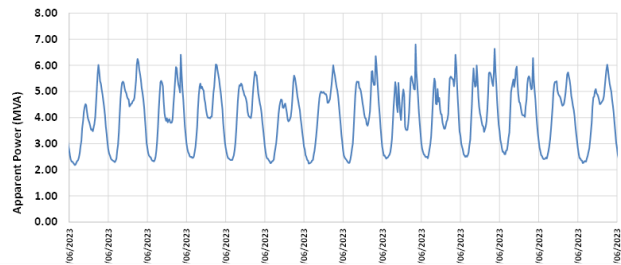
Springfield Zone Substation (2023 year) - Daily Maximum/Minimum



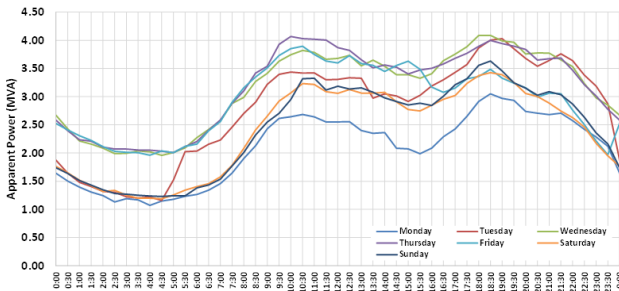
Springfield Zone Substation (2023 year) - Summer (January)



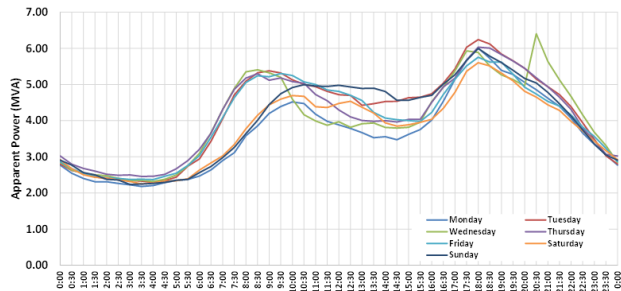
Springfield Zone Substation (2023 year) - Winter (June)



Springfield Zone Substation (2023 year) - Summer (January)



Springfield Zone Substation (2023 year) - Winter (June)



Springfield Zone Substation (2023 year) - Load Duration Curve

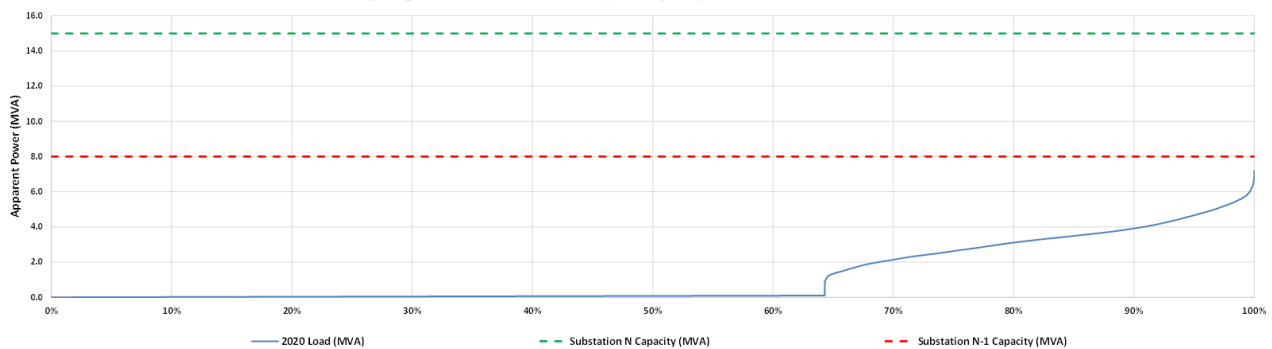
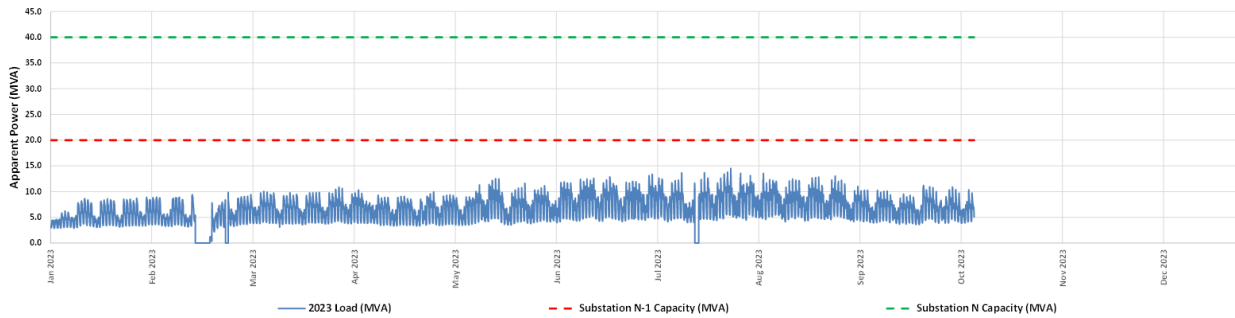


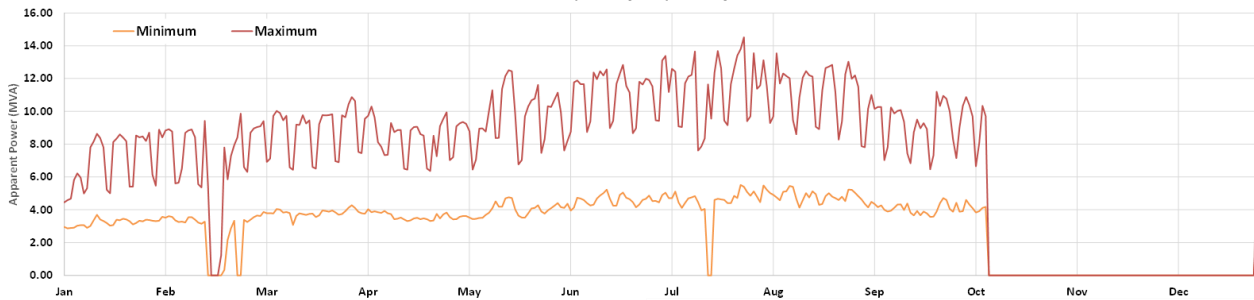
Figure 35. Springfield 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Tamatea MVA

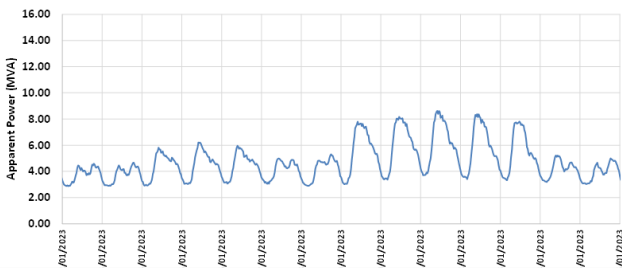
Tamatea Zone Substation (2023 year) - Half hourly loading



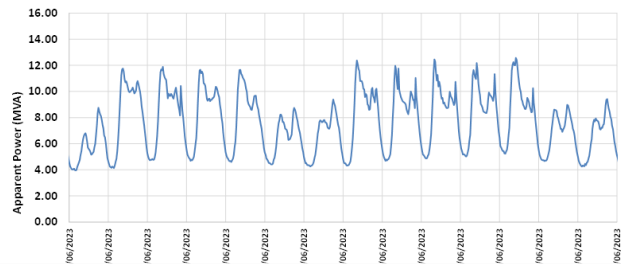
Tamatea Zone Substation (2023 year) - Daily Maximum/Minimum



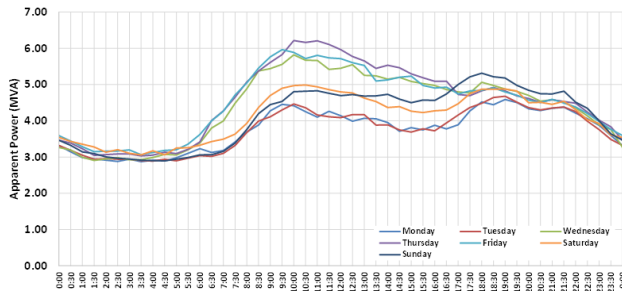
Tamatea Zone Substation (2023 year) - Summer (January)



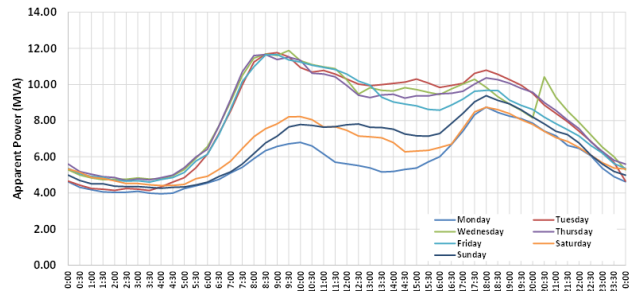
Tamatea Zone Substation (2023 year) - Winter (June)



Tamatea Zone Substation (2023 year) - Summer (January)



Tamatea Zone Substation (2023 year) - Winter (June)



