



Waikato Network

Supplementary Information – Substation Load Characteristics

EECA

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1. Executive Summary

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

For each GXP, the January 2023 through December 2023 apparent (MVA) and reactive loadings (MVar) 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:

- **Arapuni (North) GXP**
 - Figure 1. Arapuni North (Load Only): Apparent power (MVA) load characteristics.
 - Figure 2. Arapuni North (Total): Apparent power (MVA) load characteristics.
 - Figure 3. Arapuni North: Reactive power (MVar) load characteristics.
- **Bombay GXP**
 - Figure 4. Bombay: Apparent power (MVA) load characteristics.
 - Figure 5. Bombay: Reactive power (MVar) load characteristics.
- **Cambridge GXP**
 - Figure 6. Cambridge: Apparent power (MVA) load characteristics.
 - Figure 7. Cambridge: Reactive power (MVar) load characteristics.
- **Glenbrook GXP (clean bus)**
 - Figure 8. Glenbrook (clean bus): Apparent power (MVA) load characteristics.
 - Figure 9. Glenbrook (clean bus): Reactive power (MVar) load characteristics.
- **Glenbrook GXP (dirty bus)**
 - Figure 10. Glenbrook (dirty bus): Apparent power (MVA) load characteristics.
 - Figure 11. Glenbrook (dirty bus): Reactive power (MVar) load characteristics.
- **Hamilton 11 kV GXP**
 - Figure 12. Hamilton 11 kV: Apparent power (MVA) load characteristics.
 - Figure 13. Hamilton 11 kV: Reactive power (MVar) load characteristics.
- **Hamilton 33 kV GXP**
 - Figure 14. Hamilton 33 kV: Apparent power (MVA) load characteristics.
 - Figure 15. Hamilton 33 kV: Reactive power (MVar) load characteristics.
- **Hangatiki 33 kV GXP**
 - Figure 16. Hangatiki 33 kV: Apparent power (MVA) load characteristics.
 - Figure 17. Hangatiki 33 kV: Reactive power (MVar) load characteristics.
- **Hangatiki 110 kV GXP**
 - Figure 18. Hangatiki 110 kV: Apparent power (MVA) load characteristics.
 - Figure 19. Hangatiki 110 kV: Reactive power (MVar) load characteristics.
- **Hinuera GXP**
 - Figure 20. Hinuera: Apparent power (MVA) load characteristics.
 - Figure 21. Hinuera: Reactive power (MVar) load characteristics.
- **Huntly 33 kV GXP**
 - Figure 22. Huntly 33 kV: Apparent power (MVA) load characteristics.
 - Figure 23. Huntly 33 kV: Reactive power (MVar) load characteristics.
- **Kinleith 11 kV GXP**
 - Figure 24. Kinleith 11 kV: Apparent power (MVA) load characteristics.
 - Figure 25. Kinleith 11 kV: Reactive power (MVar) load characteristics.
- **Kinleith 33 kV GXP**
 - Figure 26. Kinleith 33 kV: Apparent power (MVA) load characteristics.
 - Figure 27. Kinleith 33 kV: Reactive power (MVar) load characteristics.

- **Kopu GXP**
 - Figure 28. Kopu: Apparent power (MVA) load characteristics.
 - Figure 29. Kopu: Reactive power (MVA_r) load characteristics.
- **Lichfield GXP**
 - Figure 30. Lichfield: Apparent power (MVA) load characteristics.
 - Figure 31. Lichfield: Reactive power (MVA_r) load characteristics.
- **Piako GXP**
 - Figure 32. Piako: Apparent power (MVA) load characteristics.
 - Figure 33. Piako: Reactive power (MVA_r) load characteristics.
- **Te Awamutu GXP**
 - Figure 34. Te Awamutu: Apparent power (MVA) load characteristics.
 - Figure 35. Te Awamutu: Reactive power (MVA_r) load characteristics.
- **Te Kowhai GXP**
 - Figure 36. Te Kowhai: Apparent power (MVA) load characteristics.
 - Figure 37. Te Kowhai: Reactive power (MVA_r) load characteristics.
- **Waihou GXP**
 - Figure 38. Waihou: Apparent power (MVA) load characteristics.
 - Figure 39. Waihou: Reactive power (MVA_r) load characteristics.
- **Waikino GXP**
 - Figure 40. Waikino: Apparent power (MVA) load characteristics.
 - Figure 41. Waikino: Reactive power (MVA_r) load characteristics.
- **Wairakei 33 kV GXP**
 - Figure 42. Wairakei 33 kV: Apparent power (MVA) load characteristics.
 - Figure 43. Wairakei 33 kV: Reactive power (MVA_r) load characteristics.

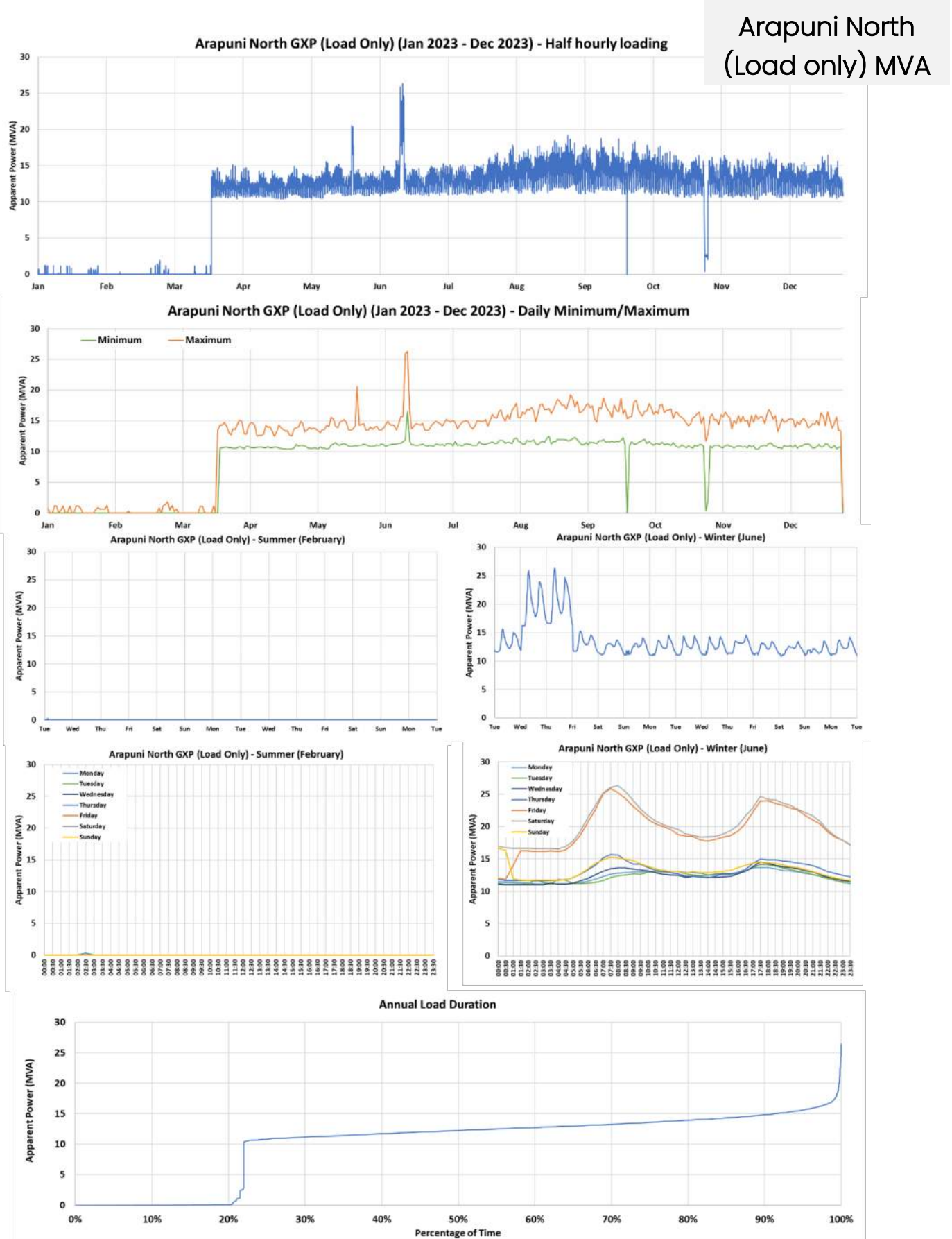


Figure 1. Arapuni North (Load Only): Apparent power (MVA) load characteristics.

**Arapuni North
(Total) MVA**

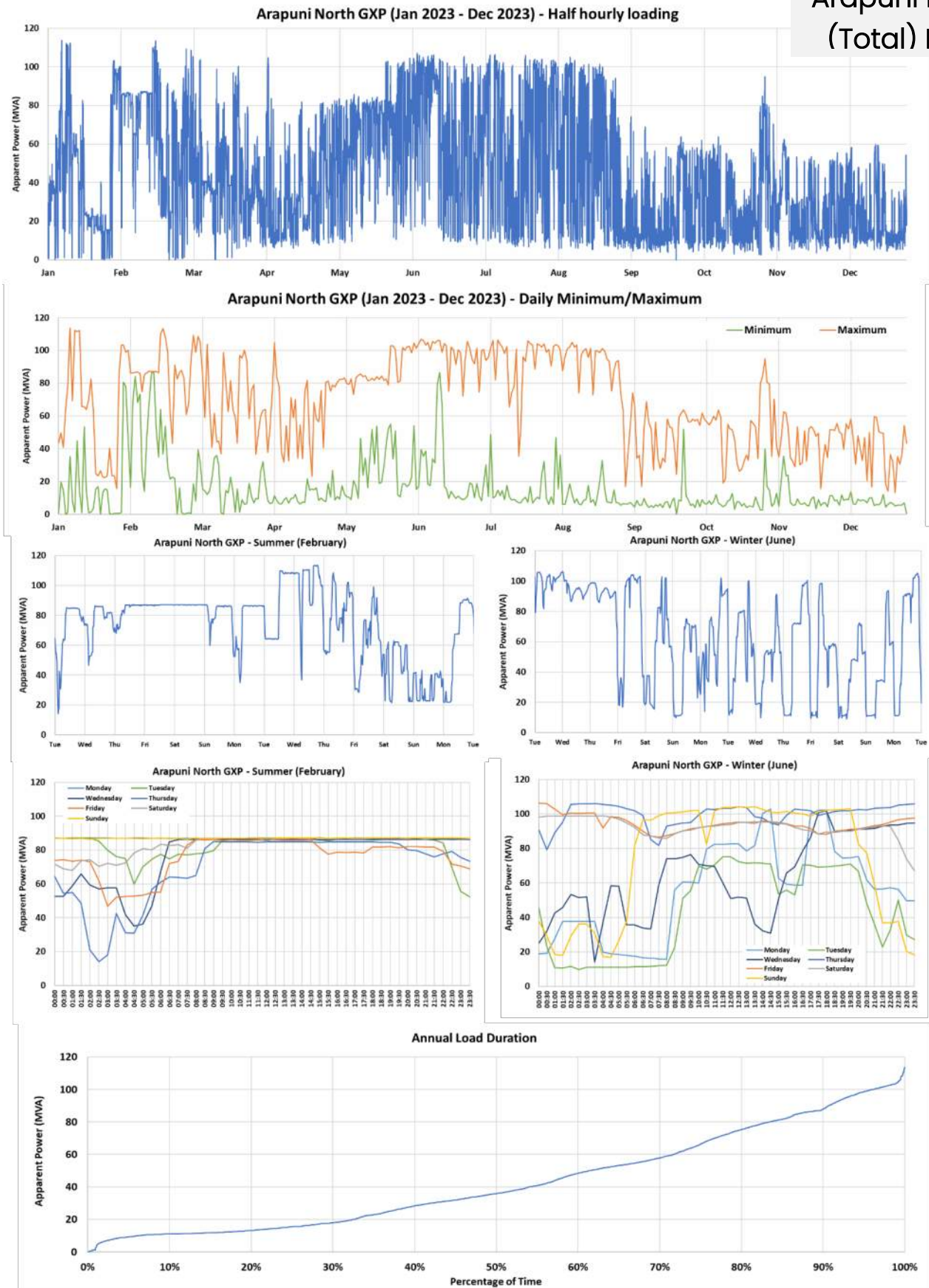


Figure 2. Arapuni North (Total): Apparent power (MVA) load characteristics.

Arapuni North MVAR

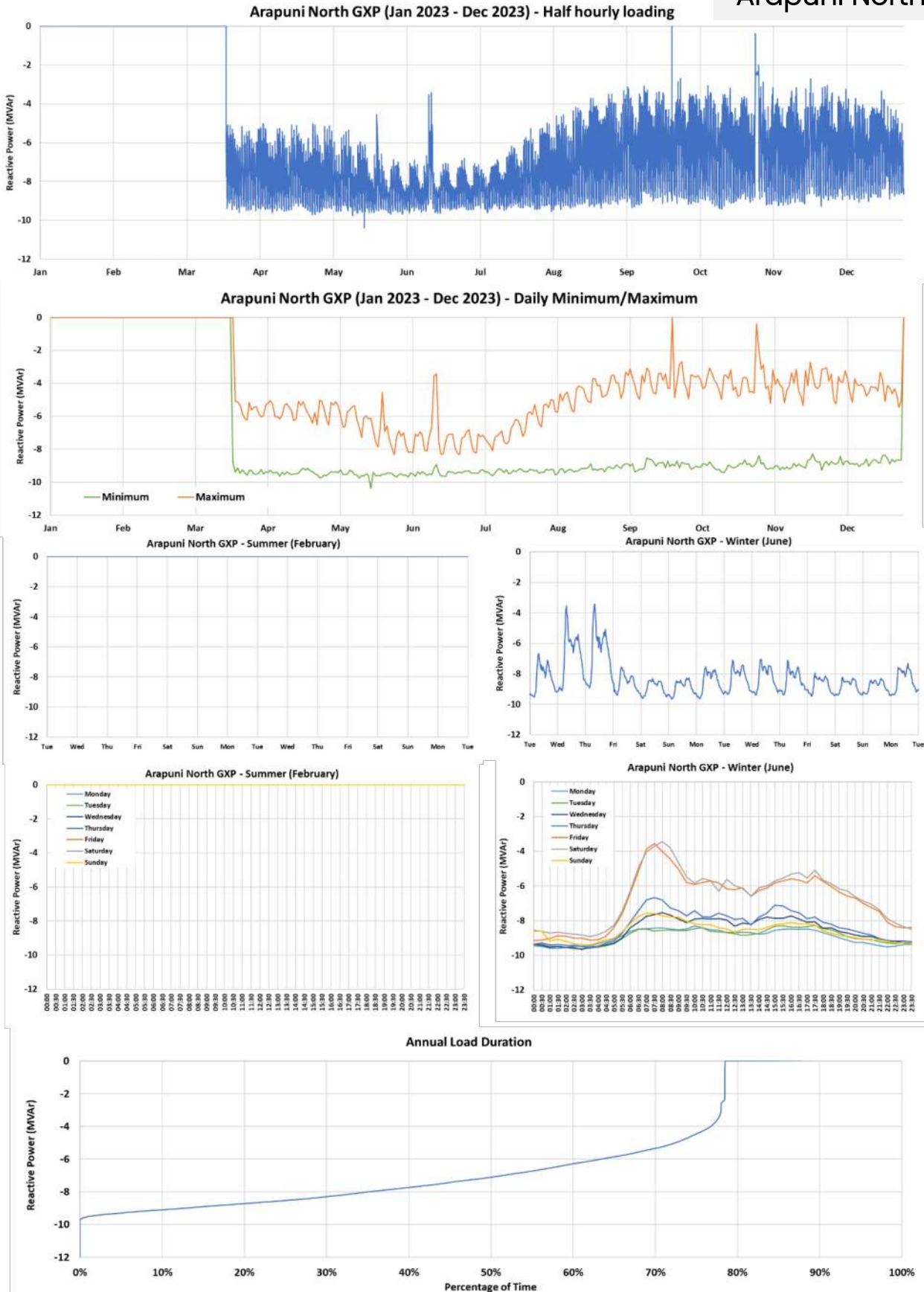


Figure 3. Arapuni North: Reactive power (MVAR) load characteristics.

Bombay MVA

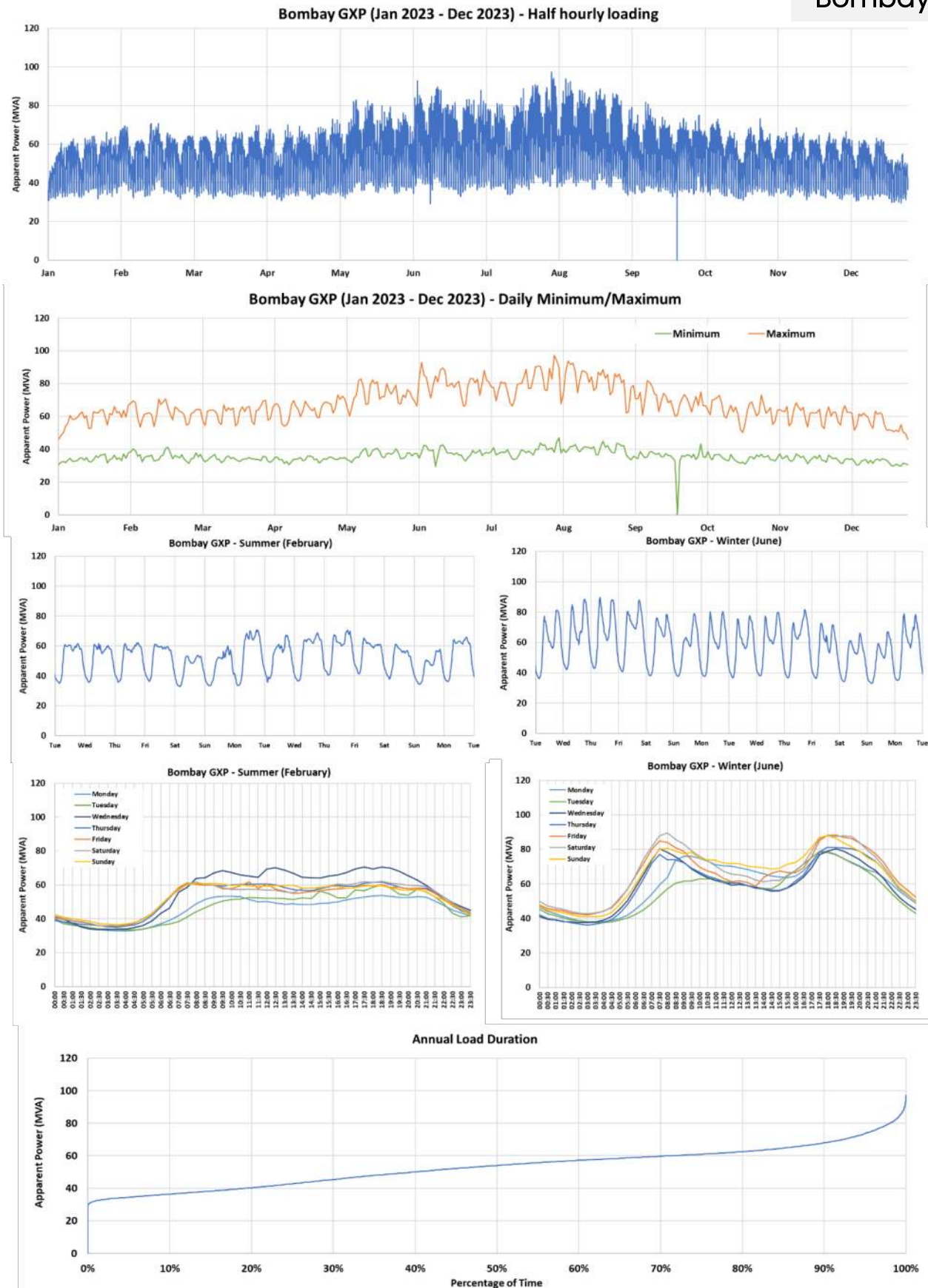


Figure 4. Bombay: Apparent power (MVA) load characteristics.

Bombay MVar

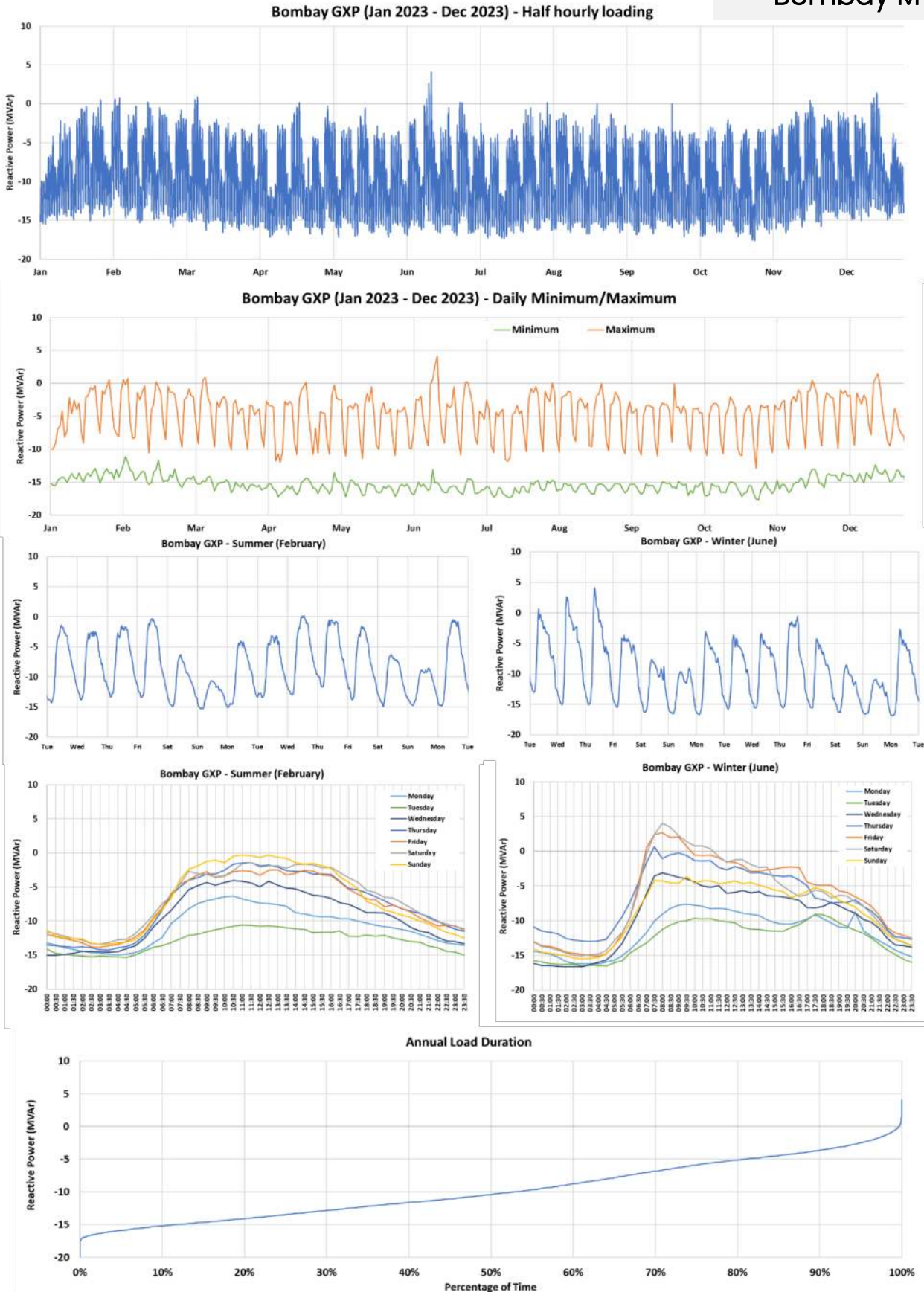


Figure 5. Bombay: Reactive power (MVar) load characteristics.

**Cambridge
MVA**

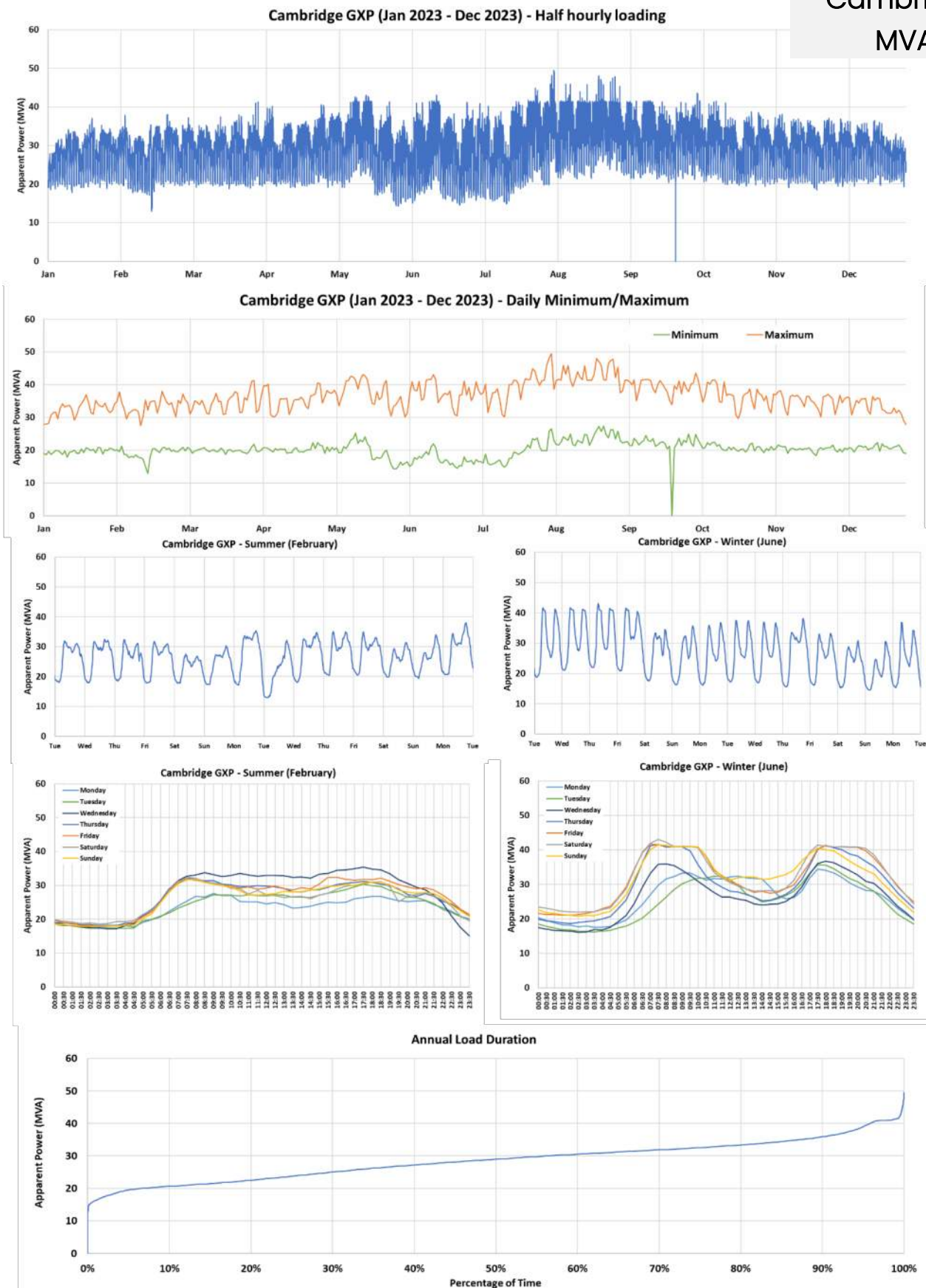


Figure 6. Cambridge: Apparent power (MVA) load characteristics.

Cambridge MVar

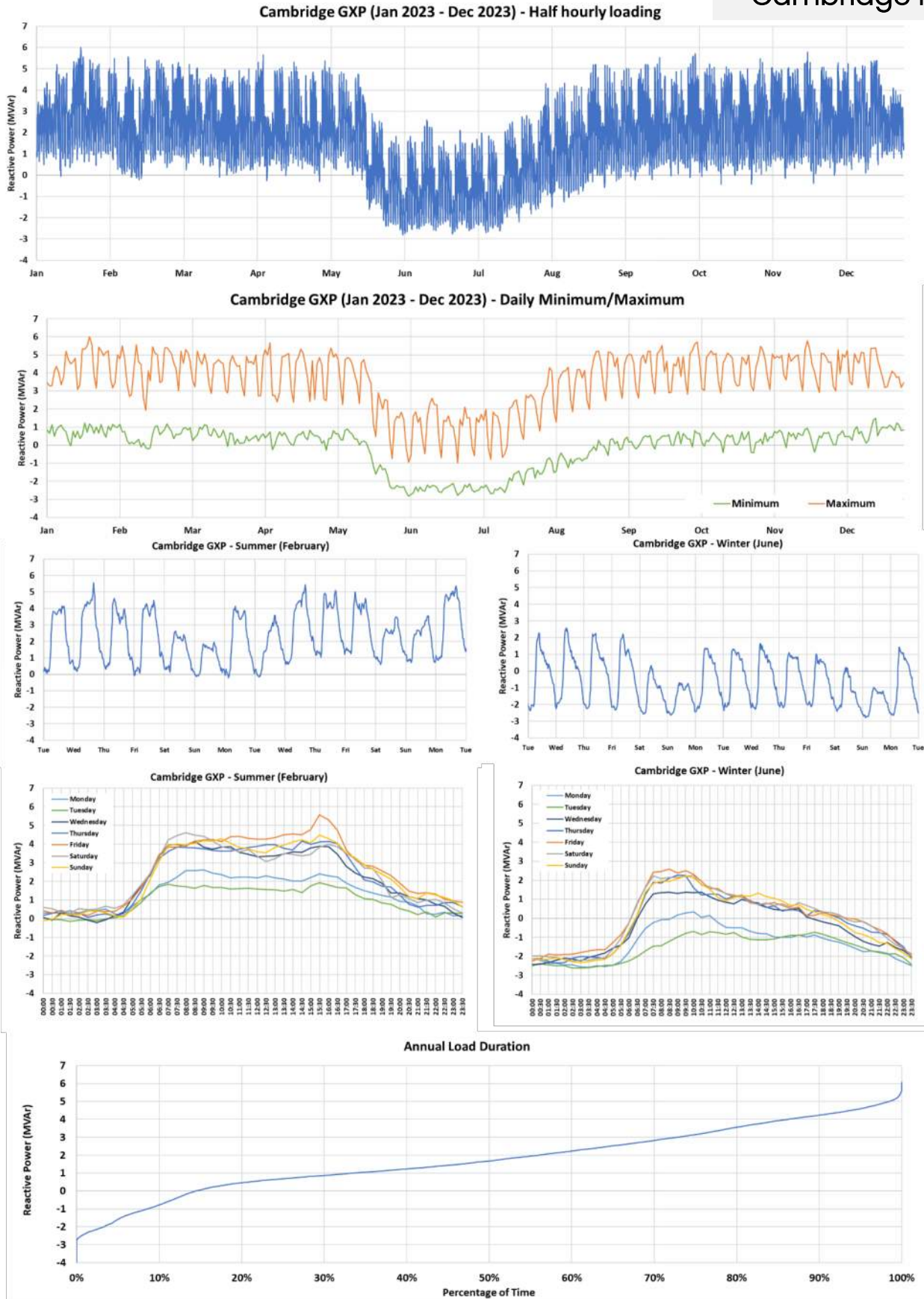


Figure 7. Cambridge: Reactive power (MVar) load characteristics.

**Glenbrook
(clean bus) MVA**

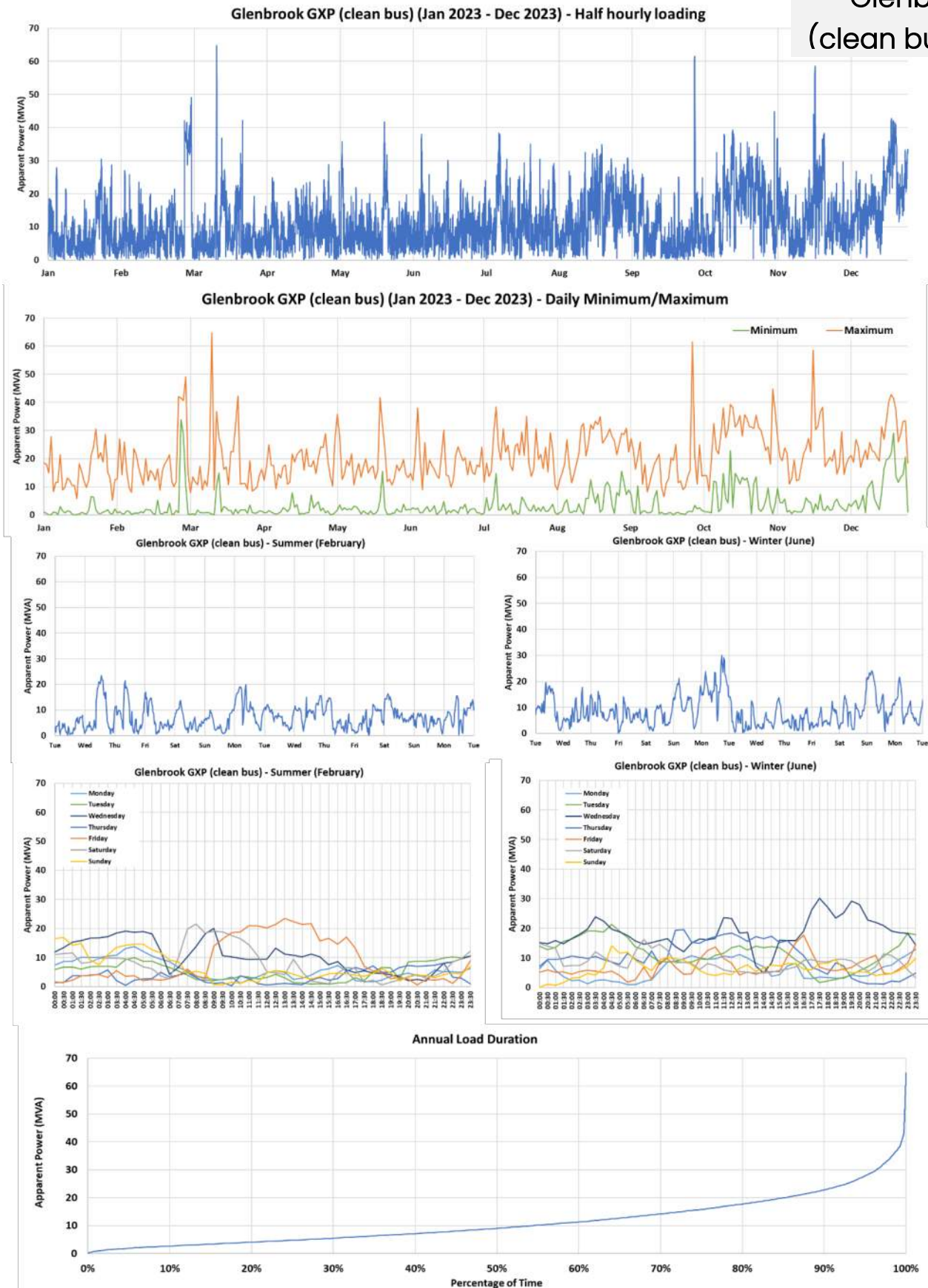


Figure 8. Glenbrook (clean bus): Apparent power (MVA) load characteristics.

Glenbrook (clean bus) MVar

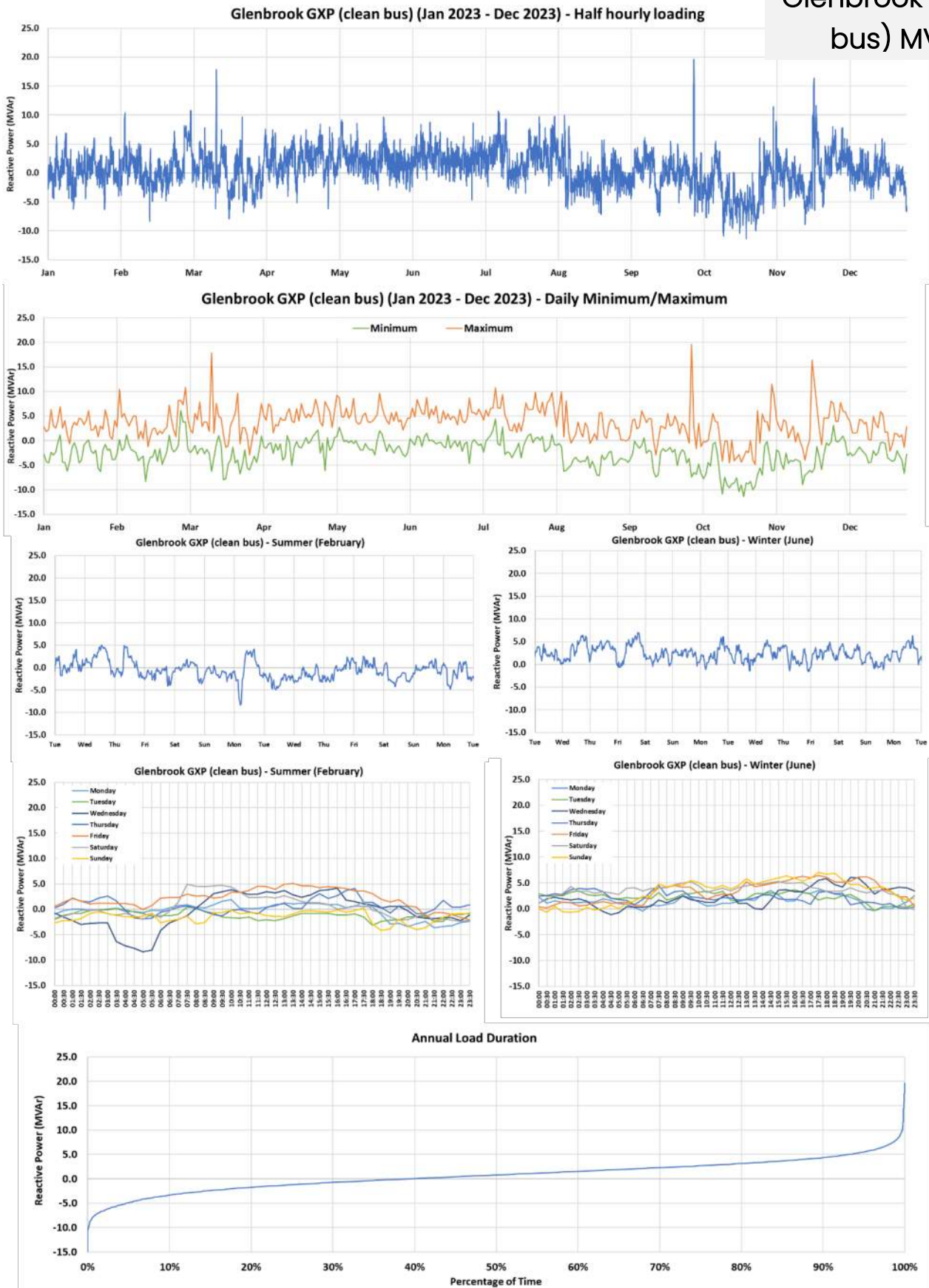


Figure 9. Glenbrook (clean bus): Reactive power (MVar) load characteristics.

Glenbrook (dirty bus)
MVA

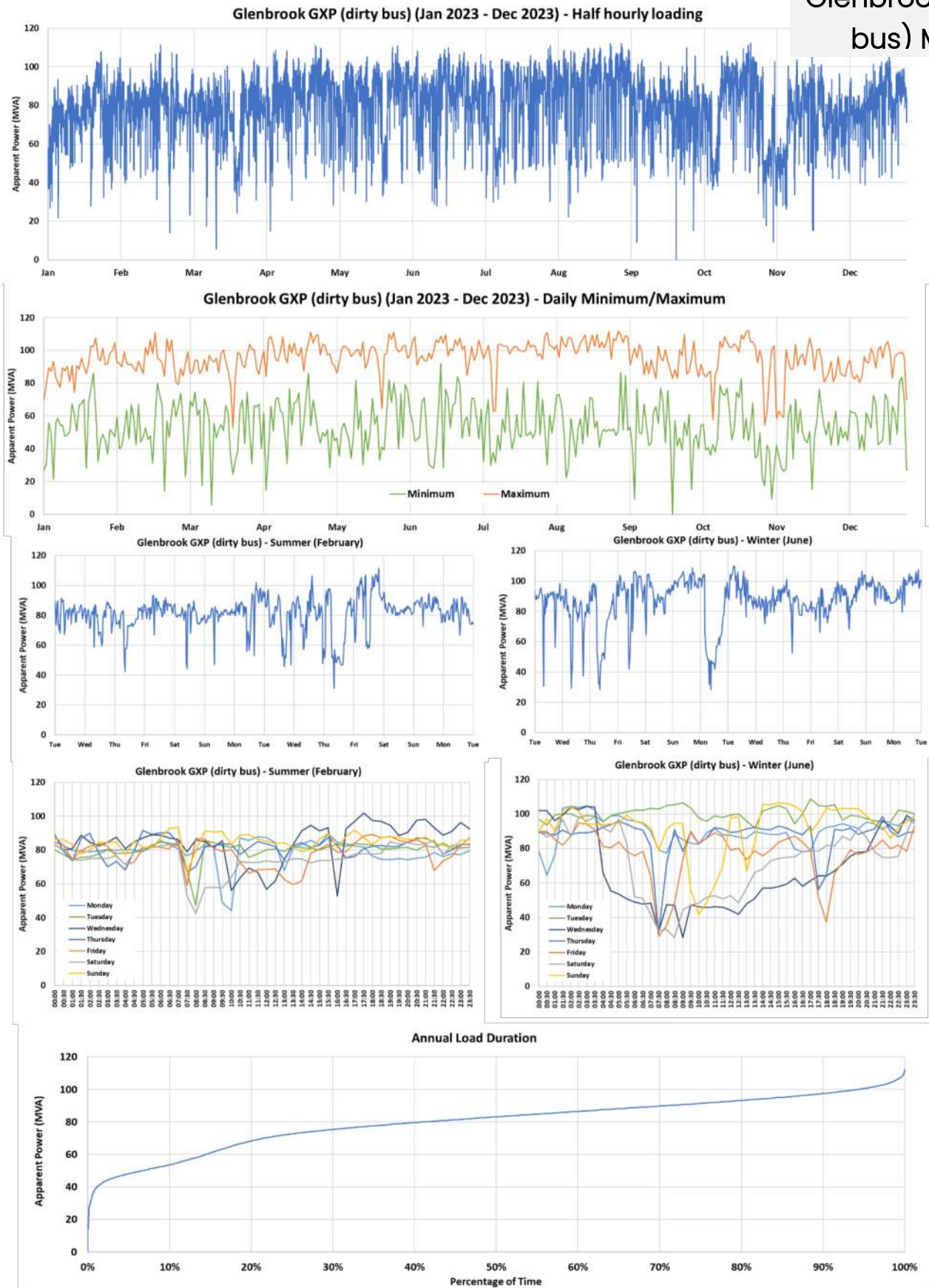


Figure 10. Glenbrook (dirty bus): Apparent power (MVA) load characteristics.