Tamatea Zone Substation (2023 year) - Load Duration Curve

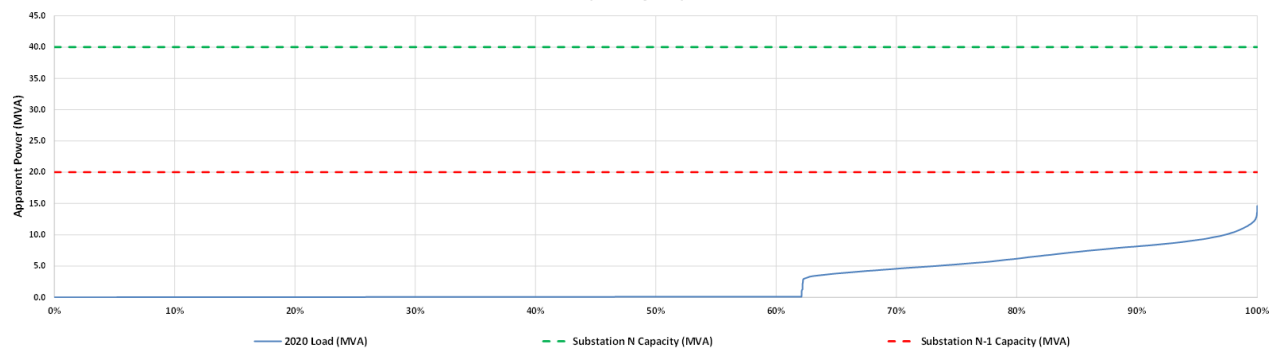
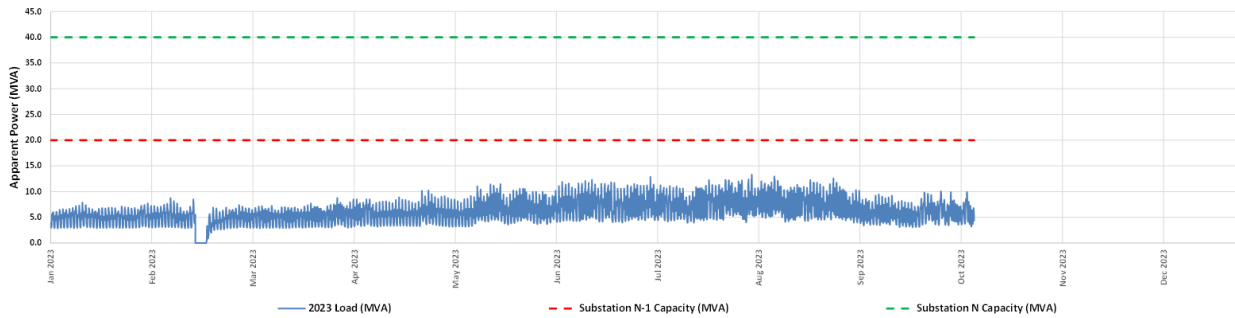


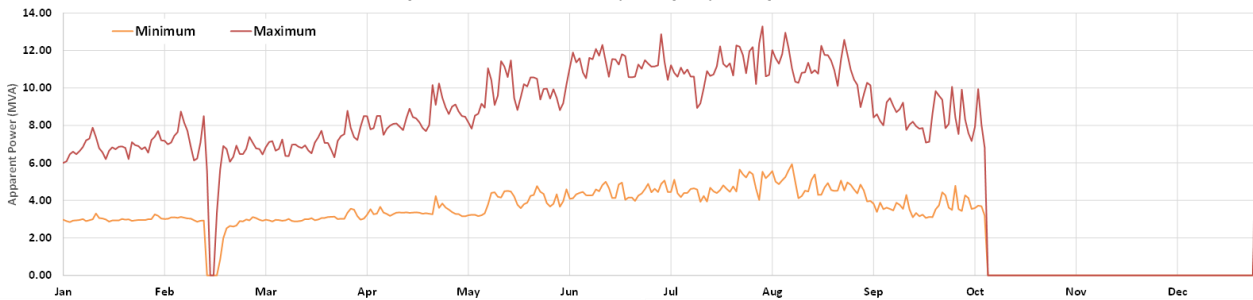
Figure 36. Tamatea 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Tannery Road MVA

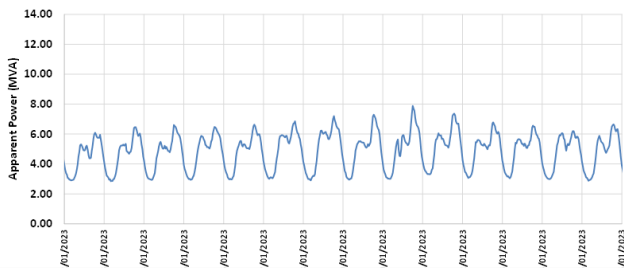
Tannery Road Zone Substation (2023 year) - Half hourly loading



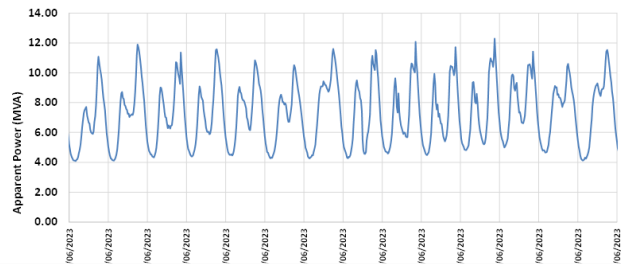
Tannery Road Zone Substation (2023 year) - Daily Maximum/Minimum



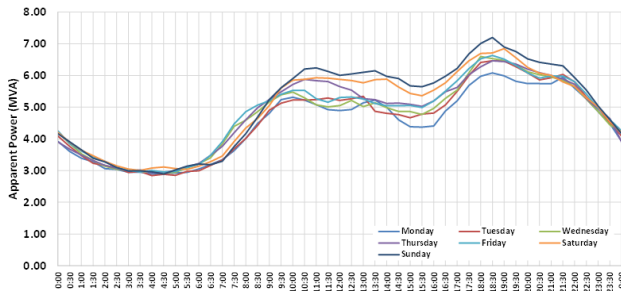
Tannery Road Zone Substation (2023 year) - Summer (January)



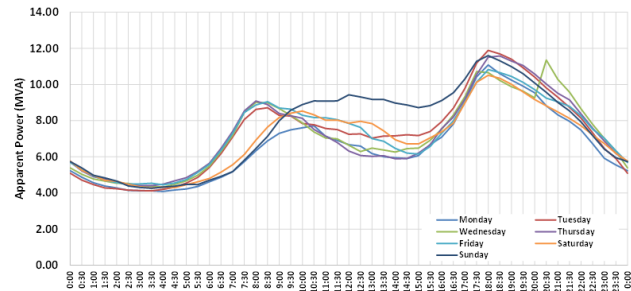
Tannery Road Zone Substation (2023 year) - Winter (June)



Tannery Road Zone Substation (2023 year) - Summer (January)



Tannery Road Zone Substation (2023 year) - Winter (June)



Tannery Road Zone Substation (2023 year) - Load Duration Curve

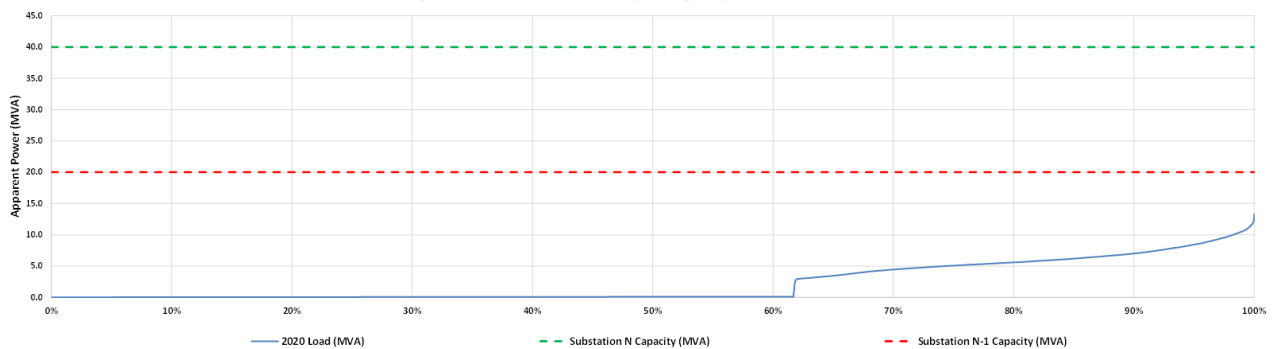
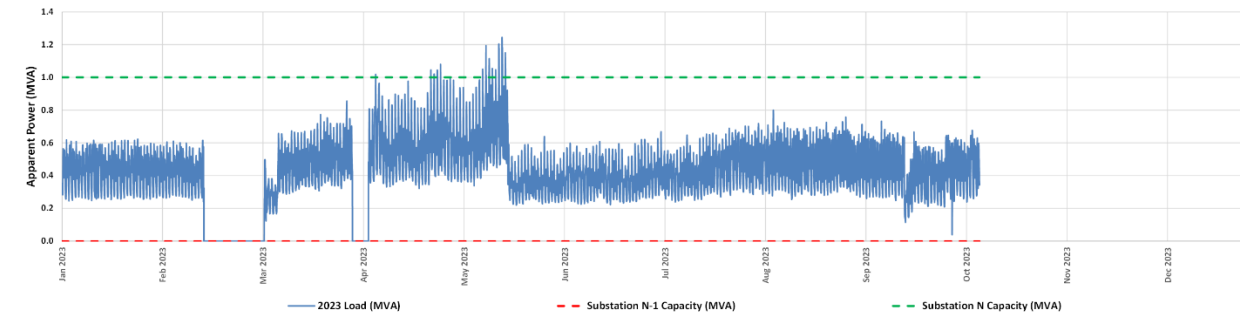


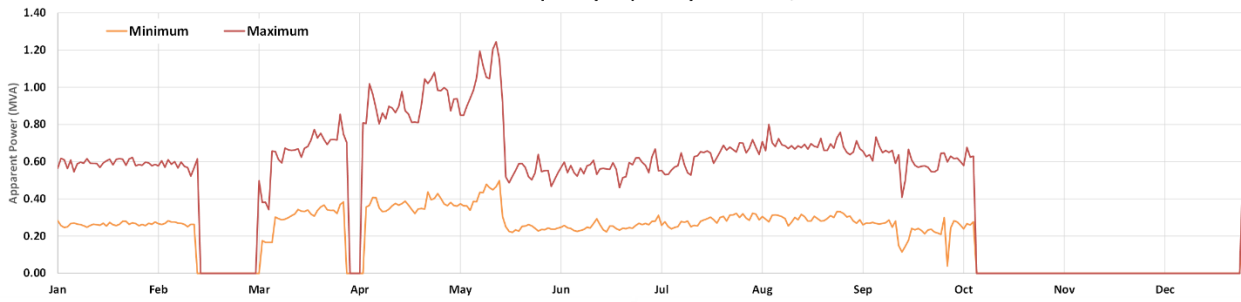
Figure 37. Tannery Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Tutira MW