Glenbrook (dirty bus)
MVar

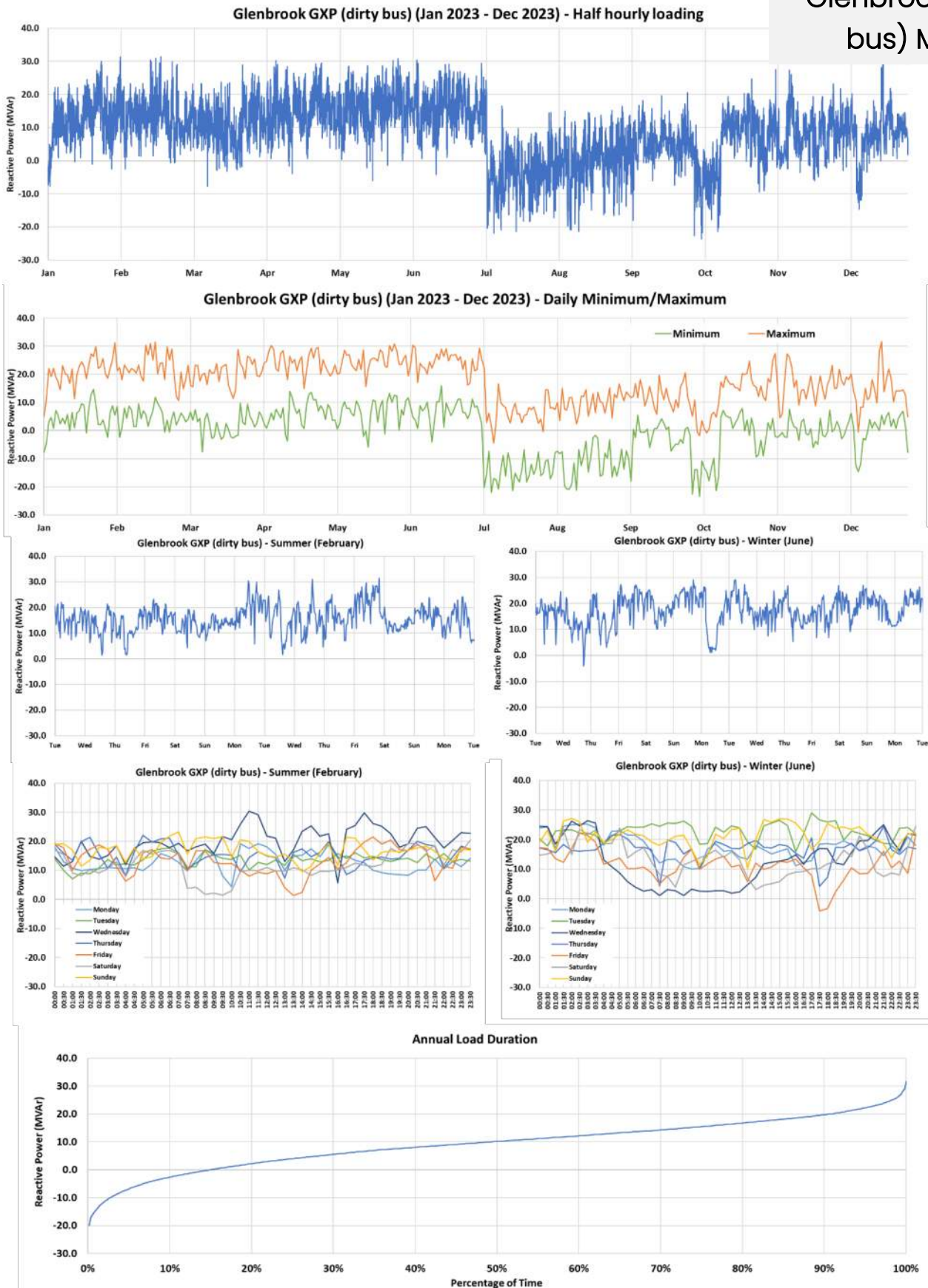


Figure 11. Glenbrook (dirty bus): Reactive power (MVar) load characteristics.

**Hamilton 11 kV
MVA**

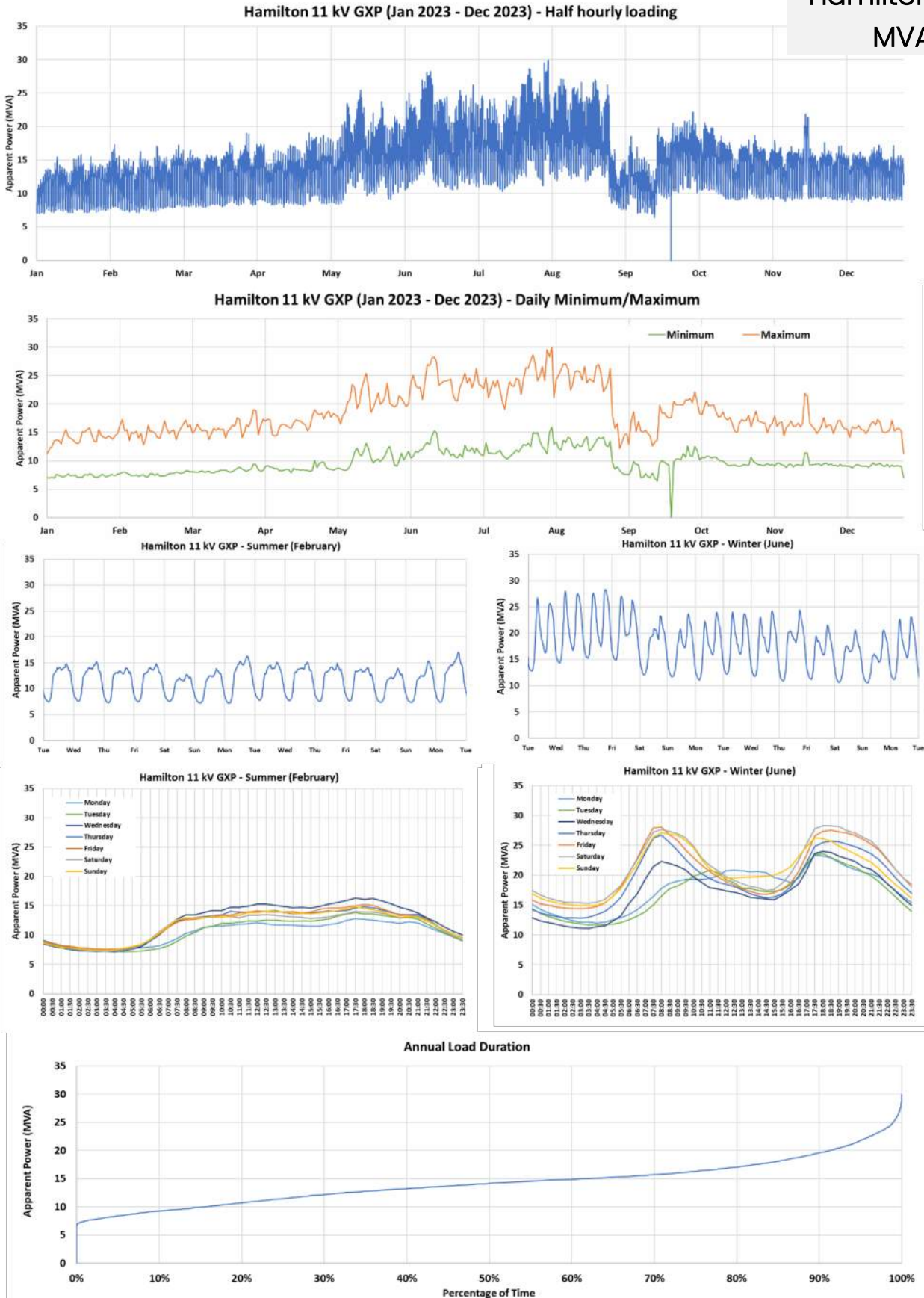


Figure 12. Hamilton 11 kV: Apparent power (MVA) load characteristics.

Hamilton 11 kV MVAR

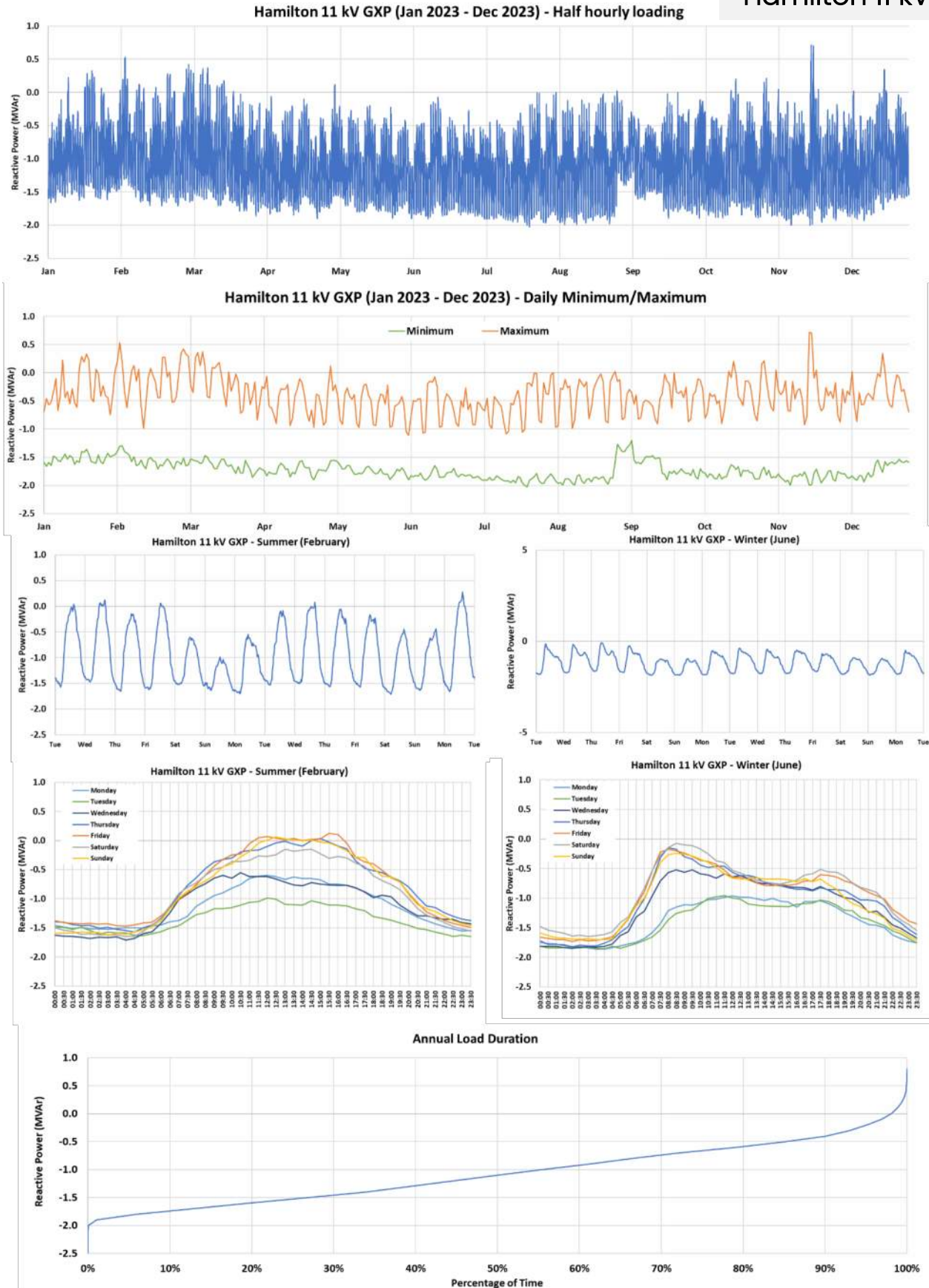


Figure 13. Hamilton 11 kV: Reactive power (MVAR) load characteristics.

**Hamilton 33 kV
MVA**

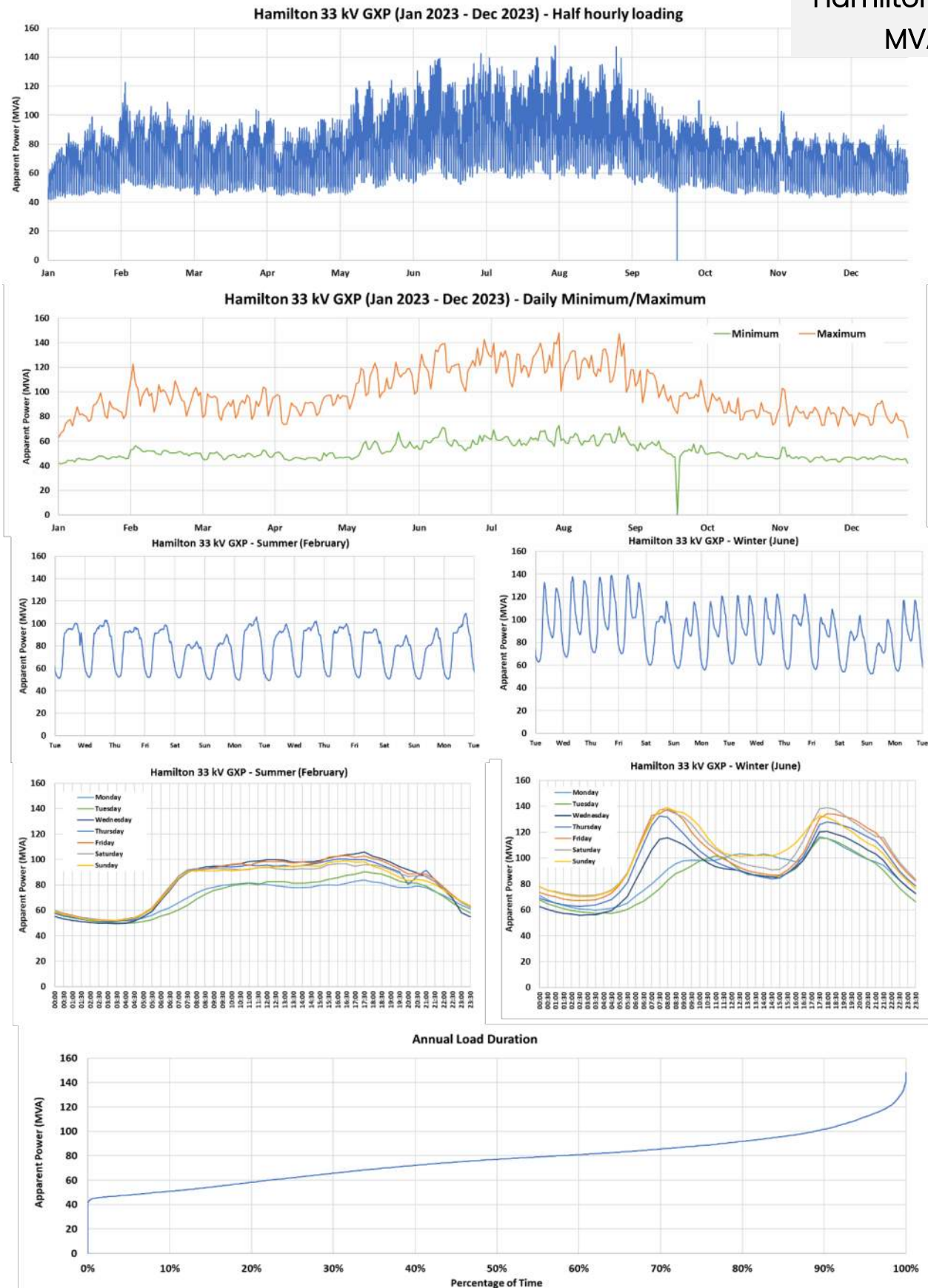


Figure 14. Hamilton 33 kV: Apparent power (MVA) load characteristics.

Hamilton 33 kV MVar

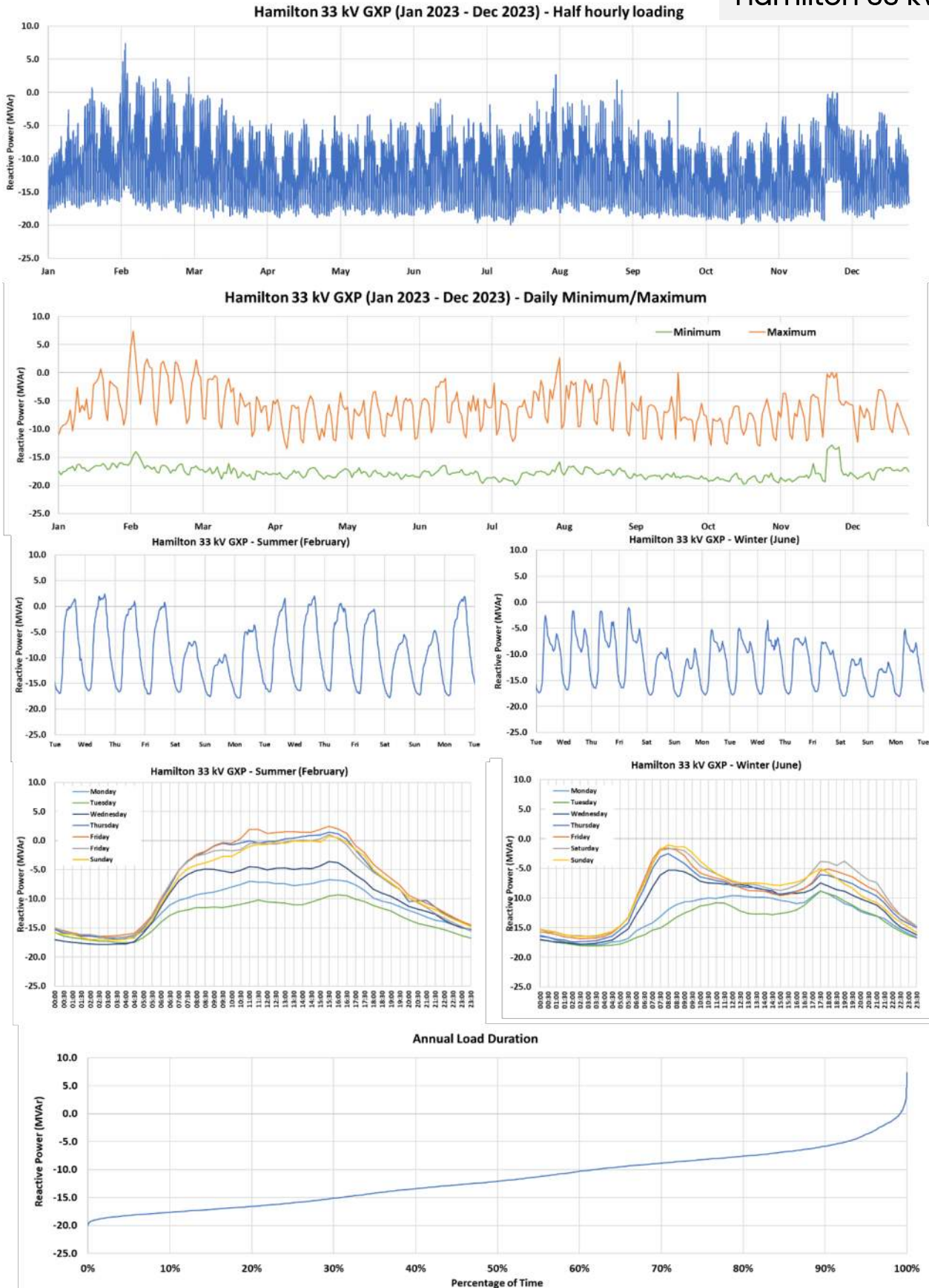


Figure 15. Hamilton 33 kV: Reactive power (MVar) load characteristics.

**Hangatiki 33 kV
MVA**

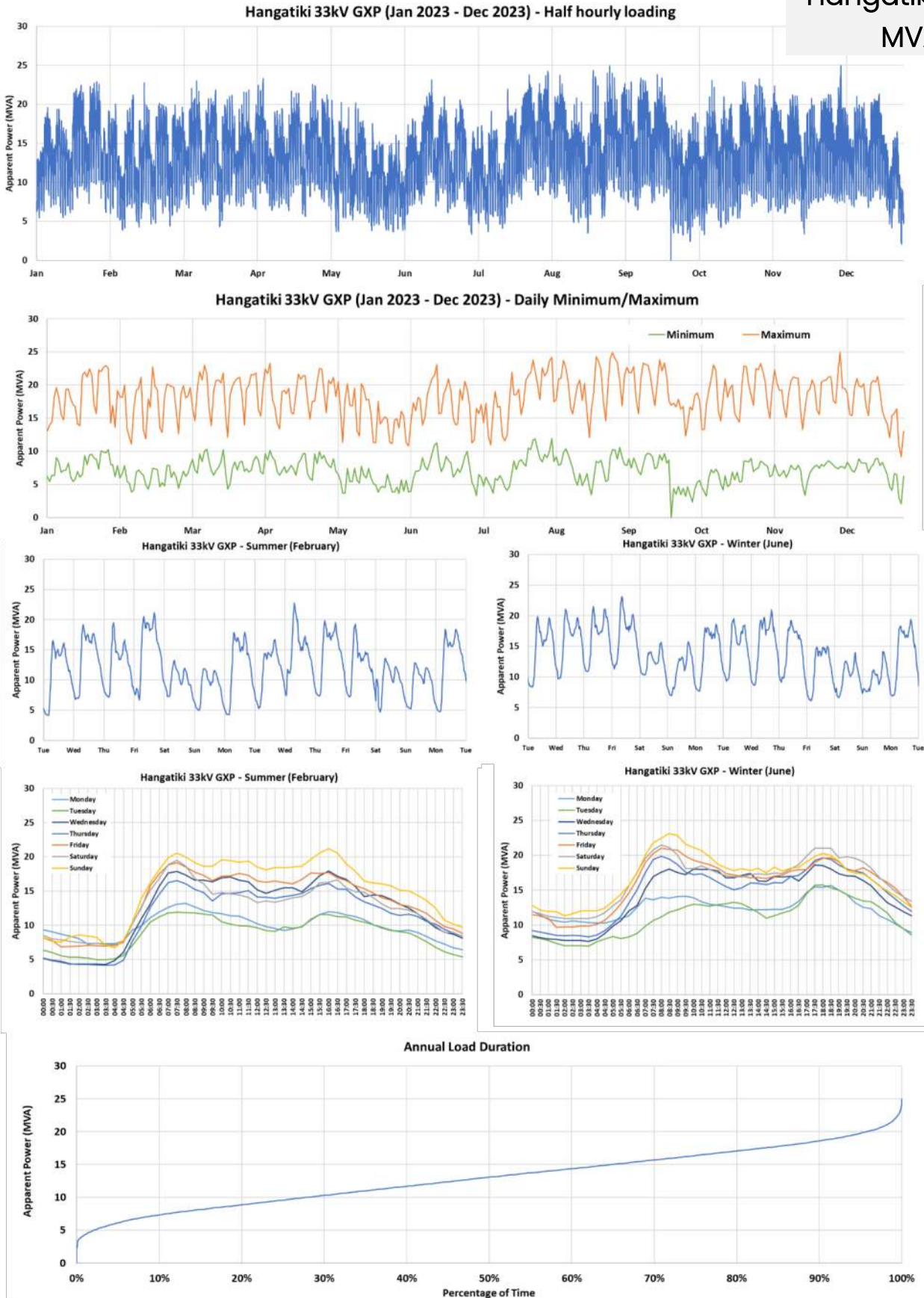


Figure 16. Hangatiki 33 kV: Apparent power (MVA) load characteristics.

Hangatiki 33 kV MVar

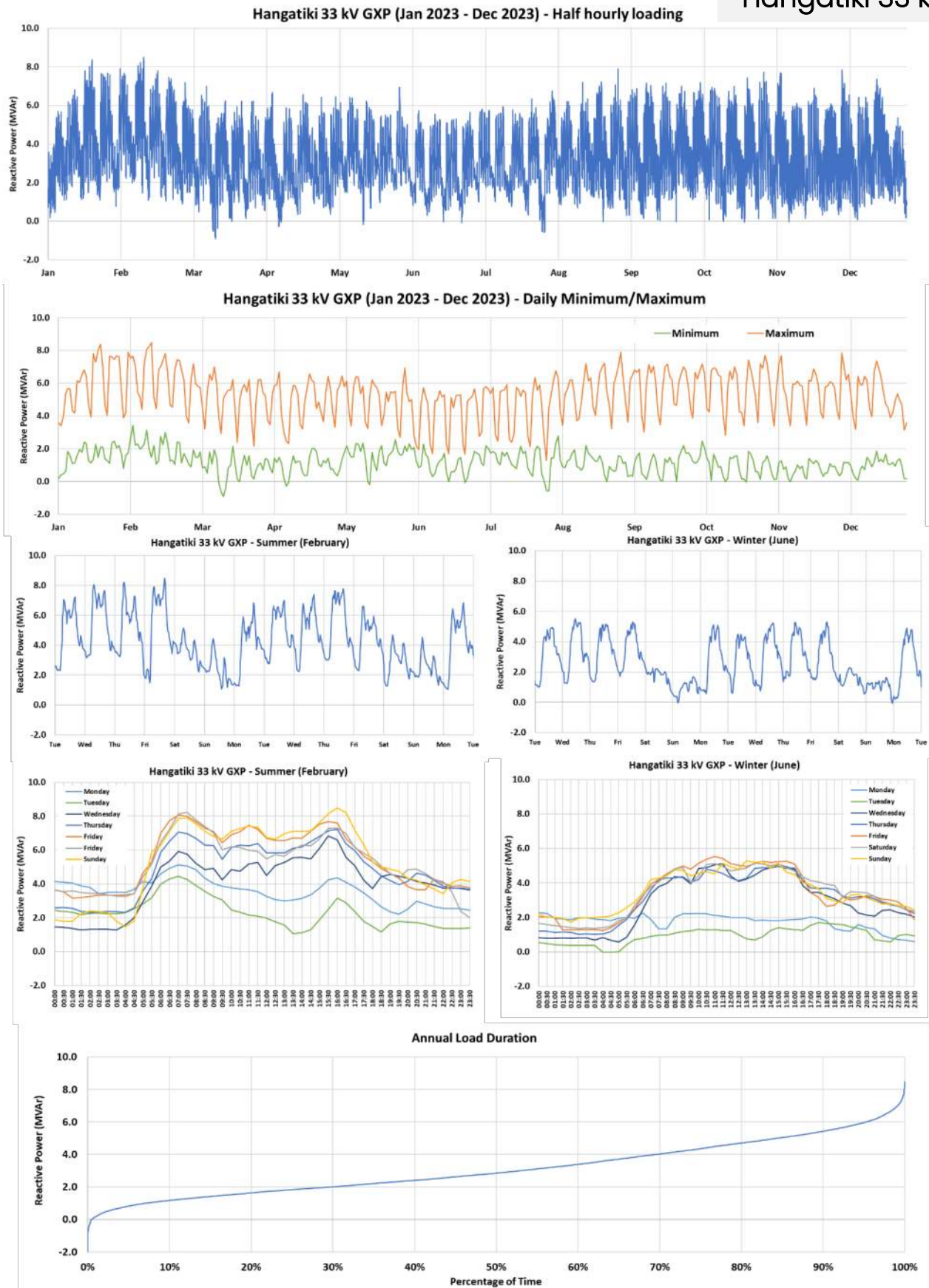


Figure 17. Hangatiki 33 kV: Reactive power (MVar) load characteristics.

**Hangatiki 110 kV
MVA**

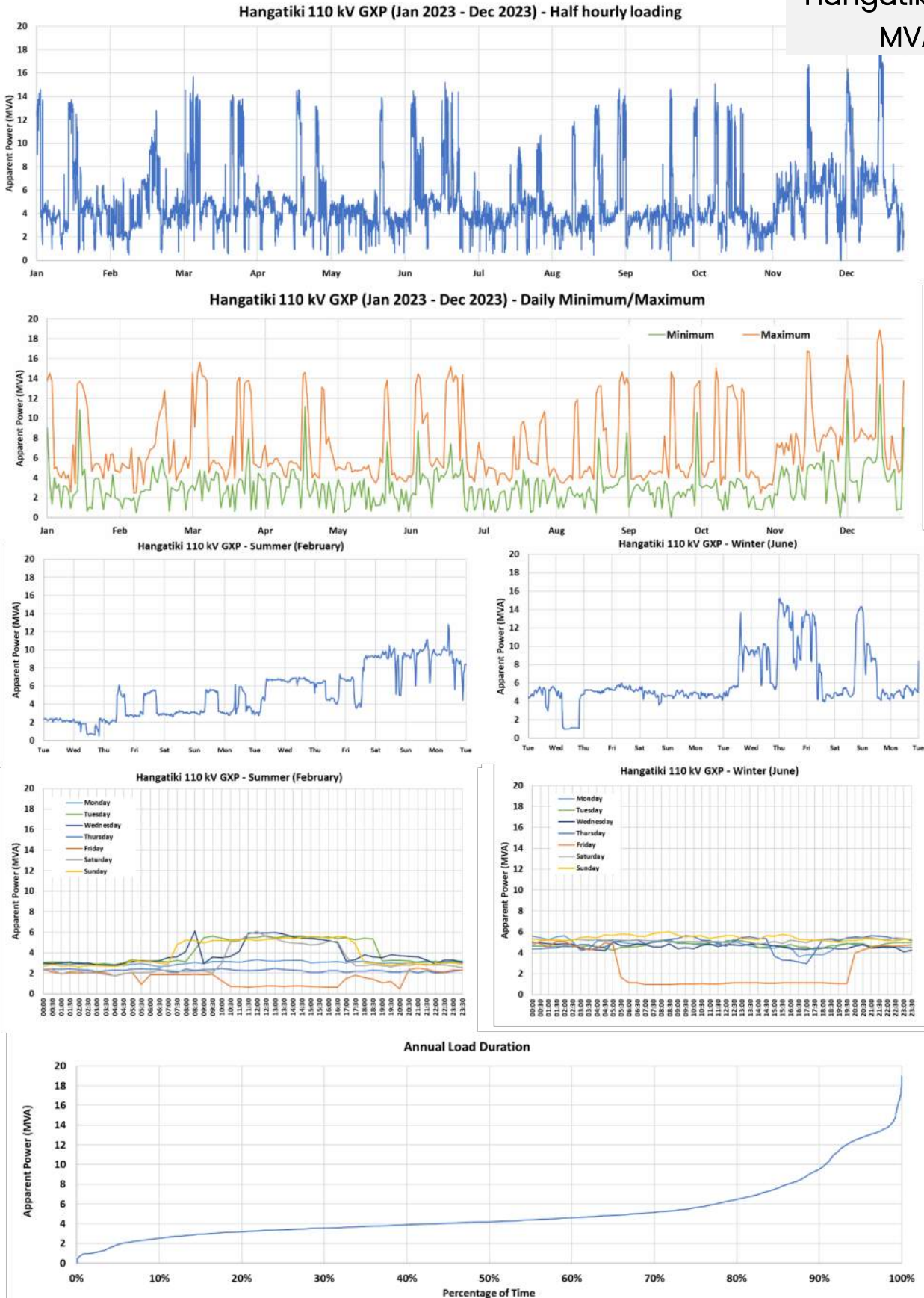


Figure 18. Hangatiki 110 kV: Apparent power (MVA) load characteristics.

Hangatiki 110 kV MVar

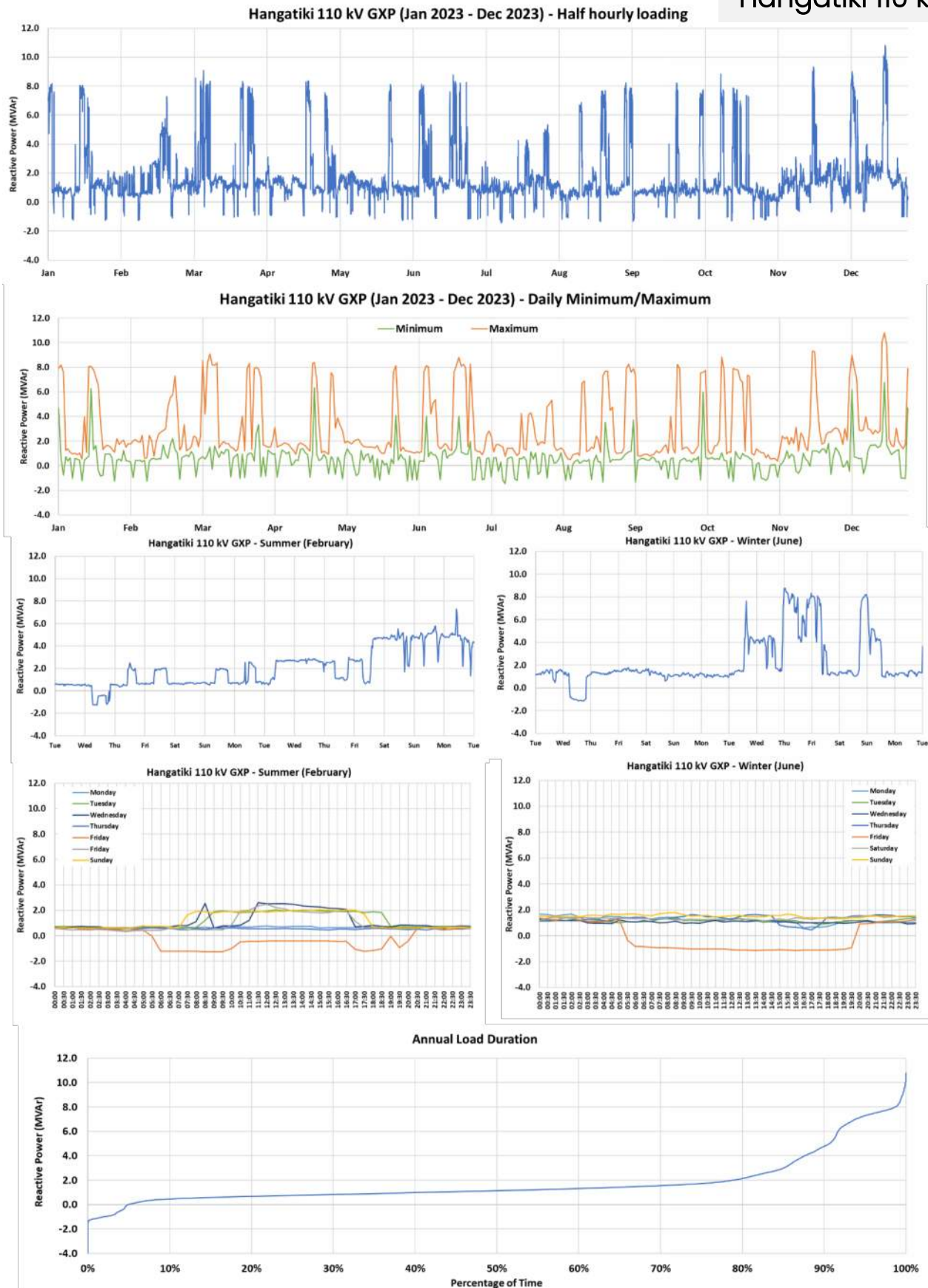


Figure 19. Hangatiki 110 kV: Reactive power (MVar) load characteristics.

Hinuera MVA

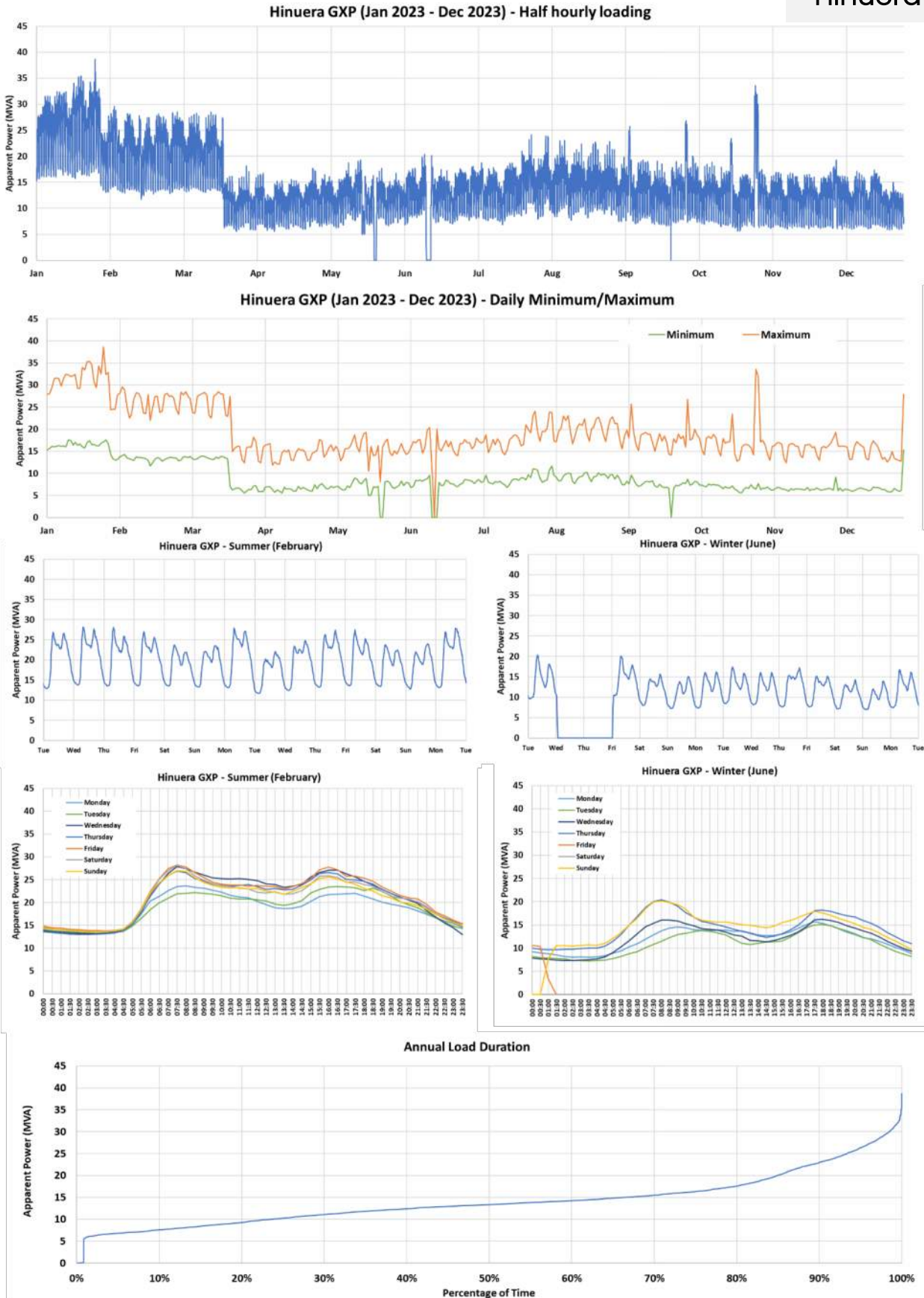


Figure 20. Hinuera: Apparent power (MVA) load characteristics.