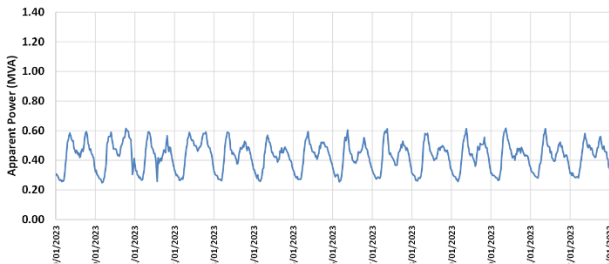
Tutira Zone Substation (2023 year) - Half hourly loading



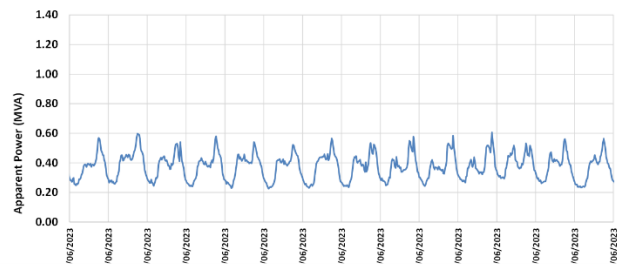
Tutira Zone Substation (2023 year) - Daily Maximum/Minimum



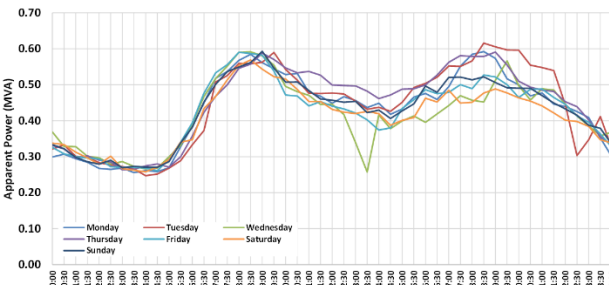
Tutira Zone Substation (2023 year) - Summer (January)



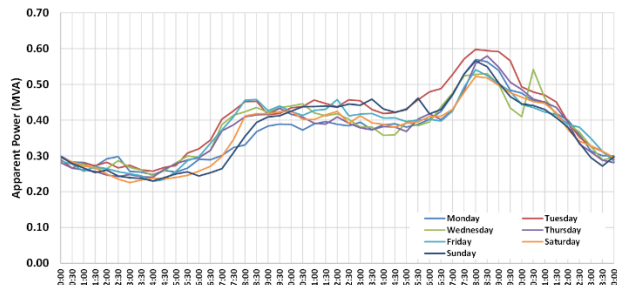
Tutira Zone Substation (2023 year) - Winter (June)



Tutira Zone Substation (2023 year) - Summer (January)



Tutira Zone Substation (2023 year) - Winter (June)



Tutira Zone Substation (2023 year) - Load Duration Curve

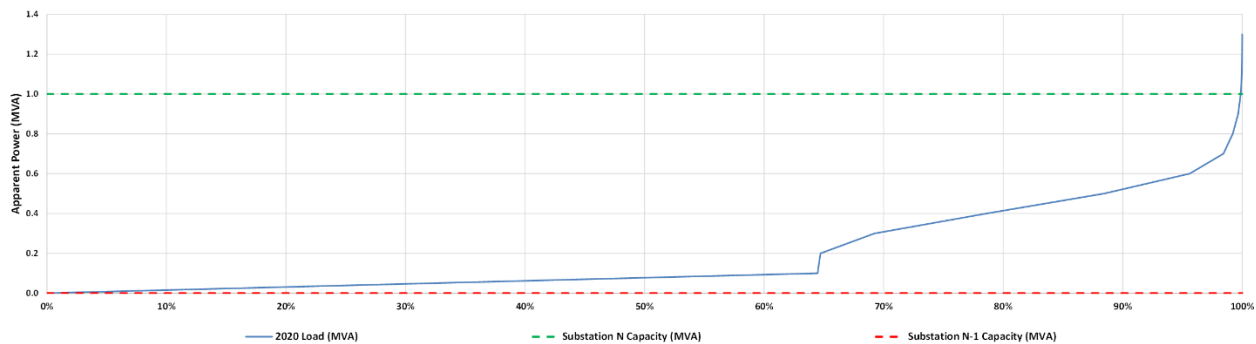
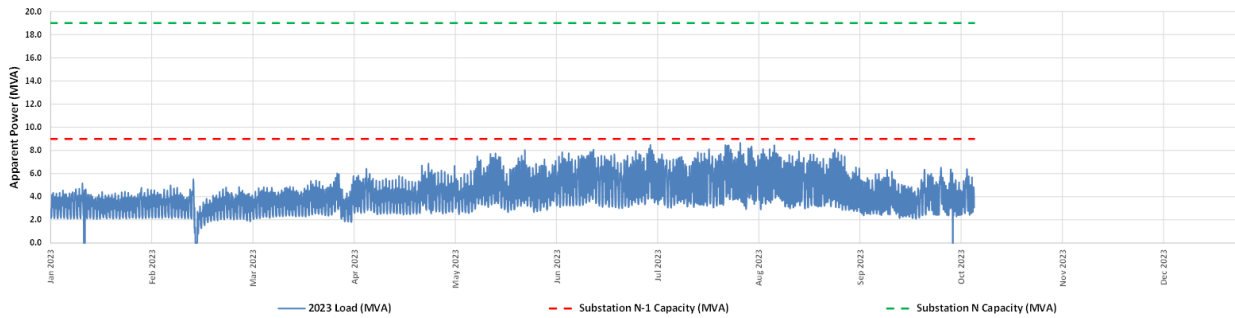


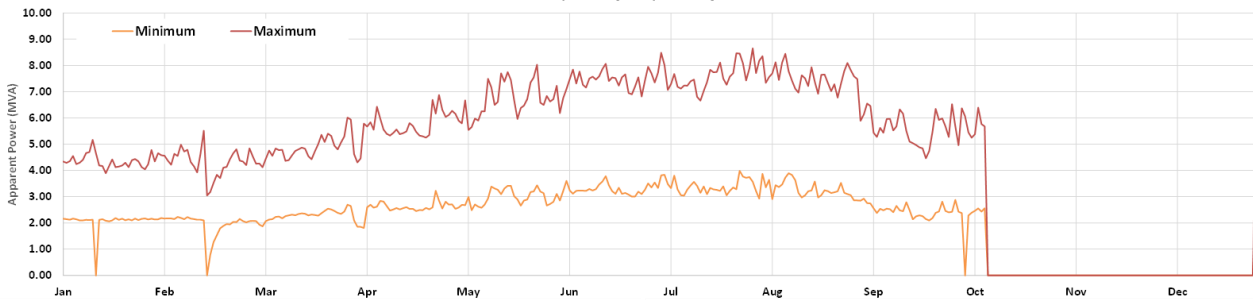
Figure 38. Tutira 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Arataki MVA

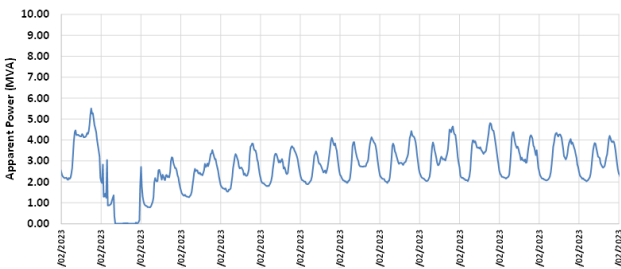
Arataki Zone Substation (2023 year) - Half hourly loading



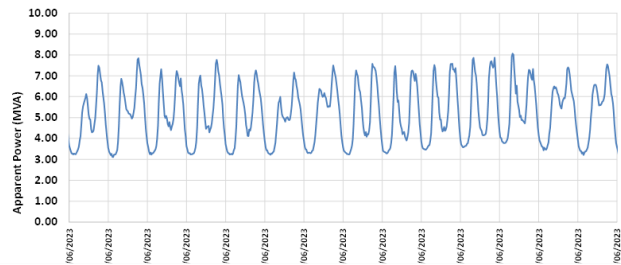
Arataki Zone Substation (2023 year) - Daily Maximum/Minimum



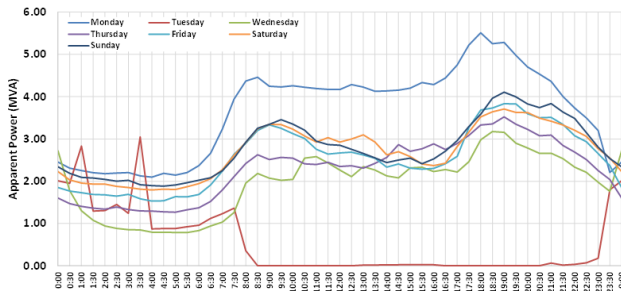
Arataki Zone Substation (2023 year) - Summer (February)



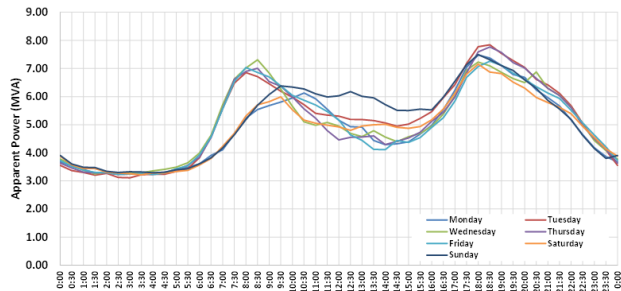
Arataki Zone Substation (2023 year) - Winter (June)



Arataki Zone Substation (2023 year) - Summer (February)



Arataki Zone Substation (2023 year) - Winter (June)