Hinuera MVar

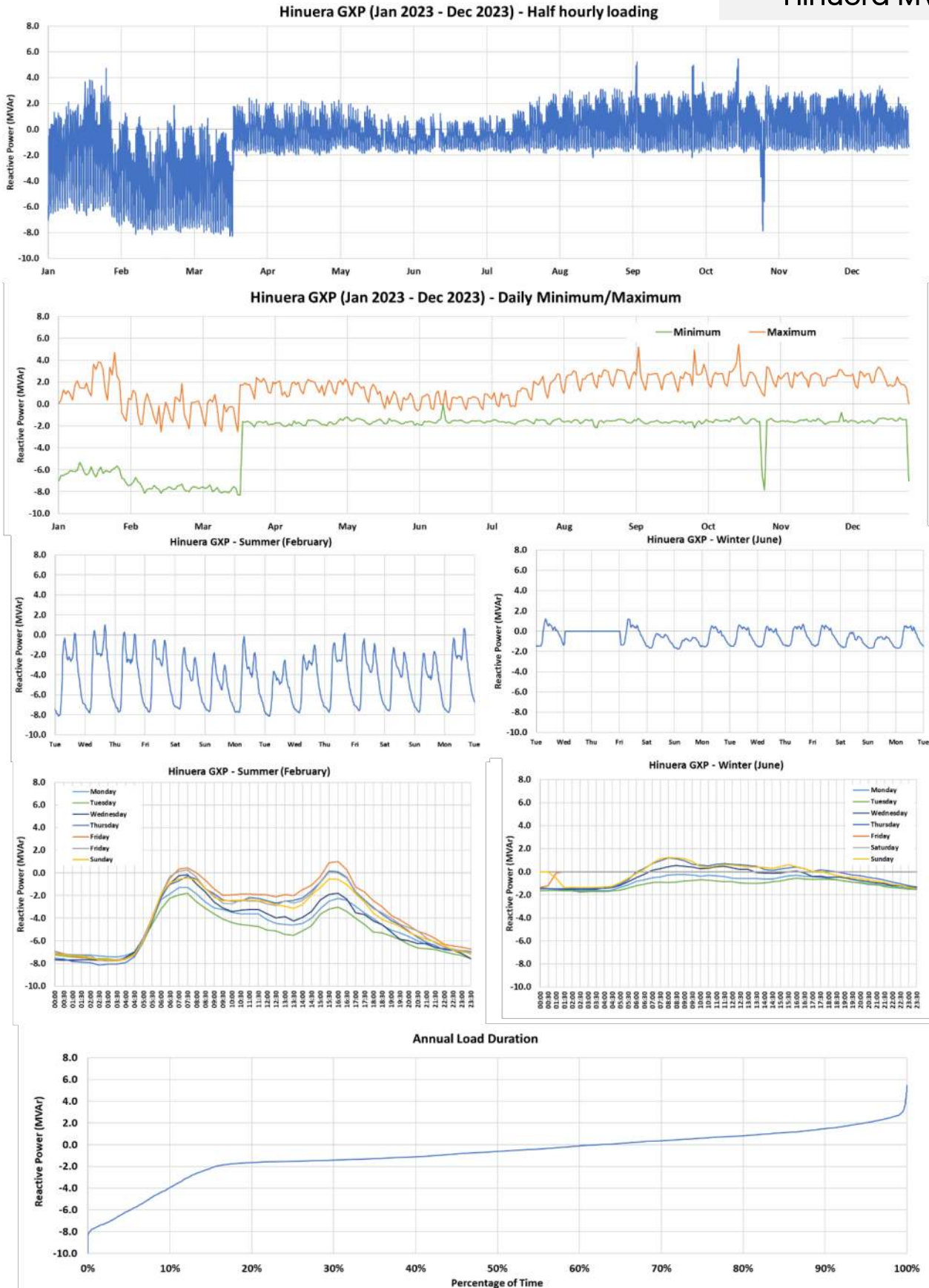


Figure 21. Hinuera: Reactive power (MVar) load characteristics.

**Huntly 33 kV
MVA**

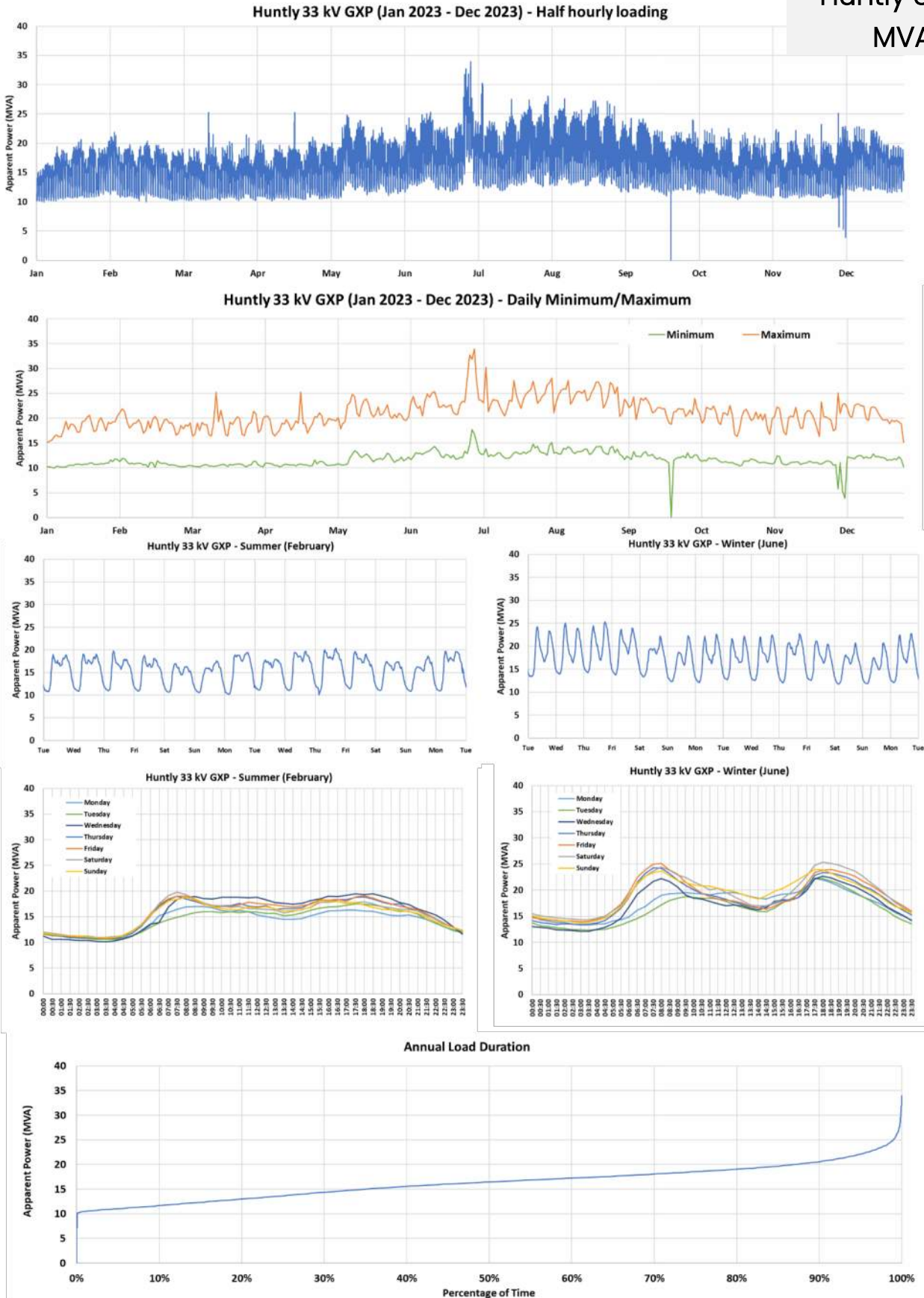


Figure 22. Huntly 33 kV: Apparent power (MVA) load characteristics.

Huntly 33 kV MVar

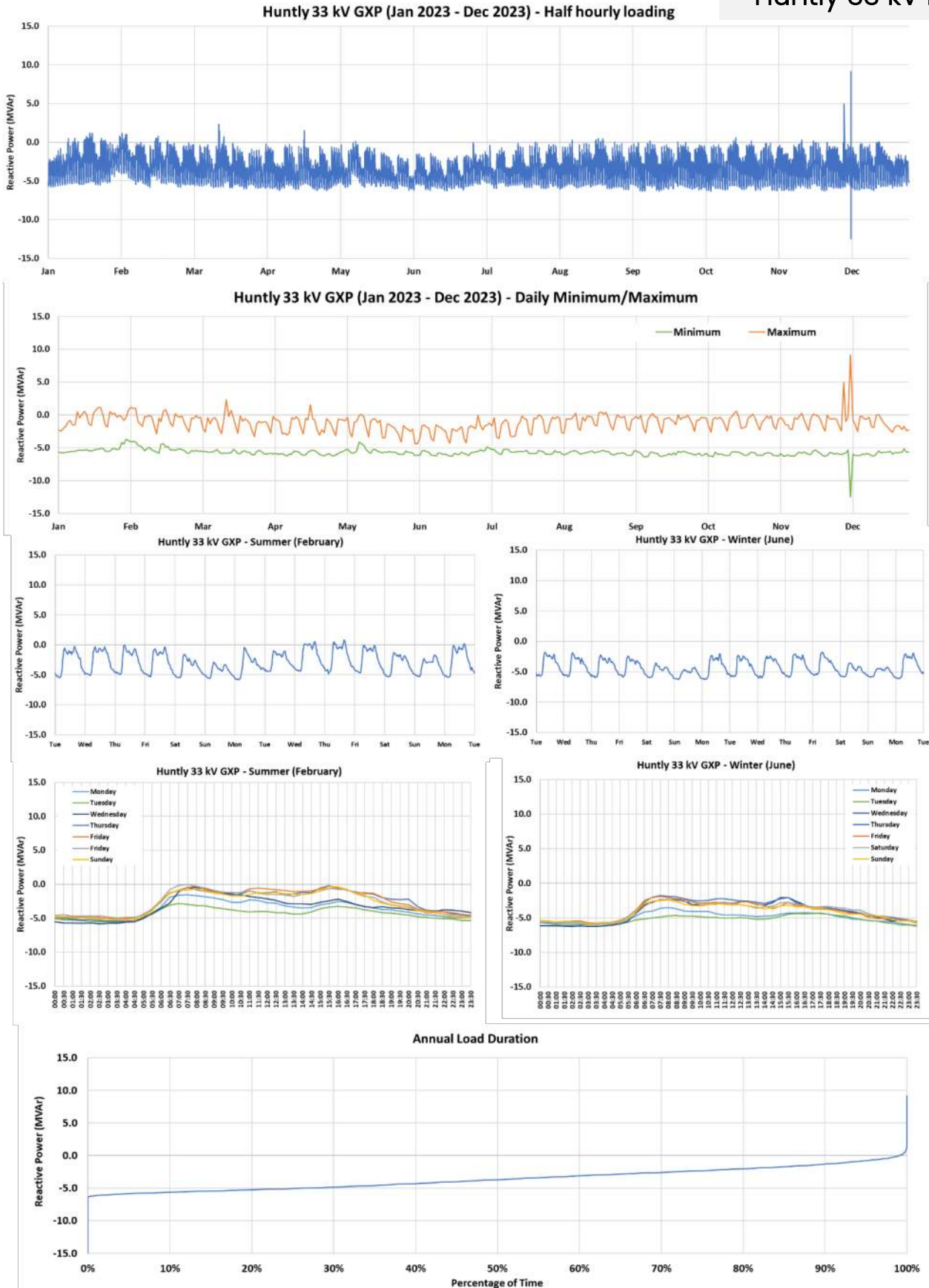


Figure 23. Huntly 33 kV: Reactive power (MVar) load characteristics.

**Kinleith 11 kV
MVA**

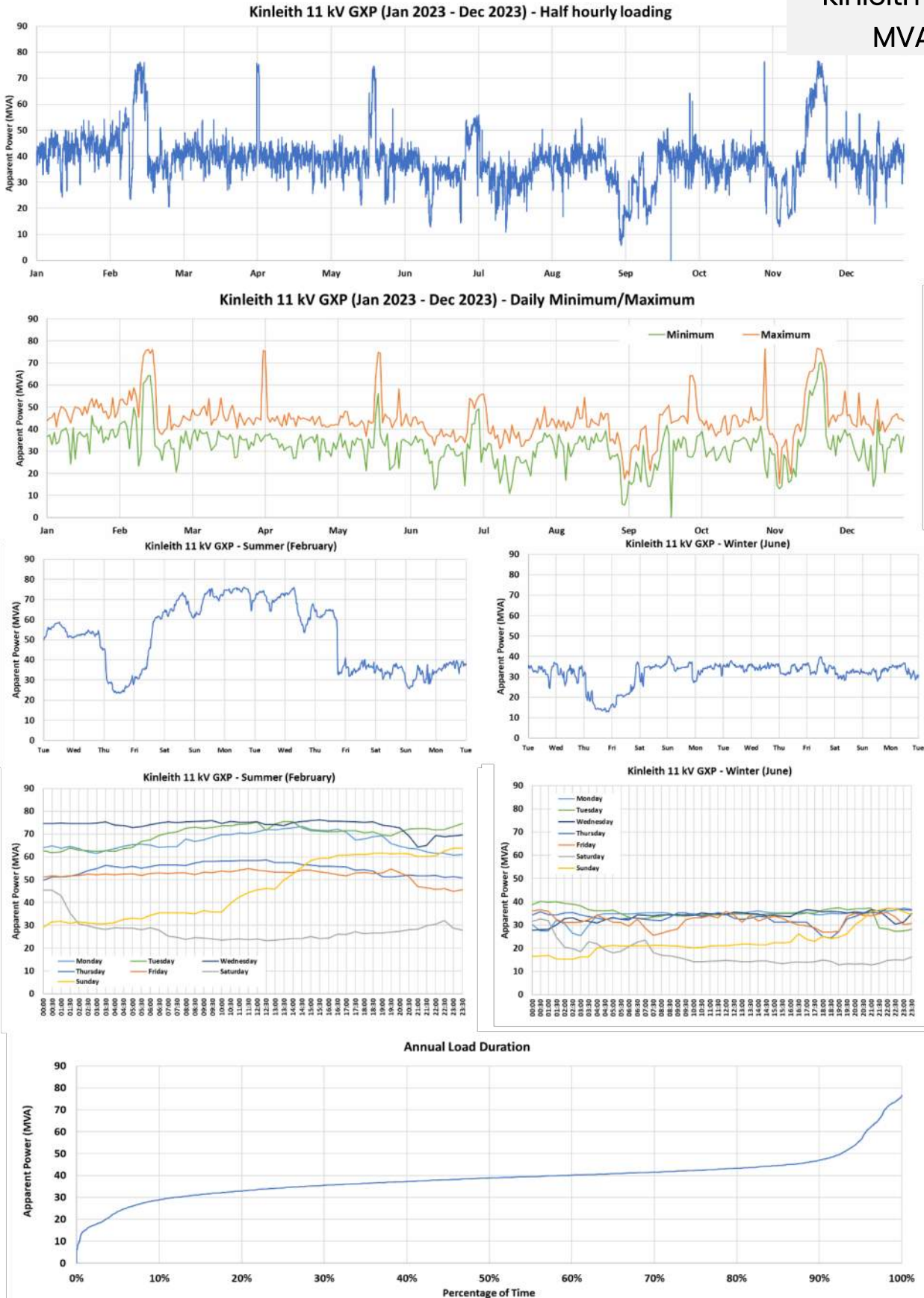


Figure 24. Kinleith 11 kV: Apparent power (MVA) load characteristics.

Kinleith 11 kV MVar

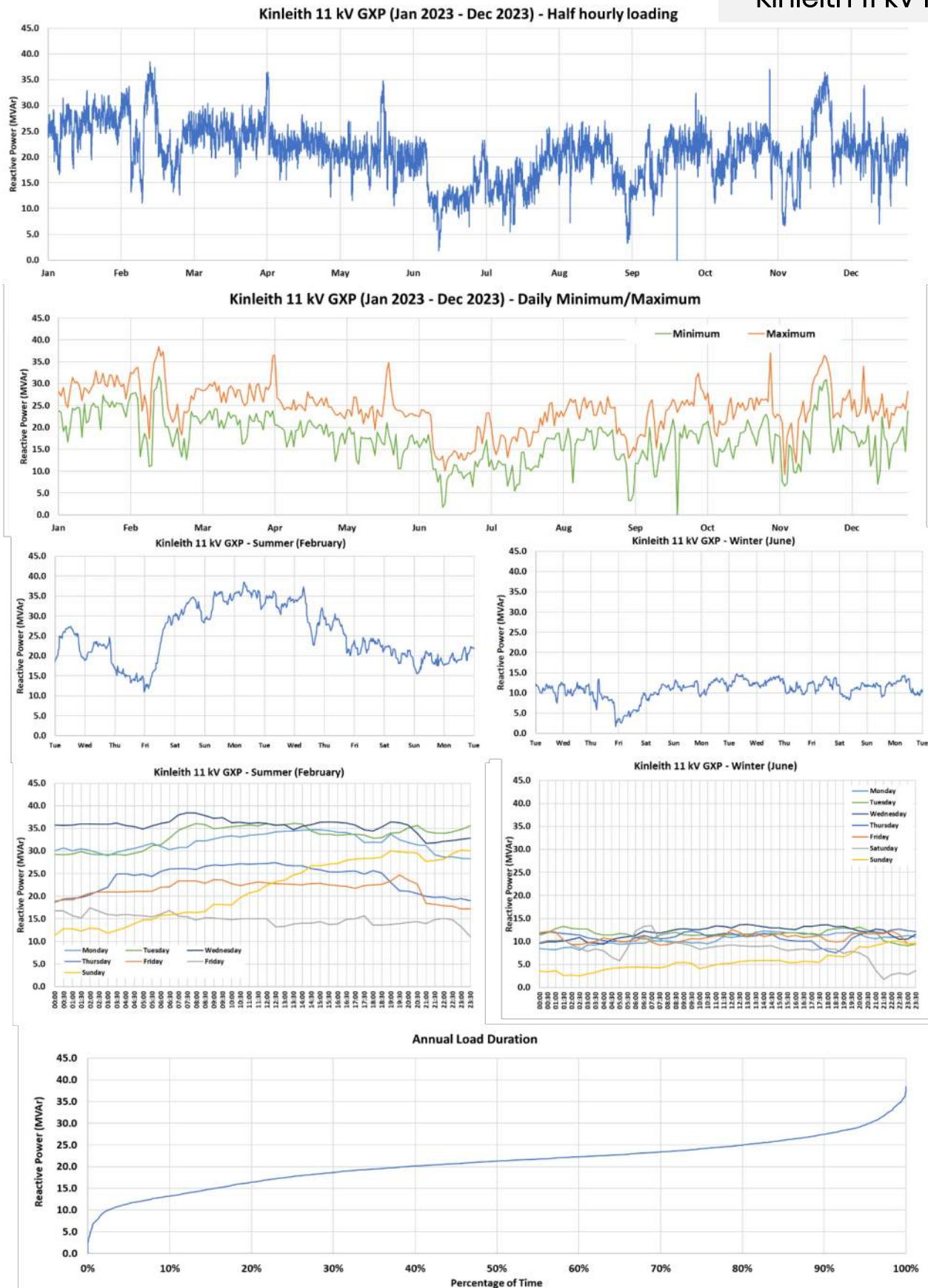


Figure 25. Kinleith 11 kV: Reactive power (MVar) load characteristics.

**Kinleith 33 kV
MVA**

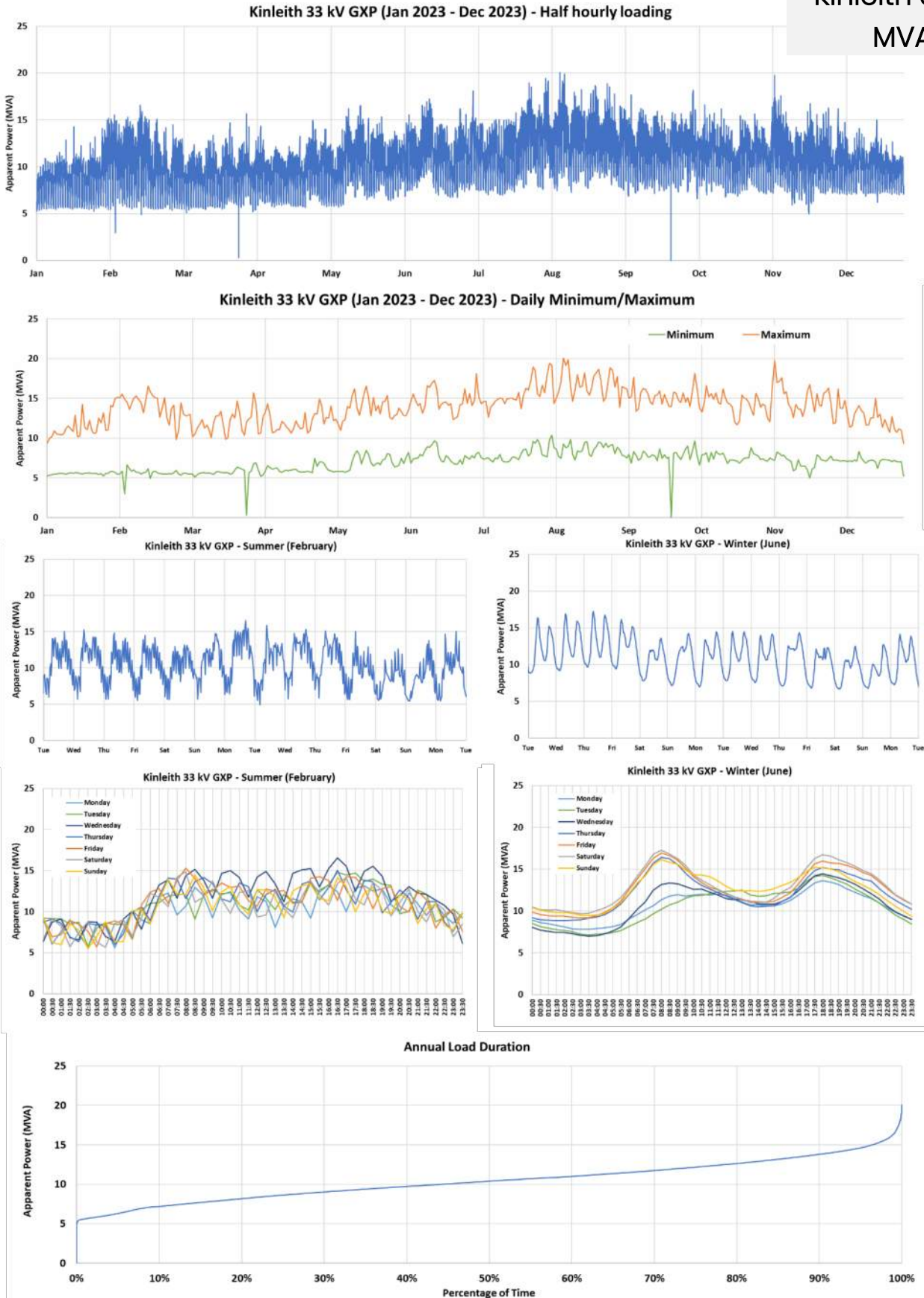


Figure 26. Kinleith 33 kV: Apparent power (MVA) load characteristics.

Kinleith 33 kV MVar

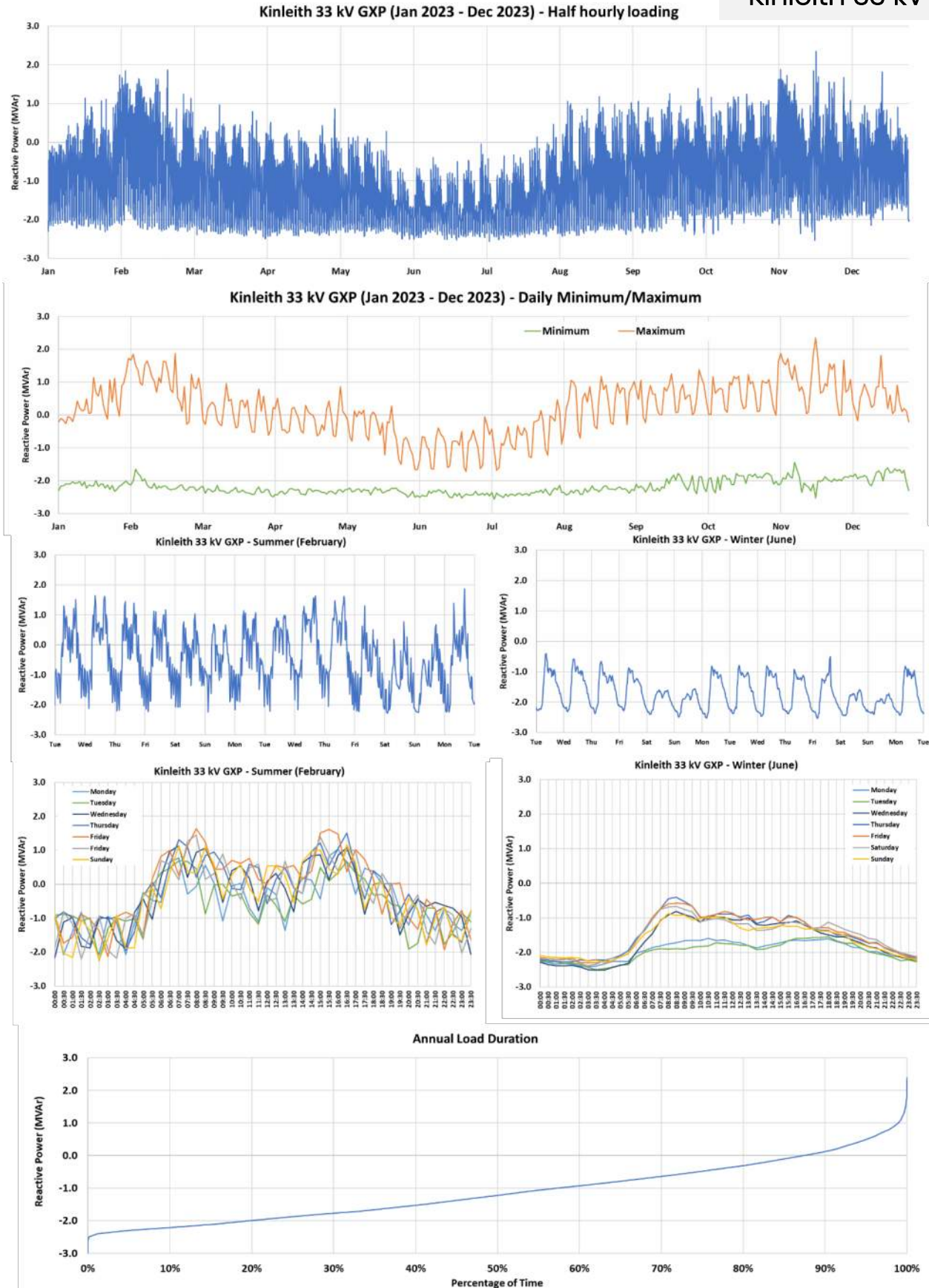


Figure 27. Kinleith 33 kV: Reactive power (MVar) load characteristics.

Kopu MVA

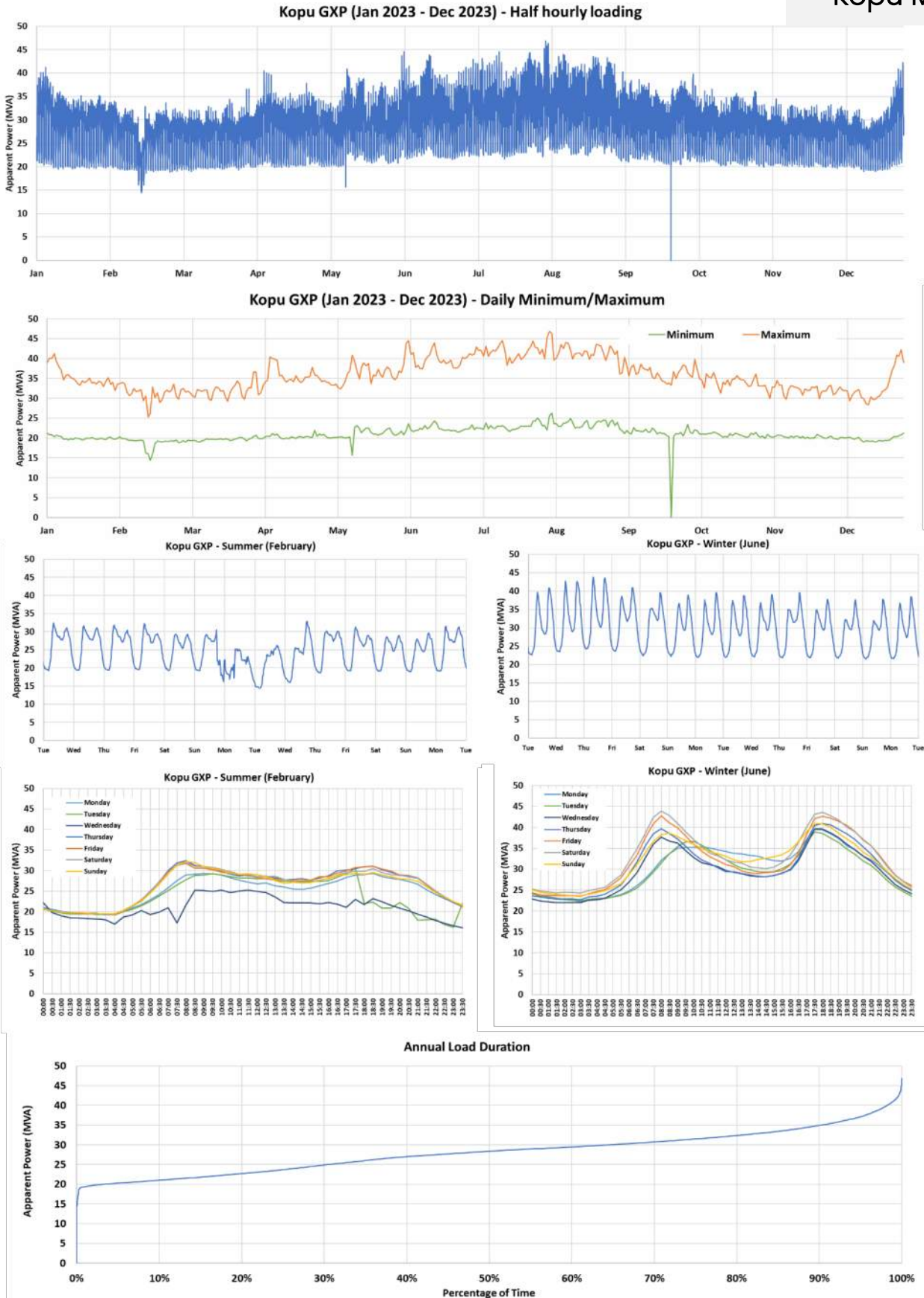


Figure 28. Kopu: Apparent power (MVA) load characteristics.

Kopu MVar

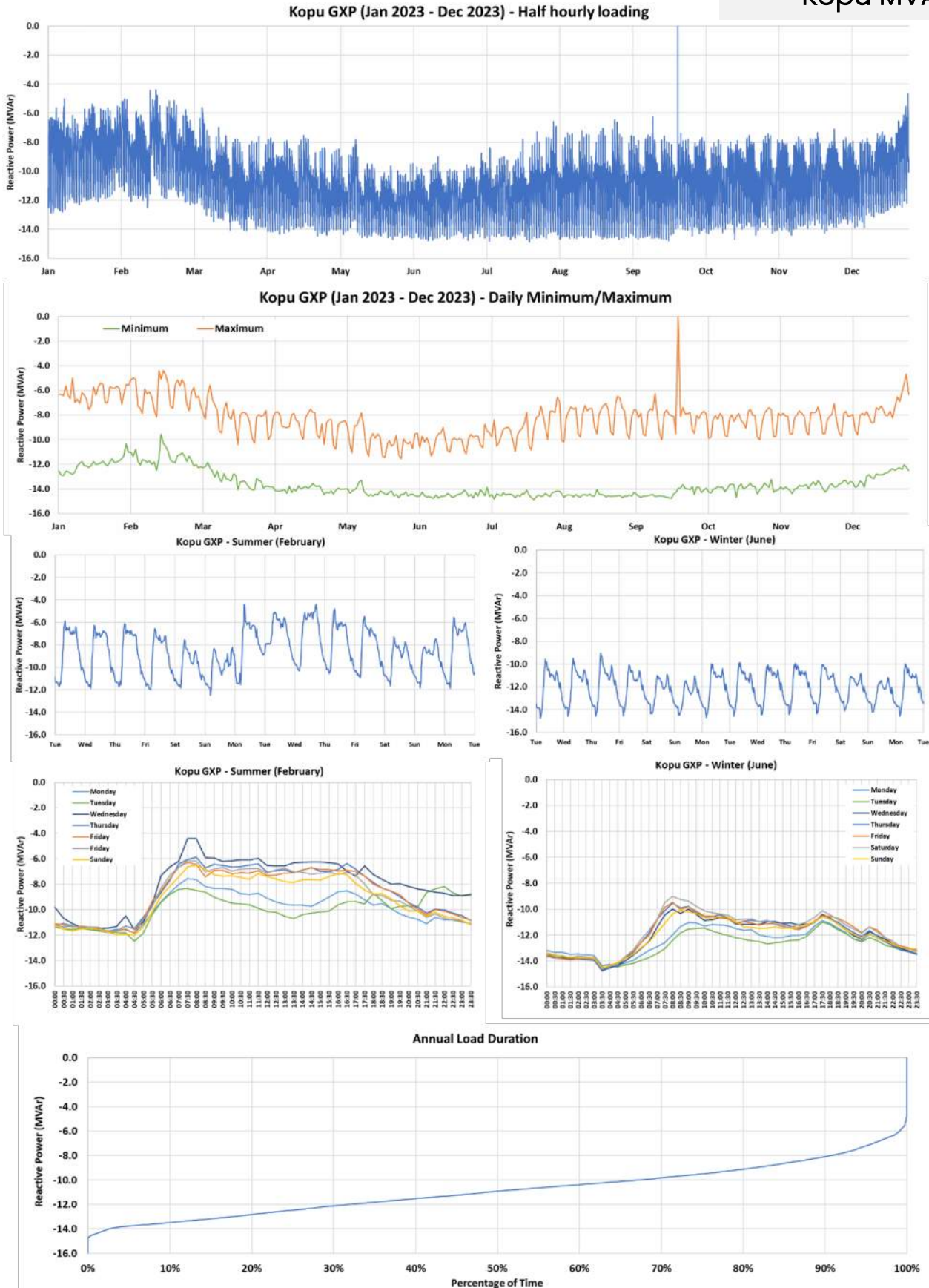


Figure 29. Kopu: Reactive power (MVar) load characteristics.

Lichfield MVA

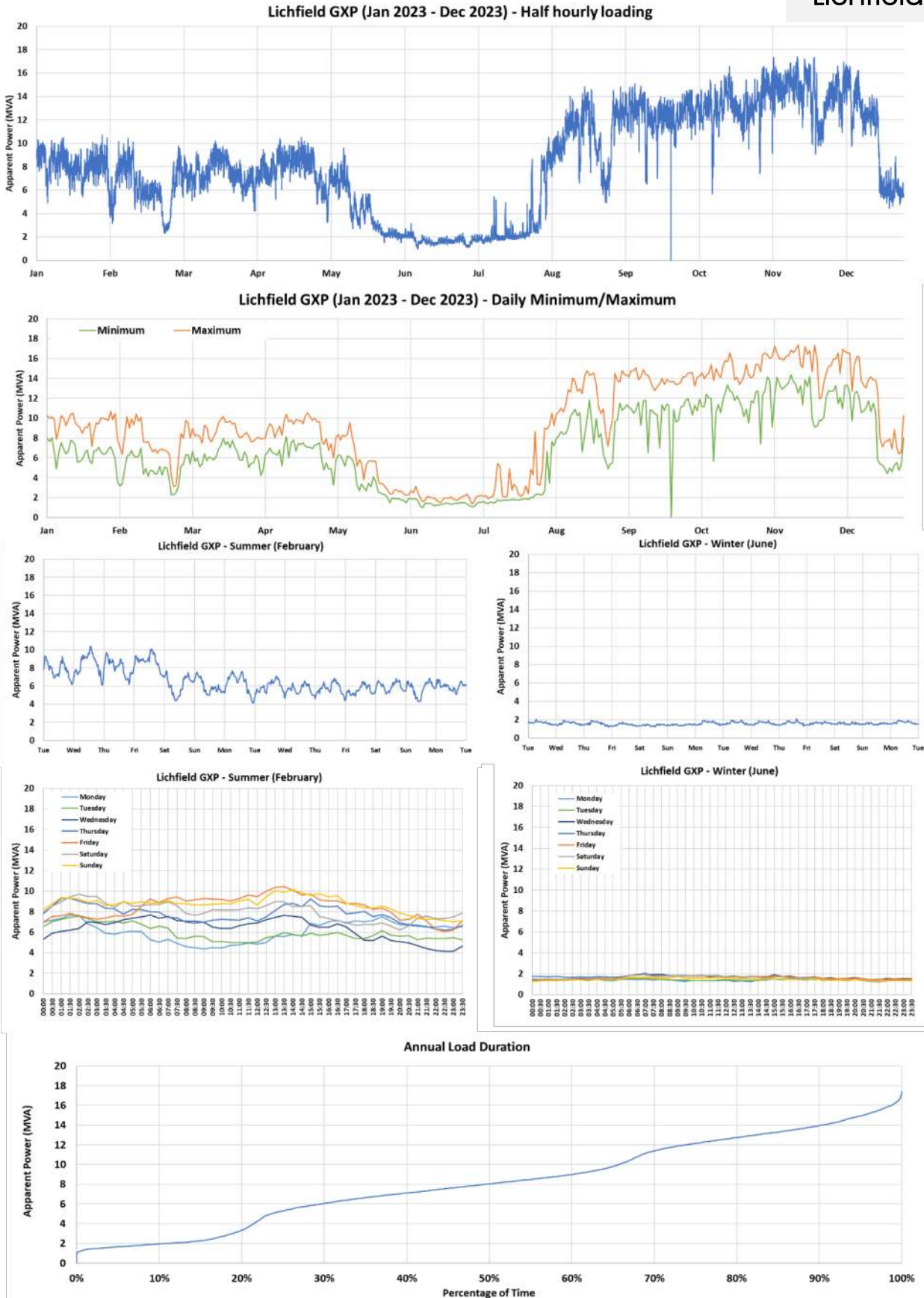


Figure 30. Lichfield: Apparent power (MVA) load characteristics.

Lichfield MVar

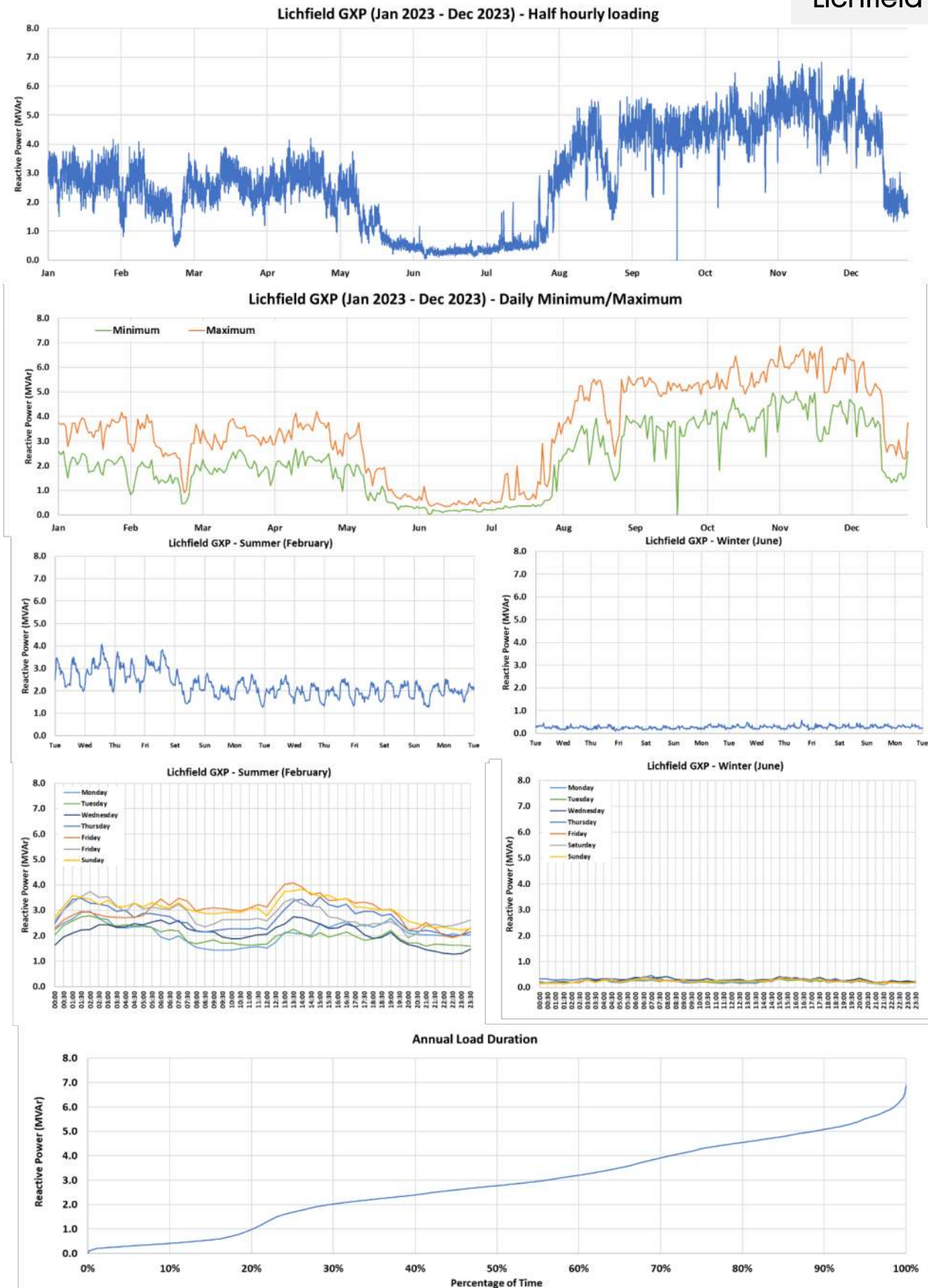


Figure 31. Lichfield: Reactive power (MVar) load characteristics.