Arataki Zone Substation (2023 year) - Load Duration Curve

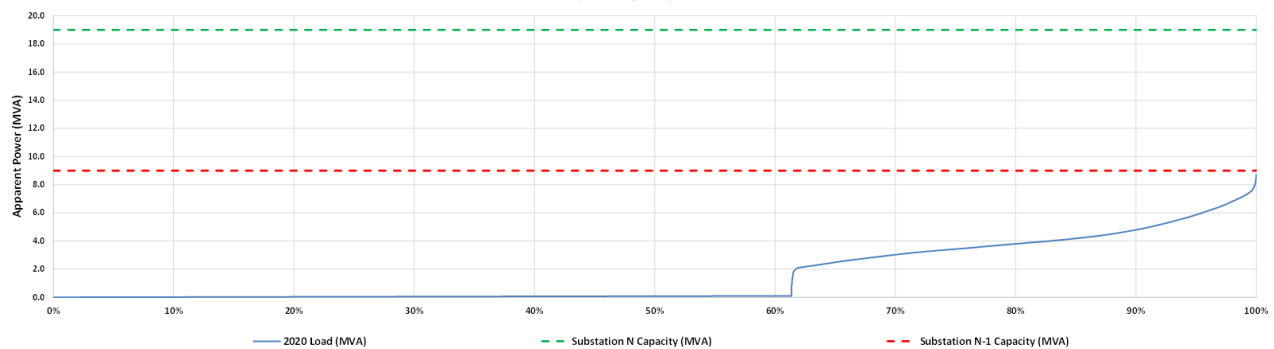
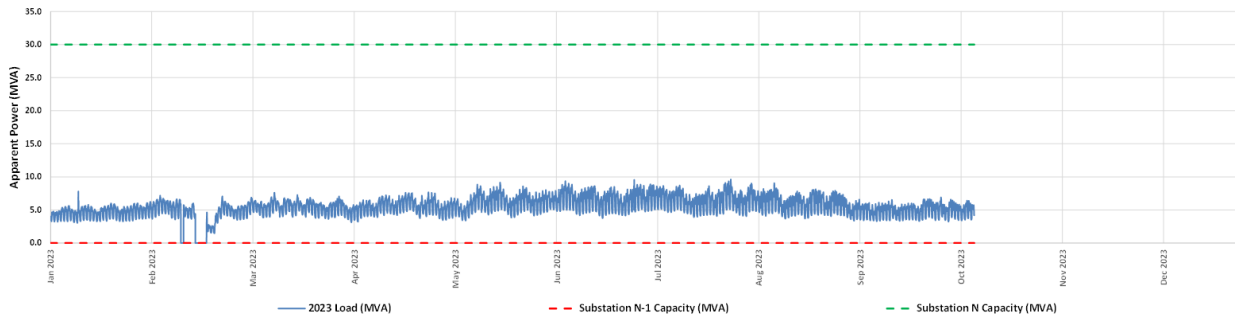


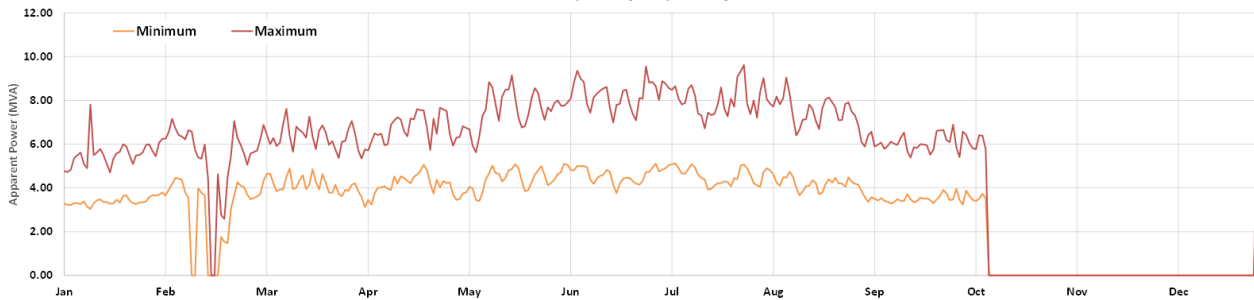
Figure 39. Arataki 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Bluff Hill MVA

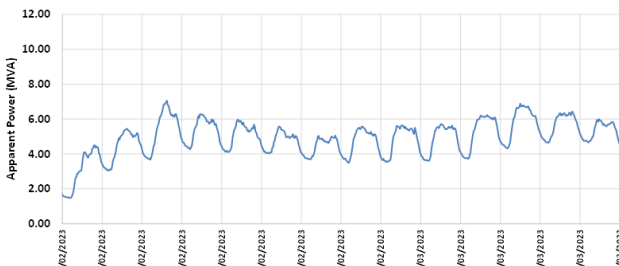
Bluff Hill Zone Substation (2023 year) - Half hourly loading



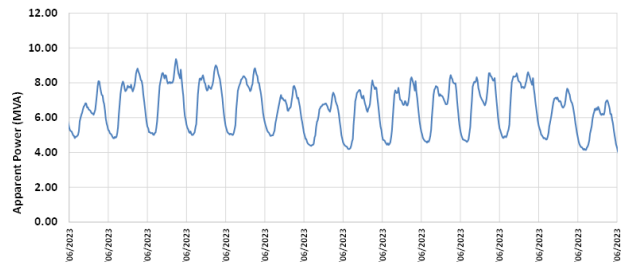
Bluff Hill Zone Substation (2023 year) - Daily Maximum/Minimum



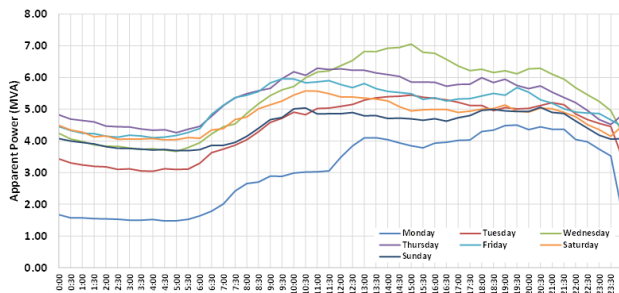
Bluff Hill Zone Substation (2023 year) - Summer (February)



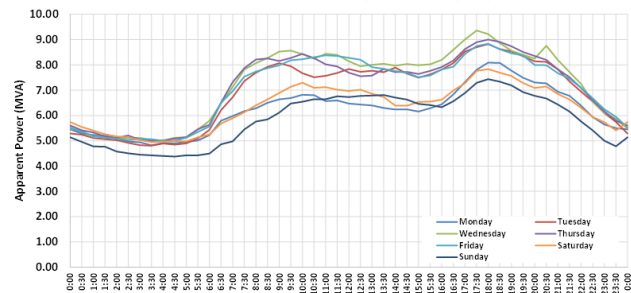
Bluff Hill Zone Substation (2023 year) - Winter (June)



Bluff Hill Zone Substation (2023 year) - Summer (February)



Bluff Hill Zone Substation (2023 year) - Winter (June)



Bluff Hill Zone Substation (2023 year) - Load Duration Curve

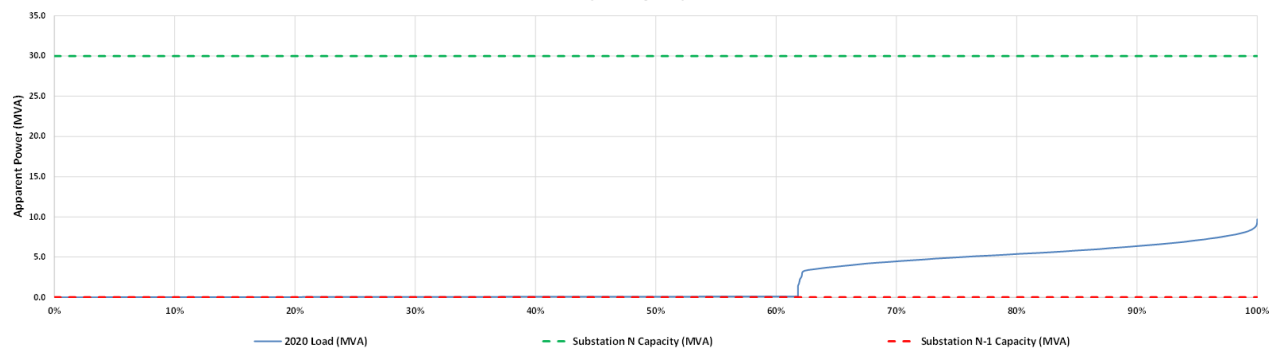
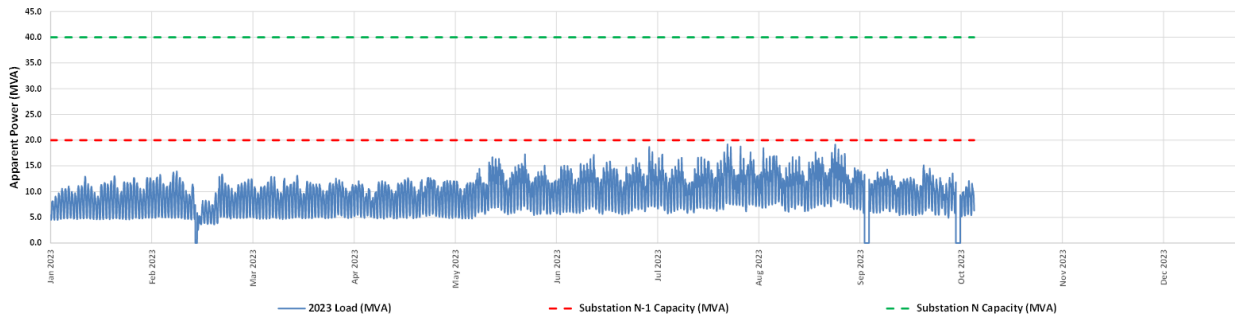


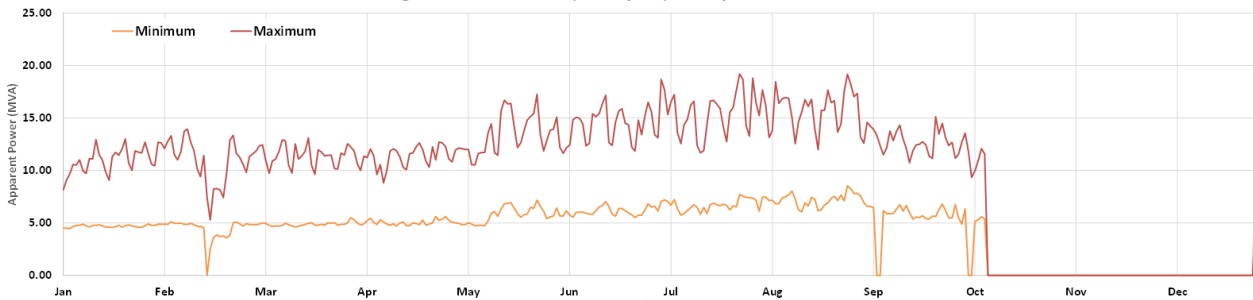
Figure 40. Bluff Hill 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Hastings MVA

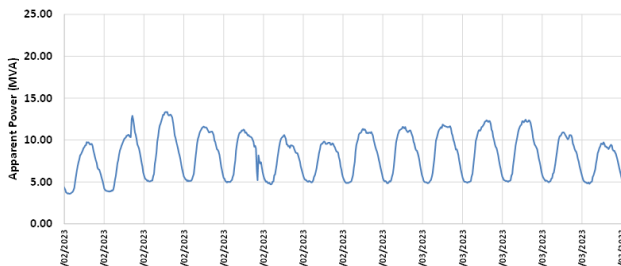
Hastings Zone Substation (2023 year) - Half hourly loading



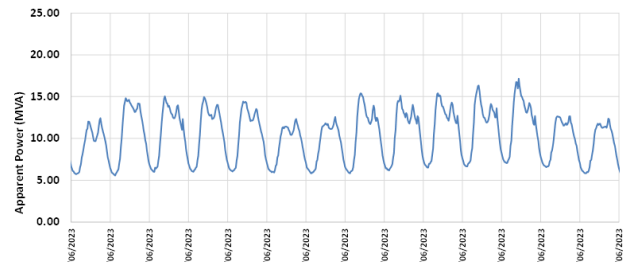
Hastings Zone Substation (2023 year) - Daily Maximum/Minimum



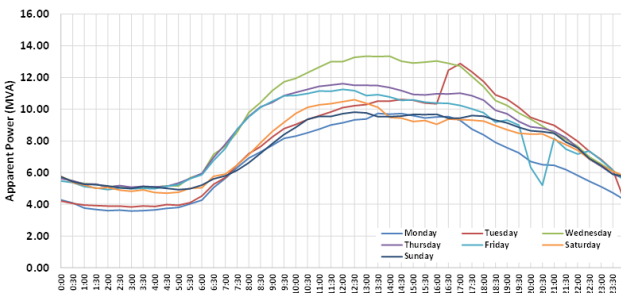
Hastings Zone Substation (2023 year) - Summer (February)



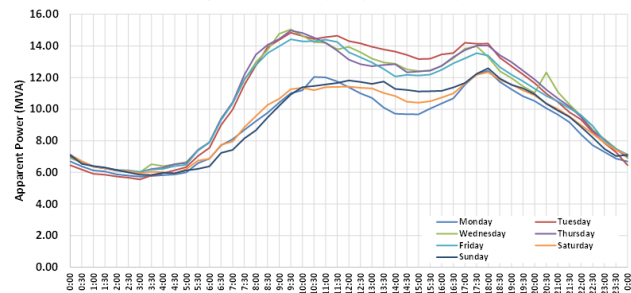
Hastings Zone Substation (2023 year) - Winter (June)



Hastings Zone Substation (2023 year) - Summer (February)



Hastings Zone Substation (2023 year) - Winter (June)



Hastings Zone Substation (2023 year) - Load Duration Curve

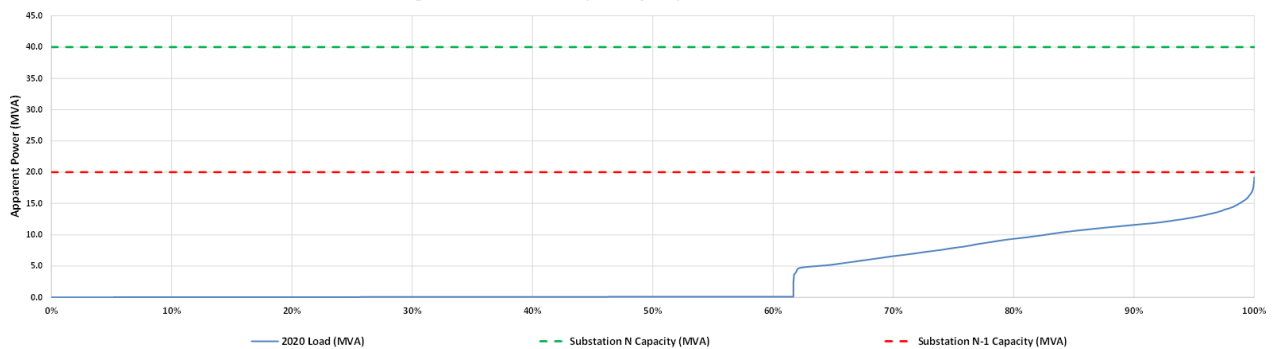
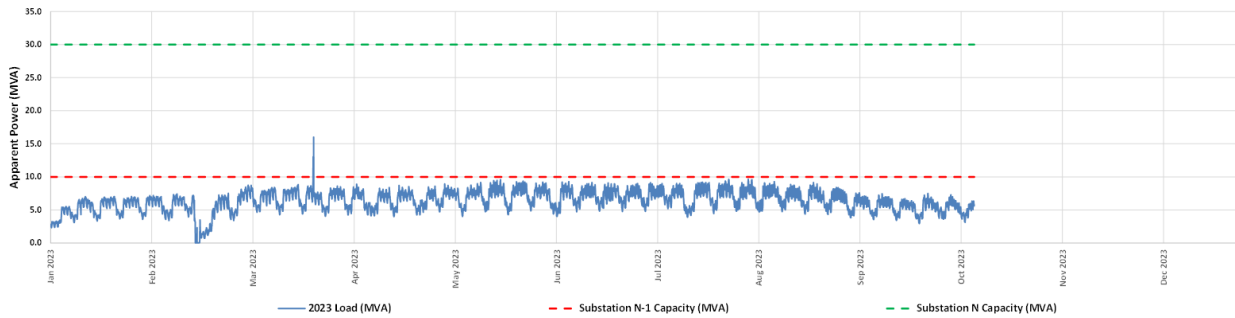


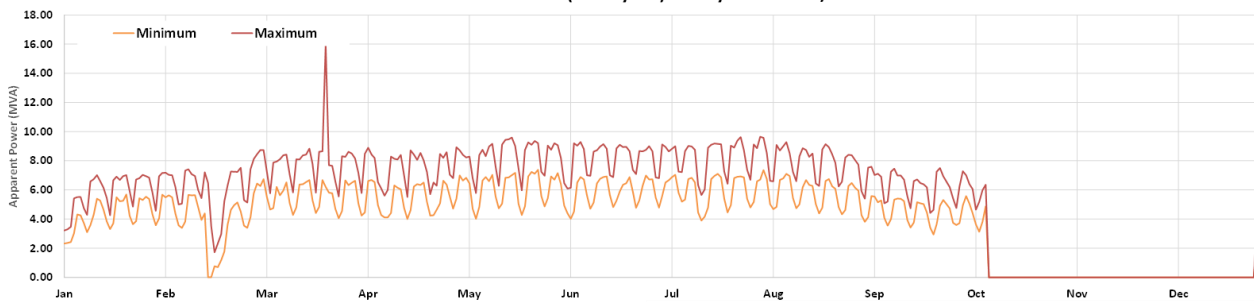
Figure 41. Hastings 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Mahora MVA

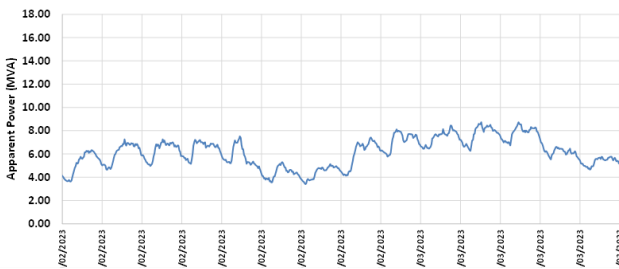
Mahora Zone Substation (2023 year) - Half hourly loading



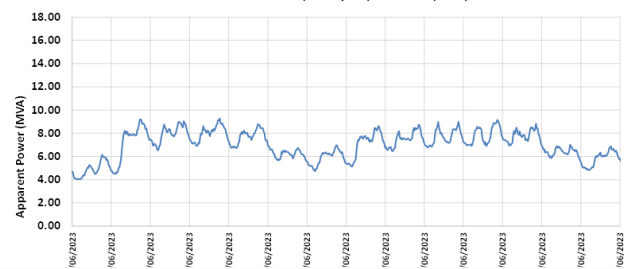
Mahora Zone Substation (2023 year) - Daily Maximum/Minimum



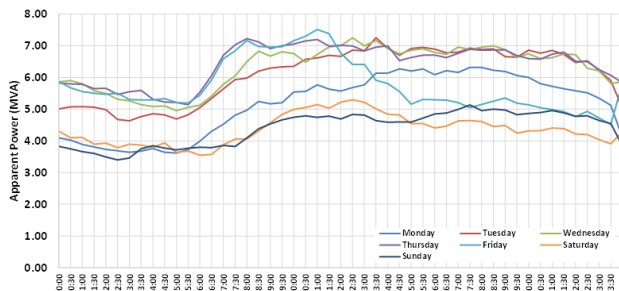
Mahora Zone Substation (2023 year) - Summer (February)