Piako MVA

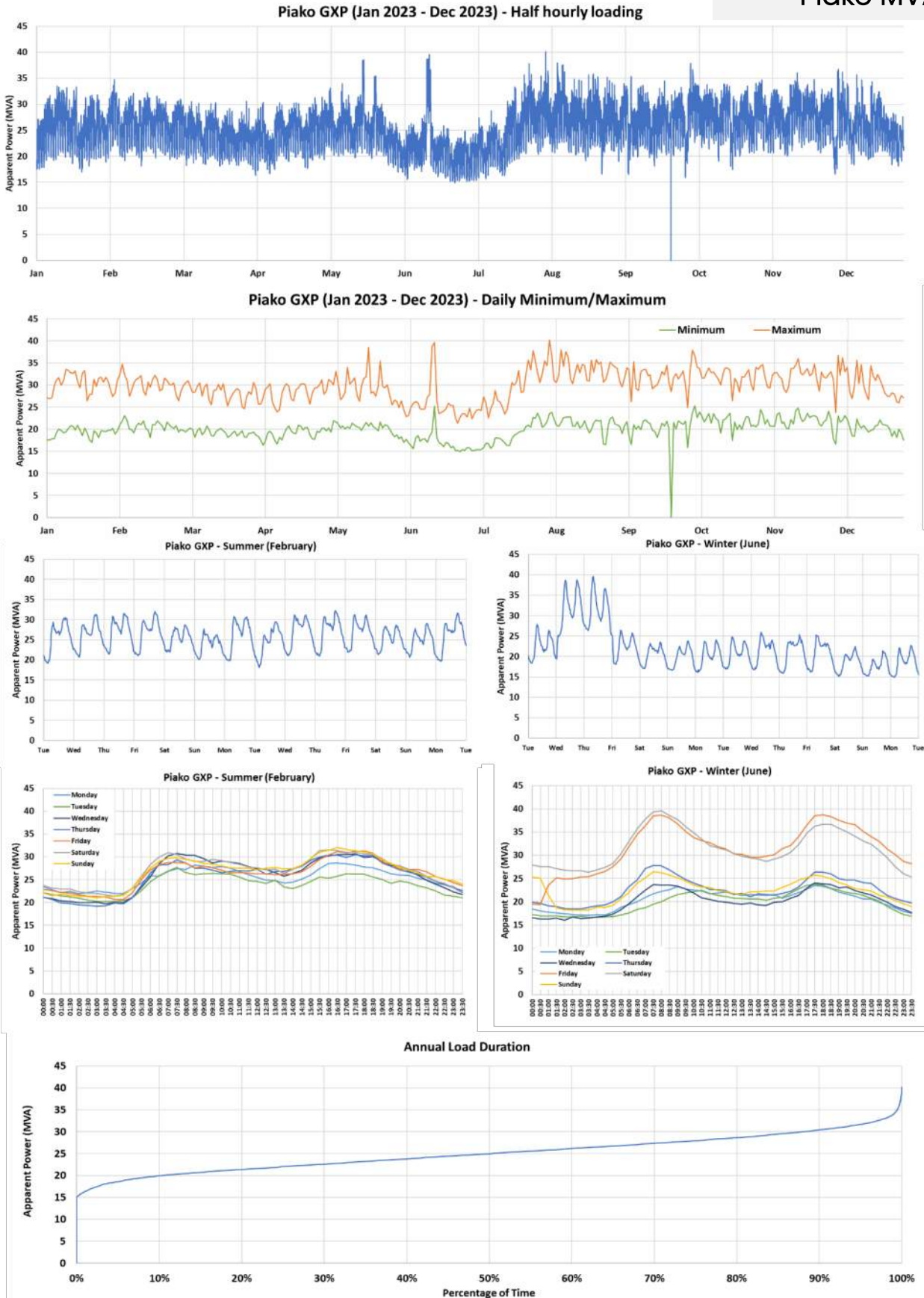


Figure 32. Piako: Apparent power (MVA) load characteristics.

Piako MVar

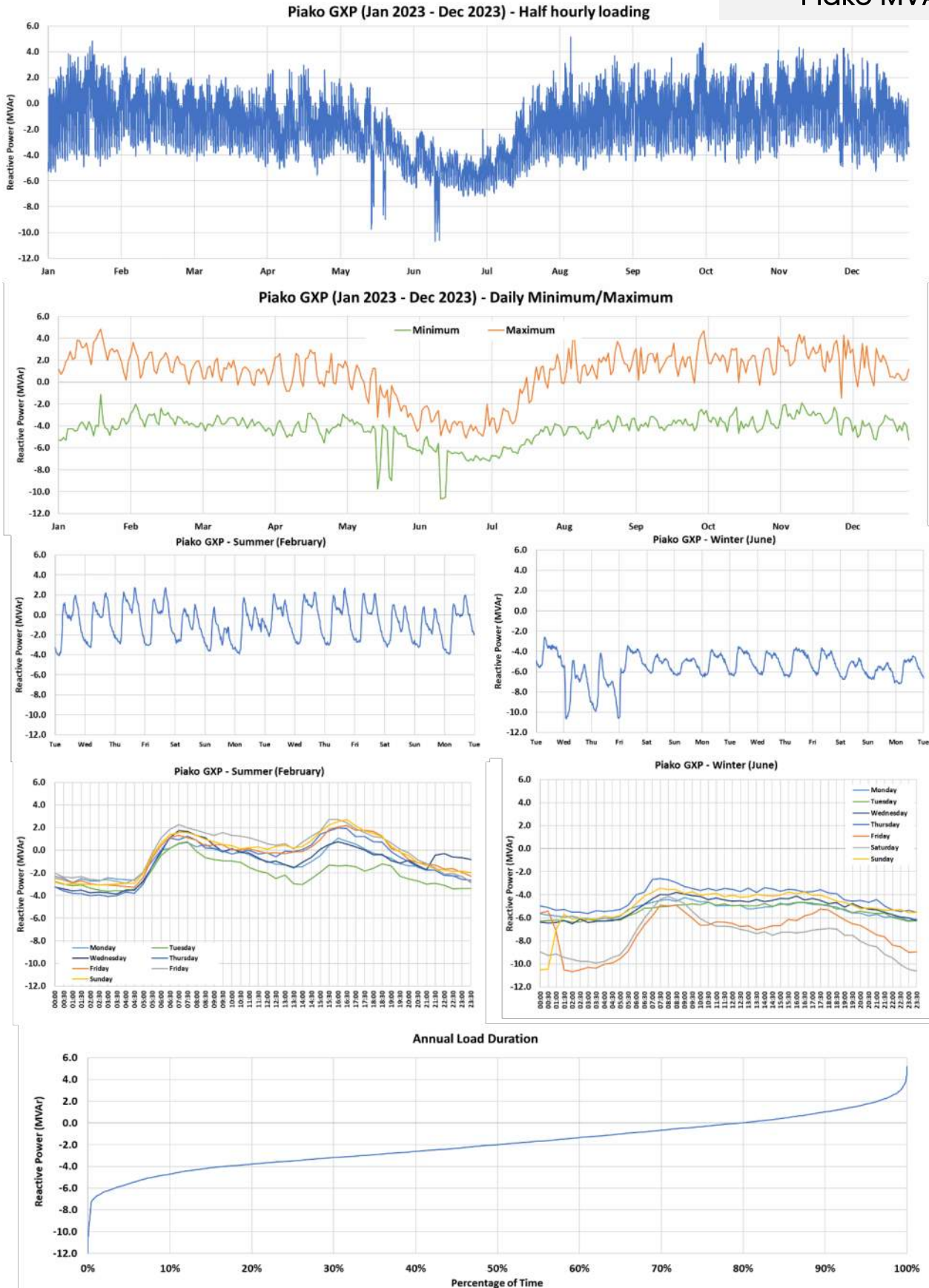


Figure 33. Piako: Reactive power (MVar) load characteristics.

**Te Awamutu
MVA**

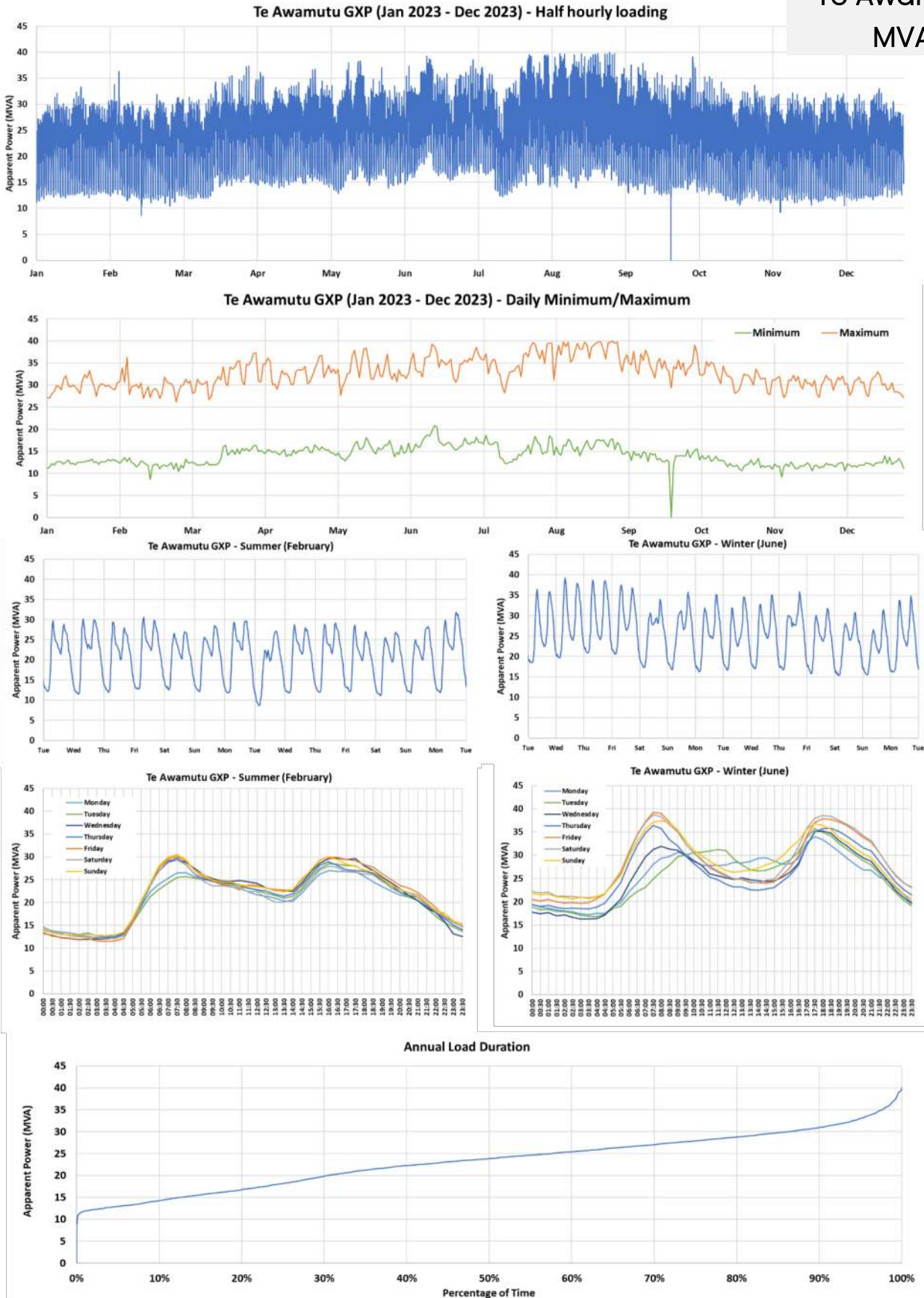


Figure 34. Te Awamutu: Apparent power (MVA) load characteristics.

Te Awamutu MVar

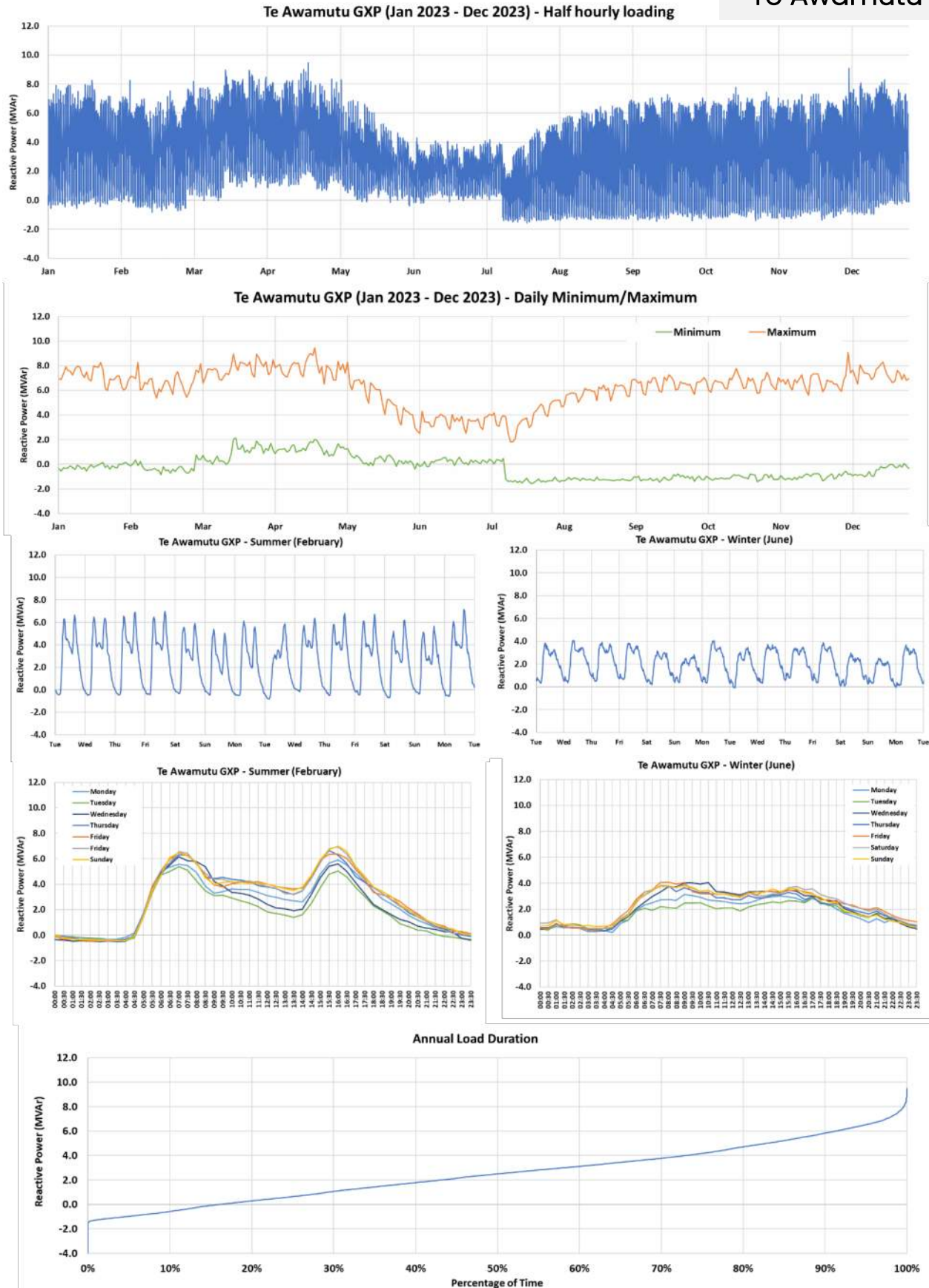


Figure 35. Te Awamutu: Reactive power (MVar) load characteristics.

**Te Kowhai
MVA**

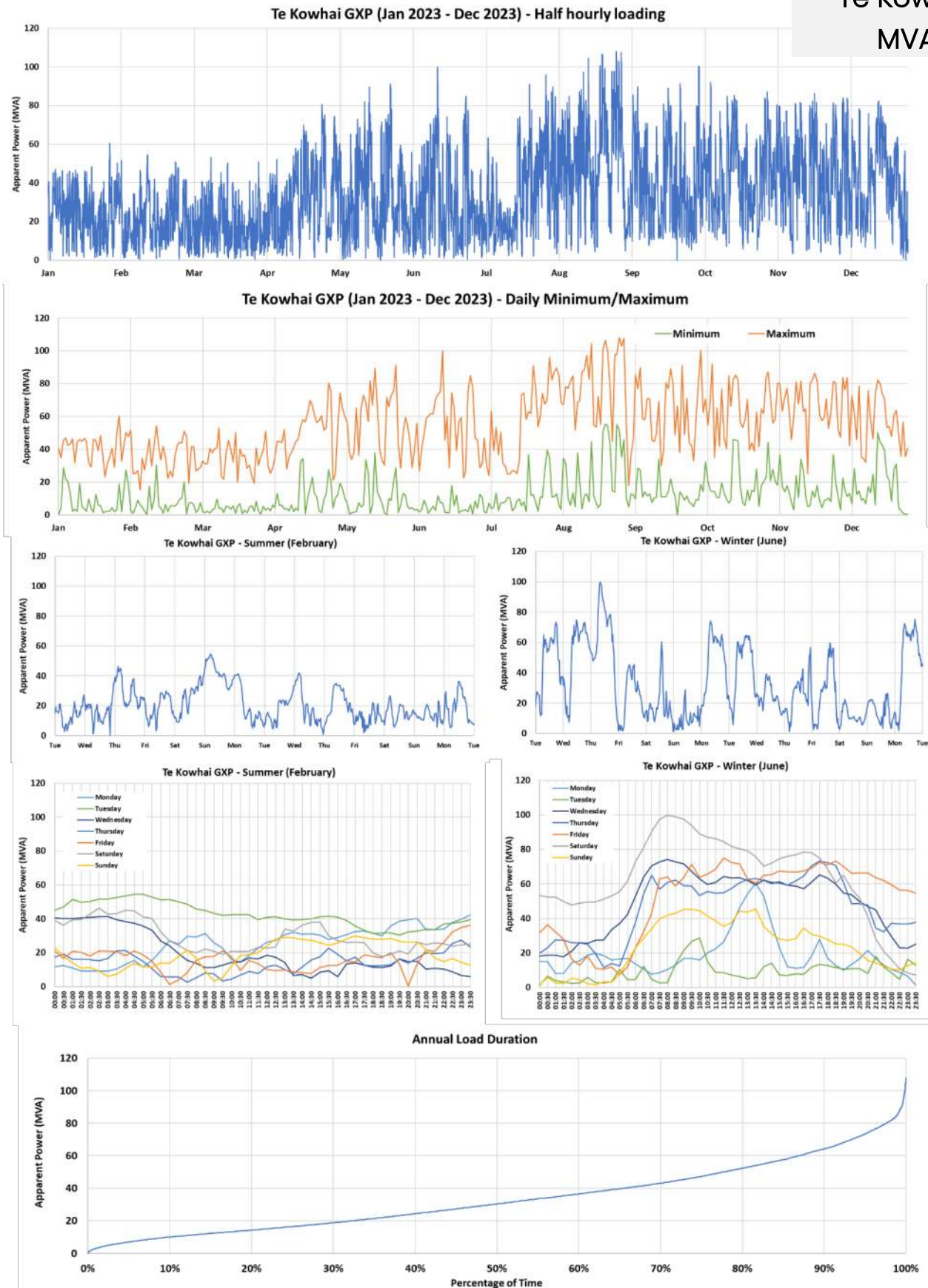


Figure 36. Te Kowhai: Apparent power (MVA) load characteristics.

Te Kowhai MVar

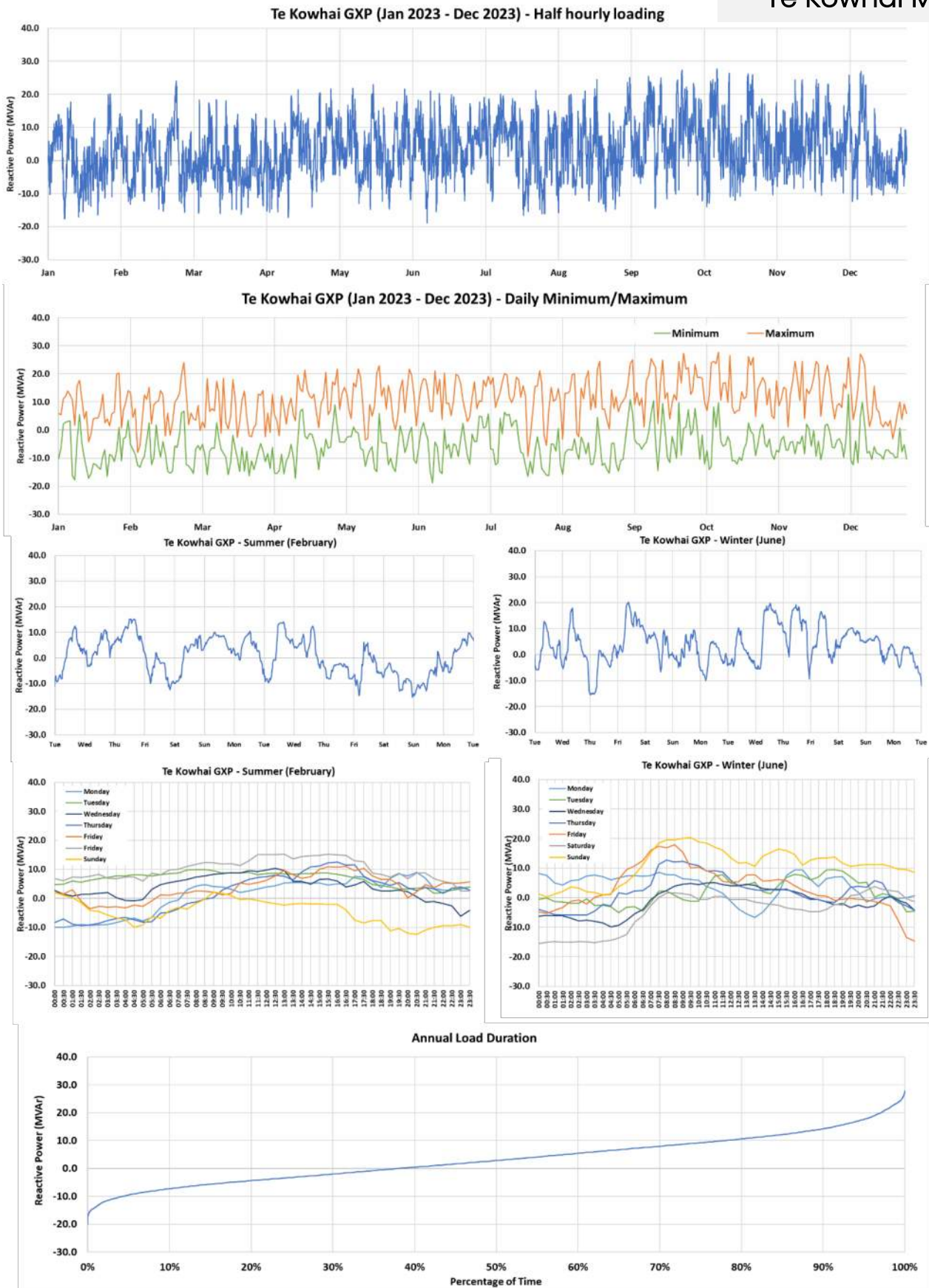


Figure 37. Te Kowhai: Reactive power (MVar) load characteristics.