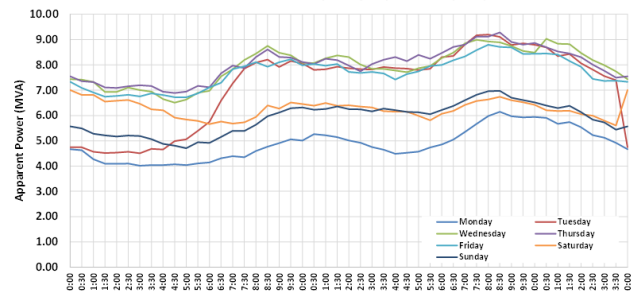
Mahora Zone Substation (2023 year) - Winter (June)



Mahora Zone Substation (2023 year) - Summer (February)



Mahora Zone Substation (2023 year) - Winter (June)



Mahora Zone Substation (2023 year) - Load Duration Curve

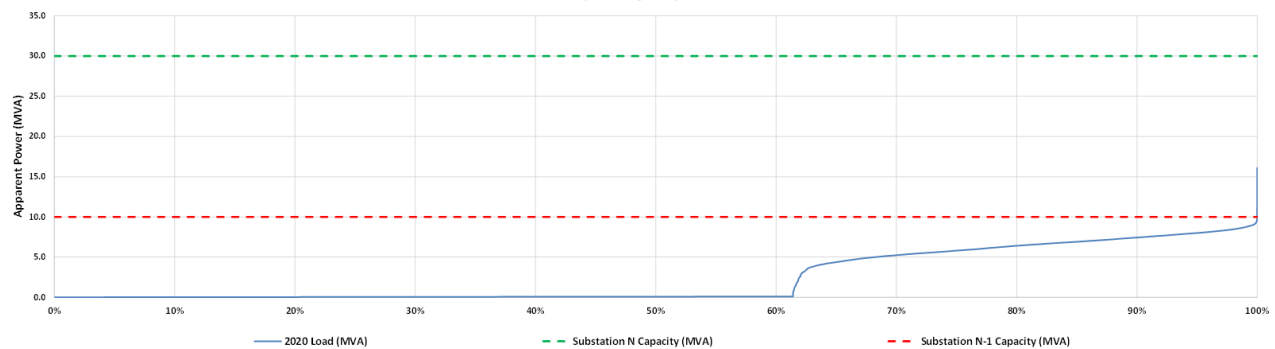
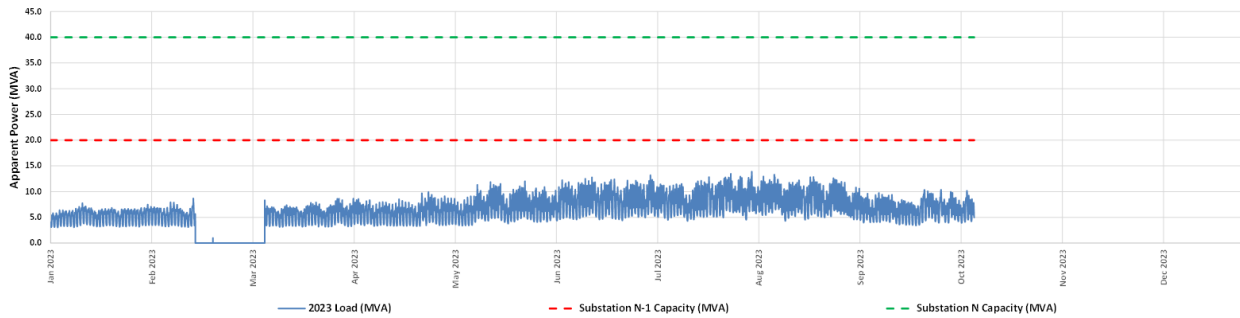


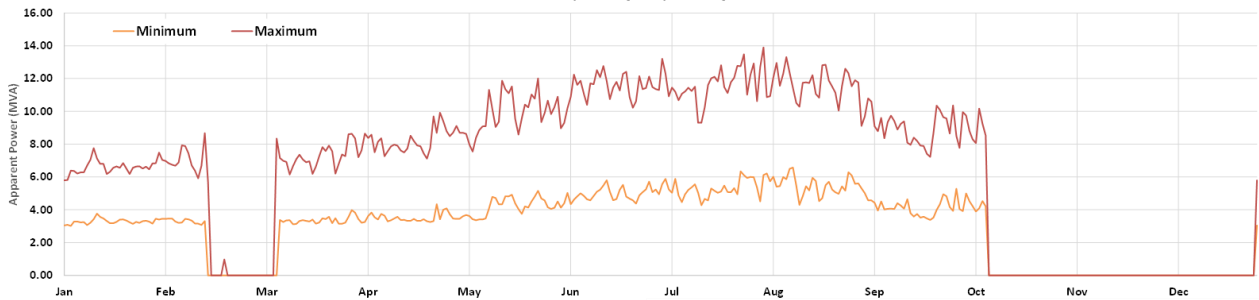
Figure 42. Mahora 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Marewa MVA

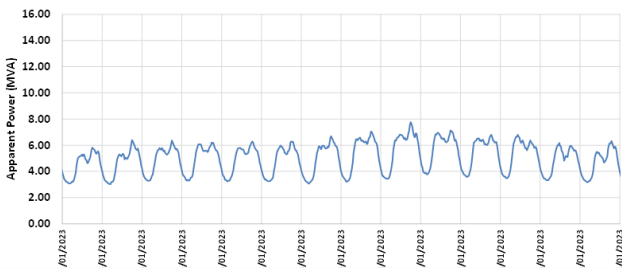
Marewa Zone Substation (2023 year) - Half hourly loading



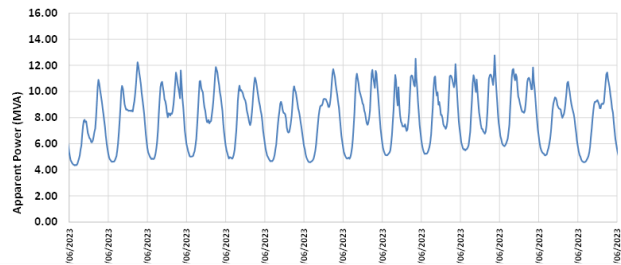
Marewa Zone Substation (2023 year) - Daily Maximum/Minimum



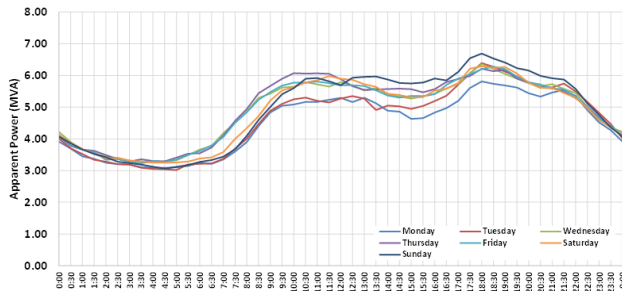
Marewa Zone Substation (2023 year) - Summer (January)



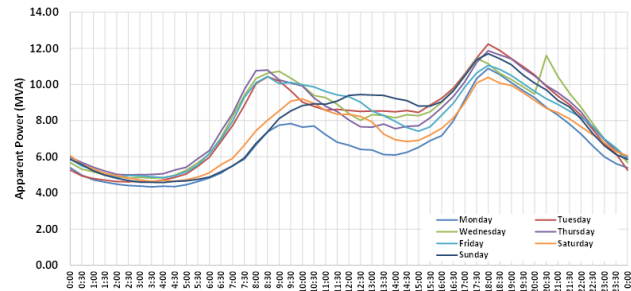
Marewa Zone Substation (2023 year) - Winter (June)



Marewa Zone Substation (2023 year) - Summer (January)



Marewa Zone Substation (2023 year) - Winter (June)



Marewa Zone Substation (2023 year) - Load Duration Curve

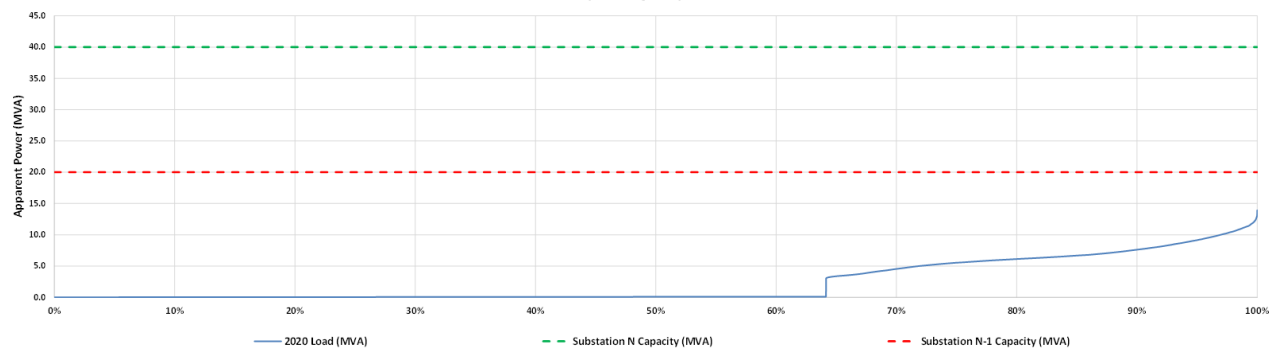
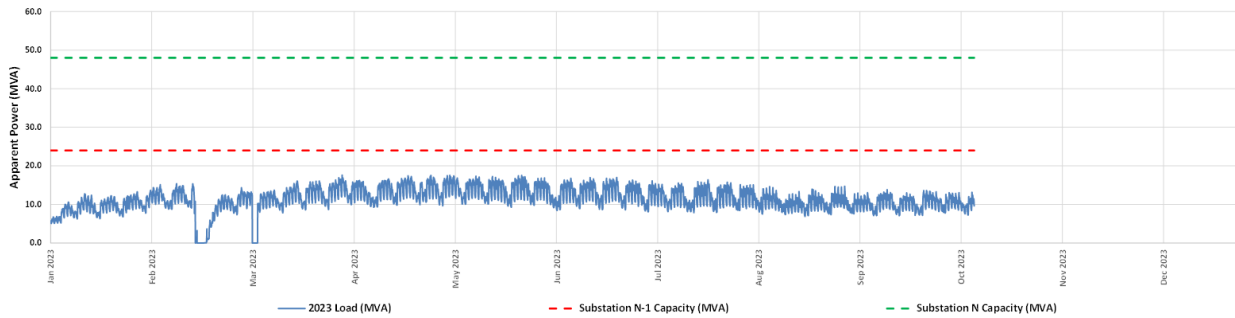


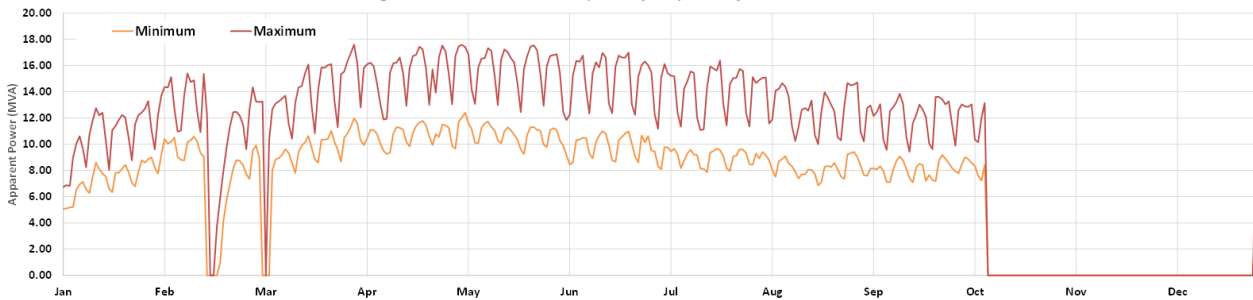
Figure 43. Marewa 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Rangitane MVA

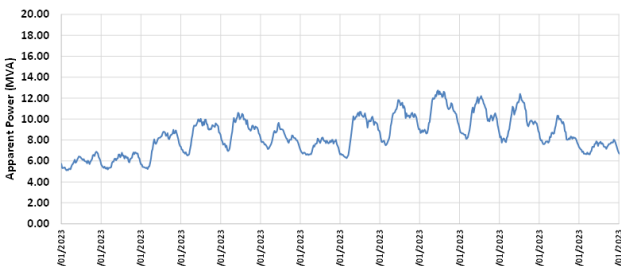
Rangitane Zone Substation (2023 year) - Half hourly loading



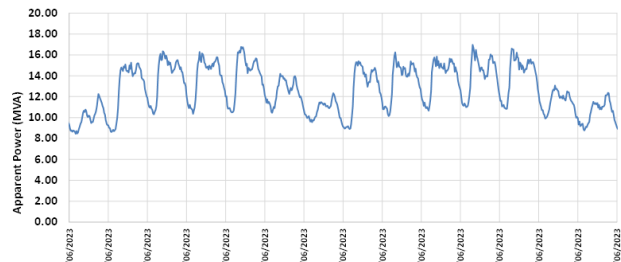
Rangitane Zone Substation (2023 year) - Daily Maximum/Minimum



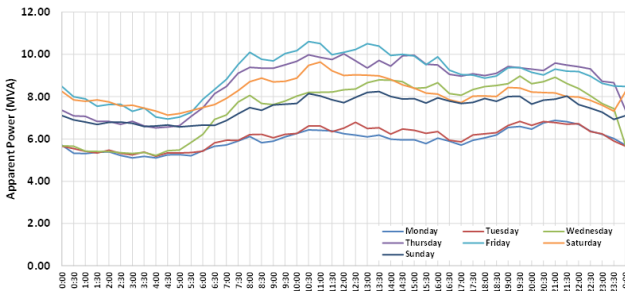
Rangitane Zone Substation (2023 year) - Summer (January)



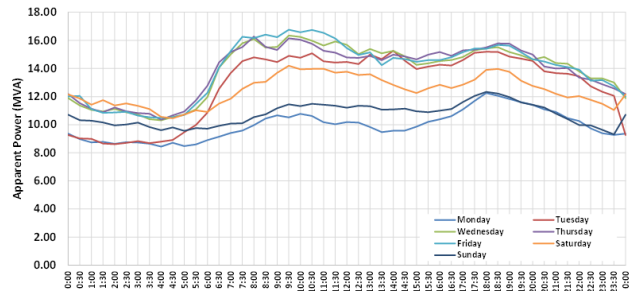
Rangitane Zone Substation (2023 year) - Winter (June)



Rangitane Zone Substation (2023 year) - Summer (January)



Rangitane Zone Substation (2023 year) - Winter (June)



Rangitane Zone Substation (2023 year) - Load Duration Curve

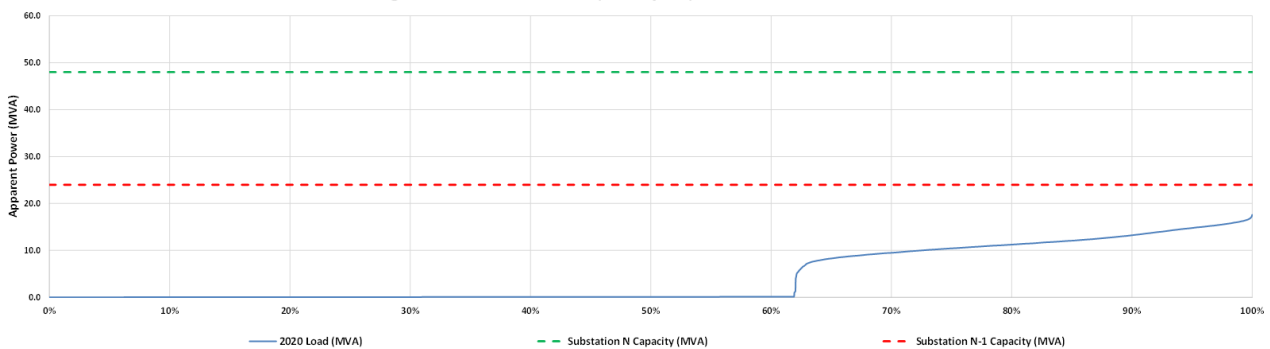
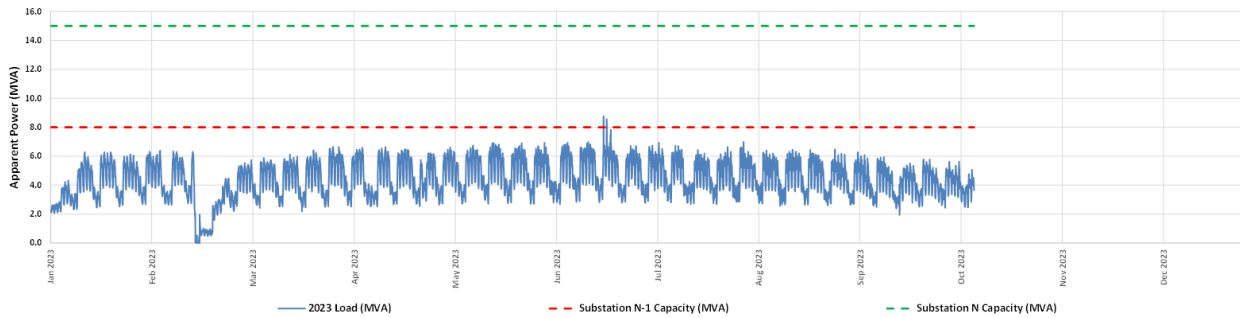


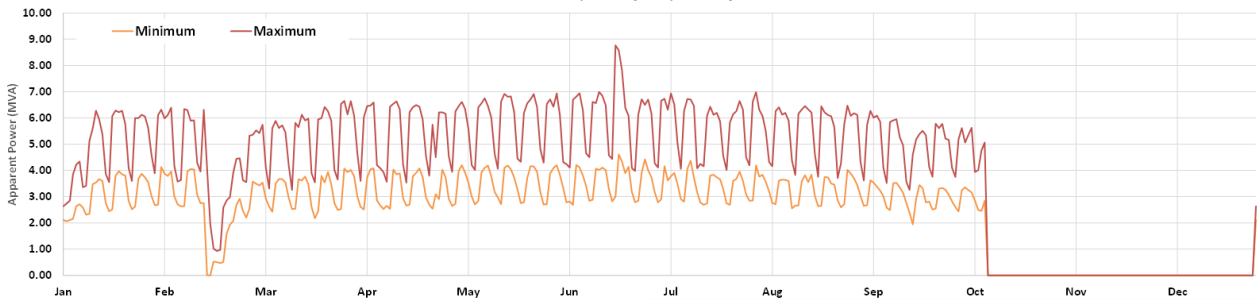
Figure 44. Rangitane 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Tomoana MVA

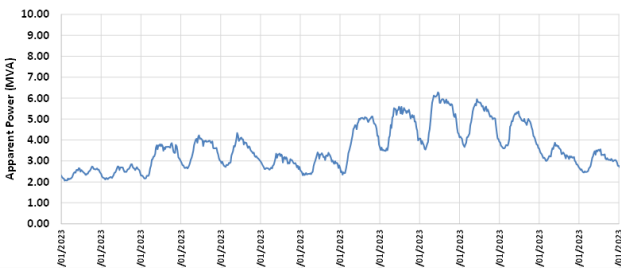
Tomoana Zone Substation (2023 year) - Half hourly loading



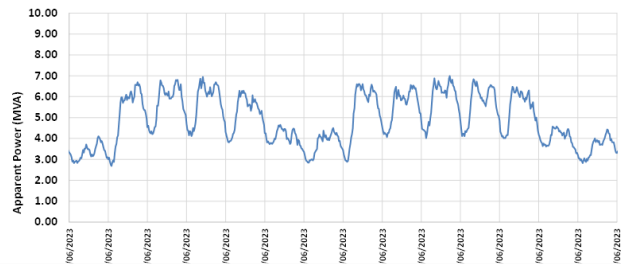
Tomoana Zone Substation (2023 year) - Daily Maximum/Minimum



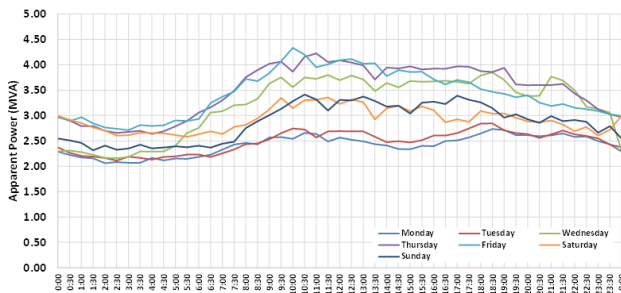
Tomoana Zone Substation (2023 year) - Summer (January)



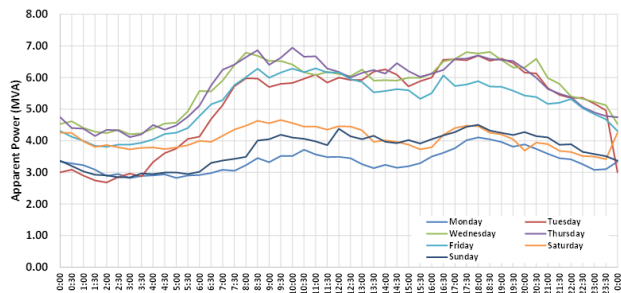
Tomoana Zone Substation (2023 year) - Winter (June)



Tomoana Zone Substation (2023 year) - Summer (January)



Tomoana Zone Substation (2023 year) - Winter (June)



Tomoana Zone Substation (2023 year) - Load Duration Curve

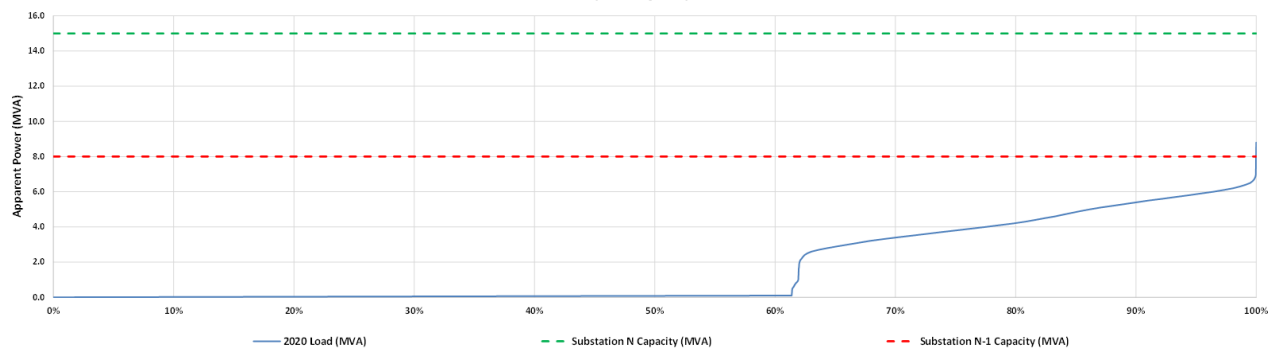
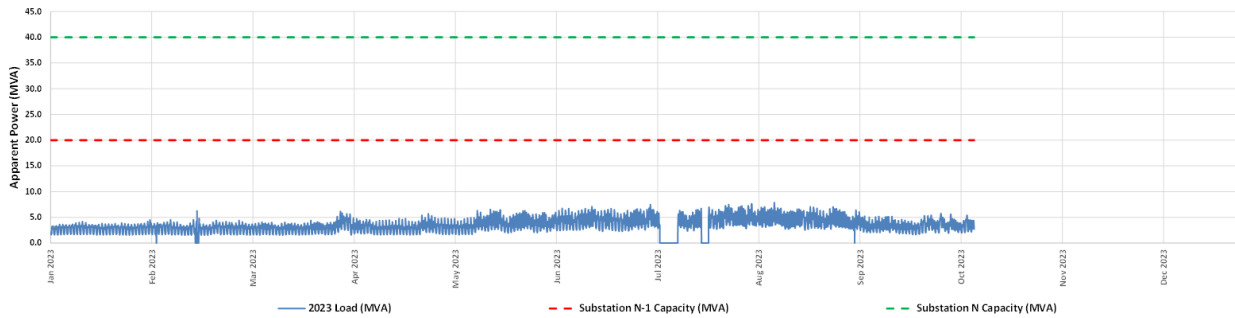


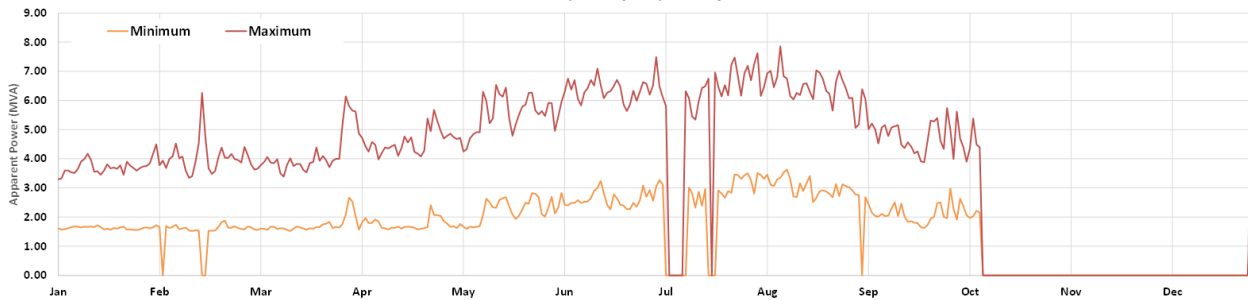
Figure 45. Tomoana 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Windsor MVA

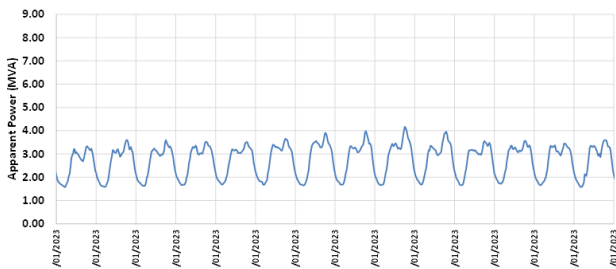
Windsor Zone Substation (2023 year) - Half hourly loading



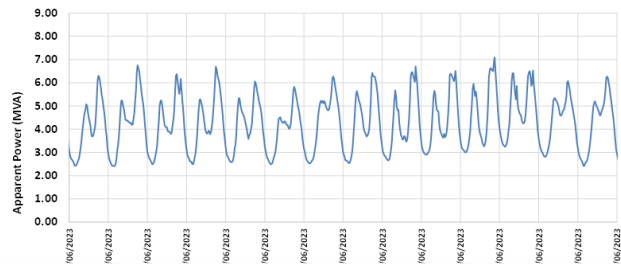
Windsor Zone Substation (2023 year) - Daily Maximum/Minimum



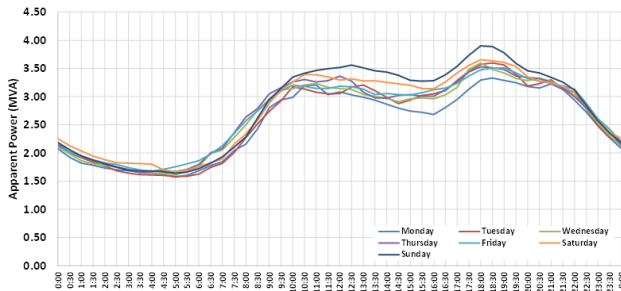
Windsor Zone Substation (2023 year) - Summer (January)



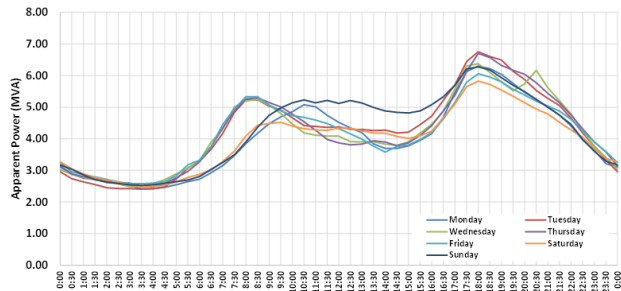
Windsor Zone Substation (2023 year) - Winter (June)



Windsor Zone Substation (2023 year) - Summer (January)



Windsor Zone Substation (2023 year) - Winter (June)



Windsor Zone Substation (2023 year) - Load Duration Curve

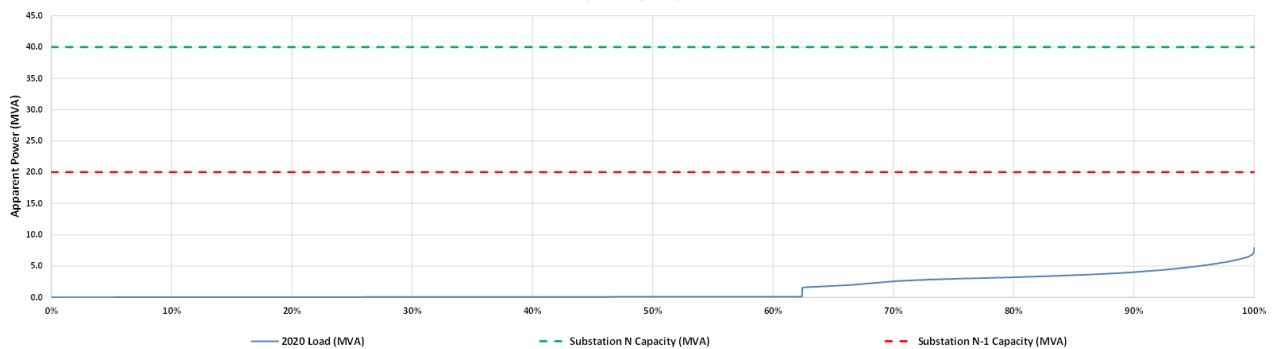


Figure 46. Windsor 33/11 kV zone substation: Apparent power (MVA) load characteristics.