Waihou MVA

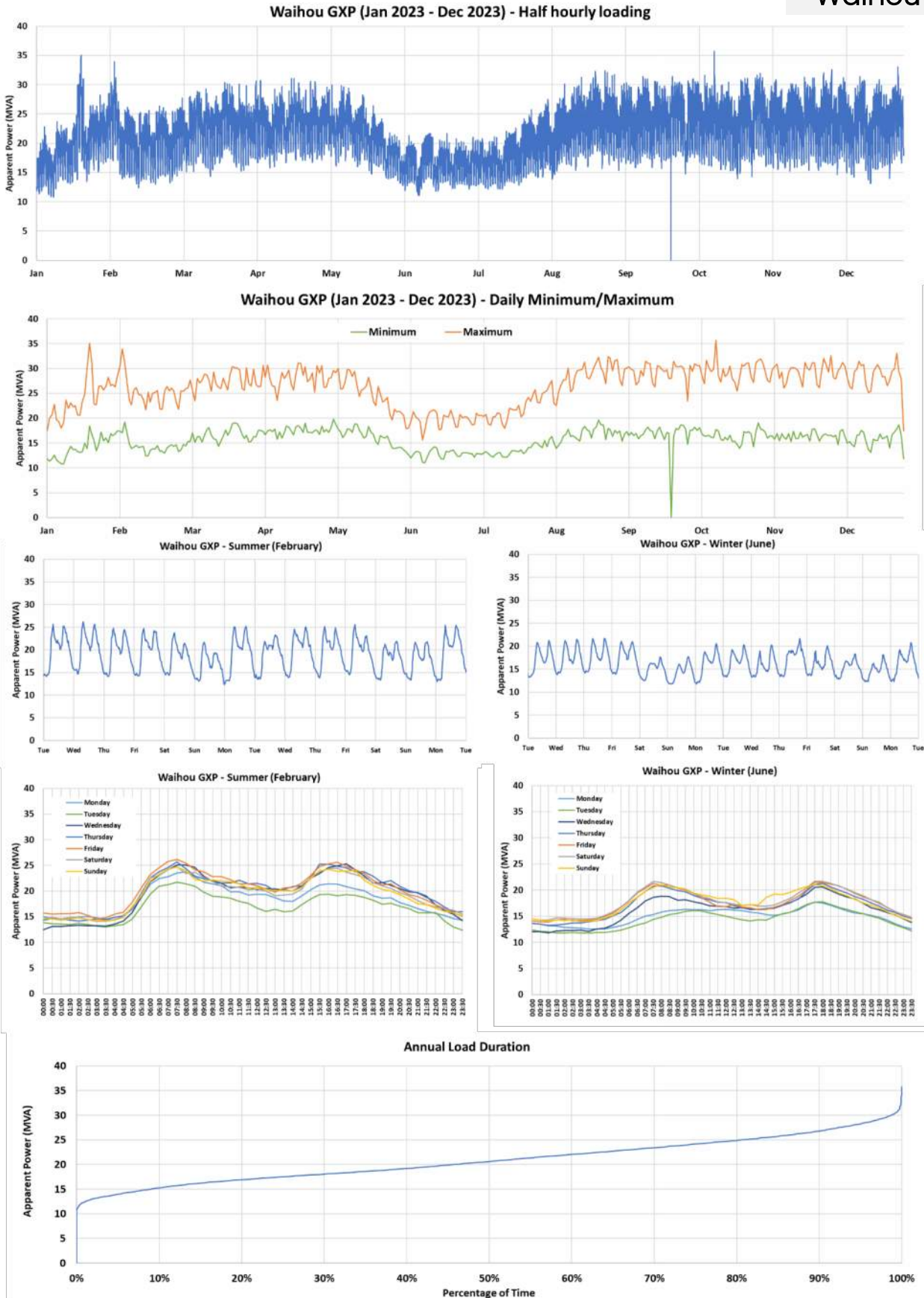


Figure 38. Waihou: Apparent power (MVA) load characteristics.

Waihou MVar

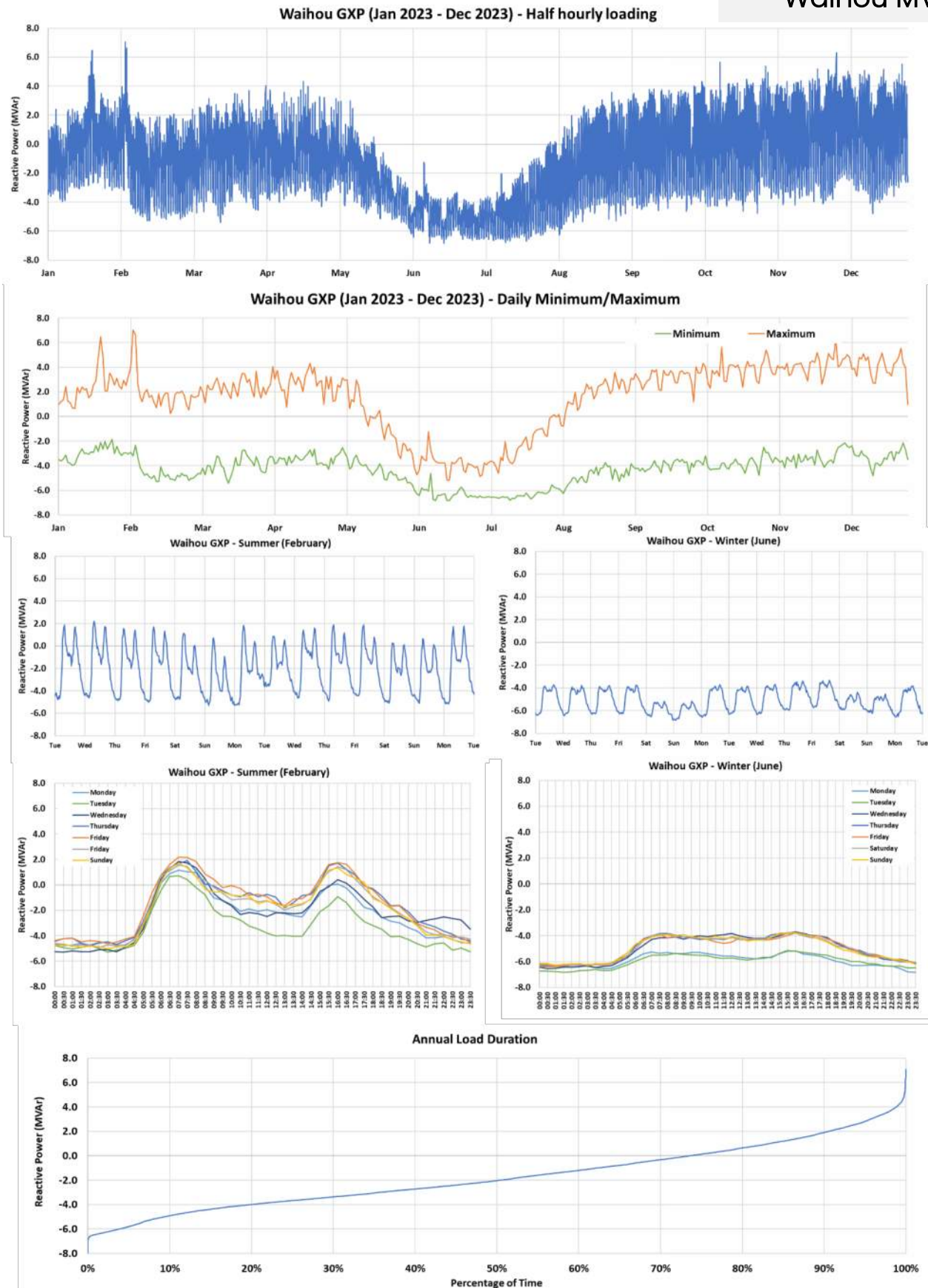


Figure 39. Waihou: Reactive power (MVar) load characteristics.

Waikino MVA

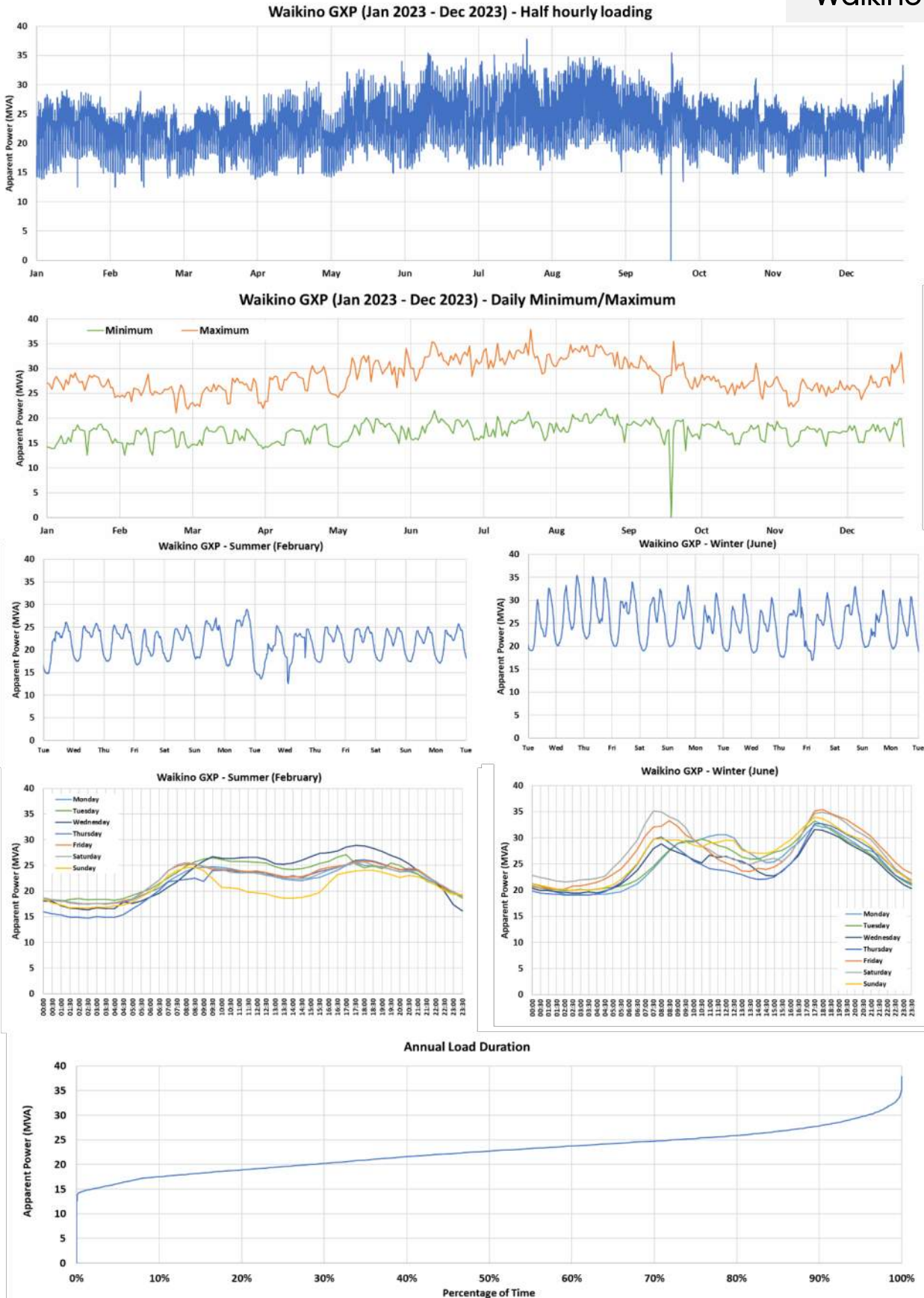


Figure 40. Waikino: Apparent power (MVA) load characteristics.

Waikino MVar

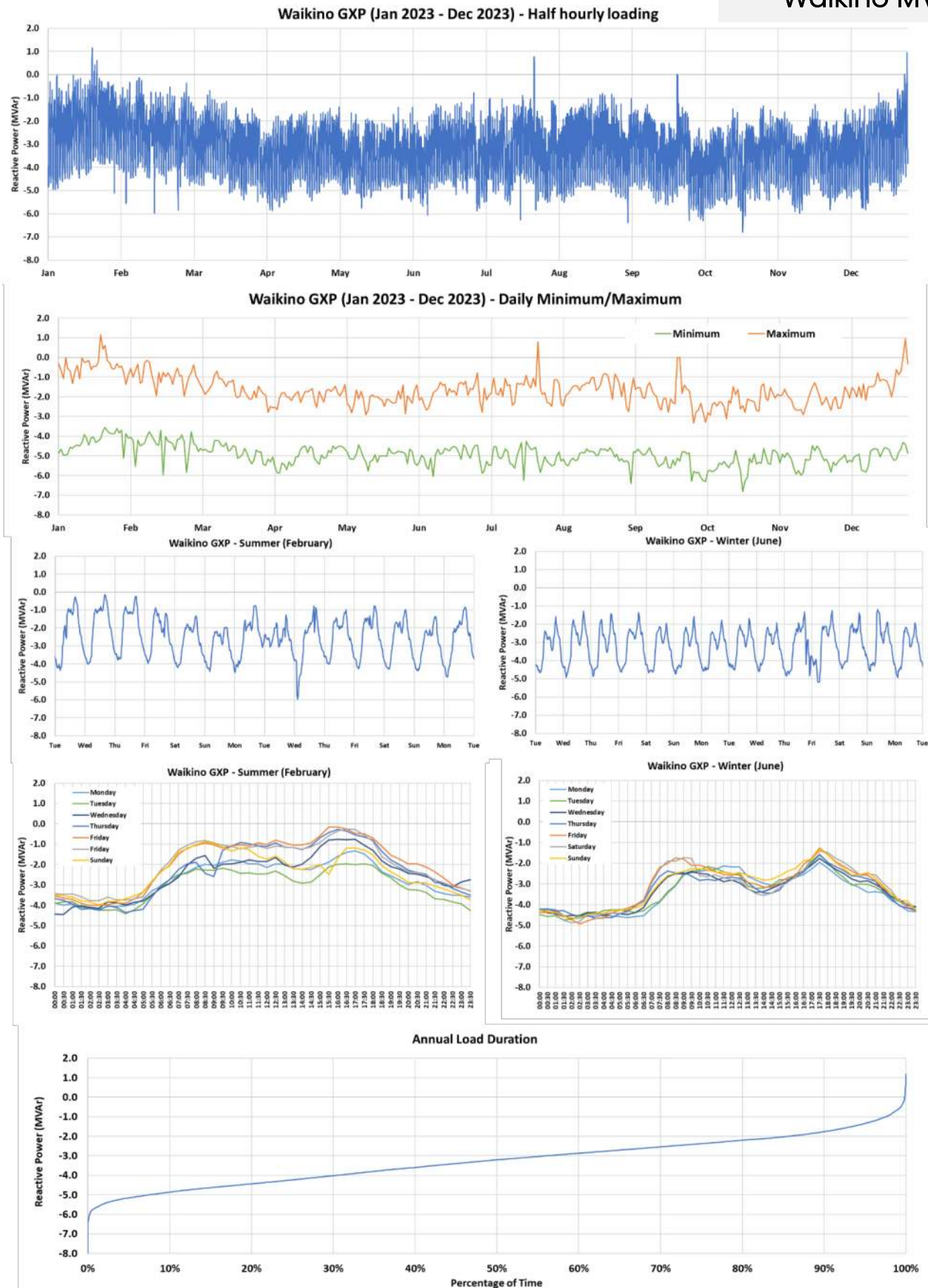


Figure 41. Waikino: Reactive power (MVar) load characteristics.

**Wairakei 33 kv
MVA**

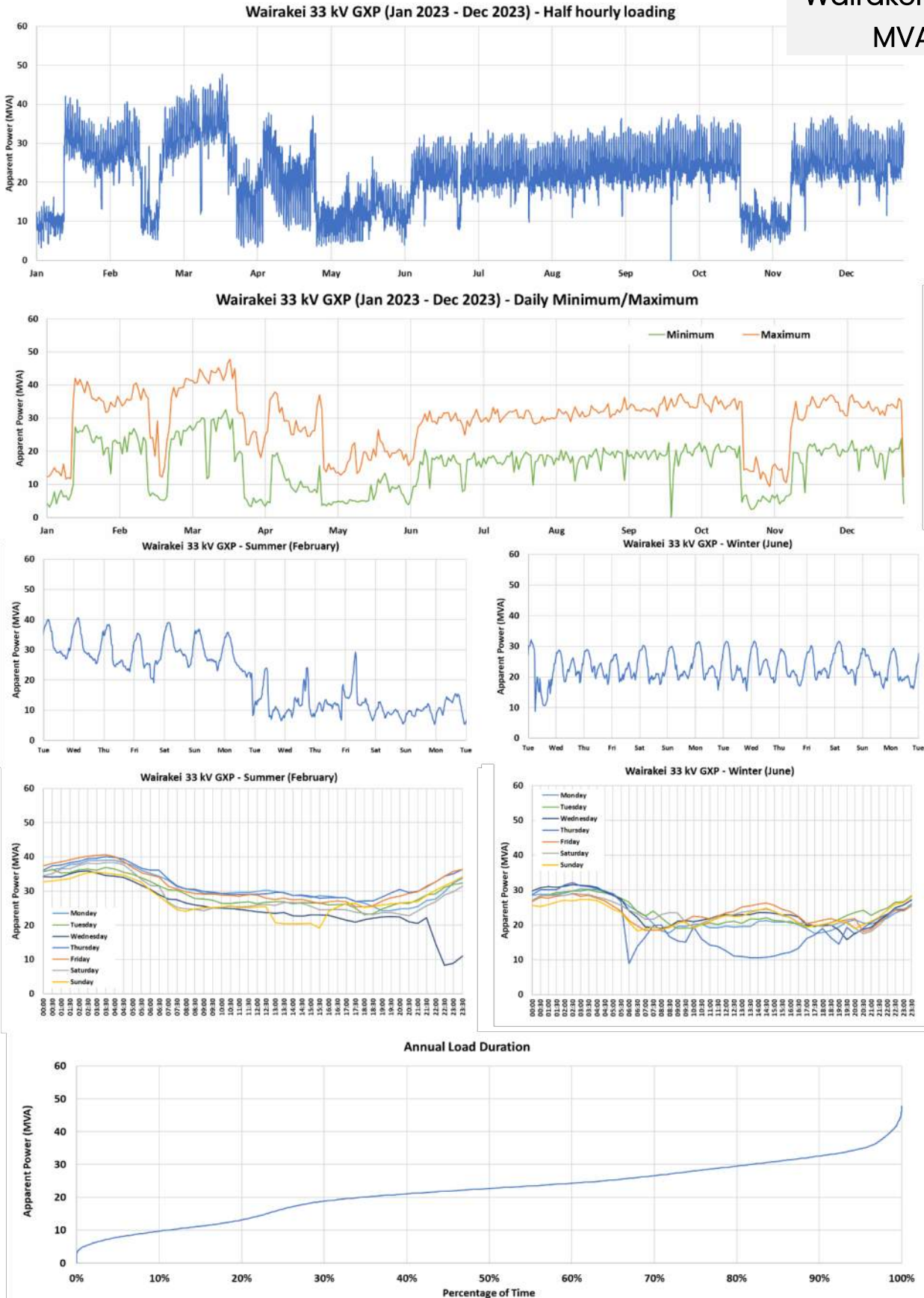


Figure 42. Wairakei 33 kv: Apparent power (MVA) load characteristics.

Wairakei 33 kV MVar

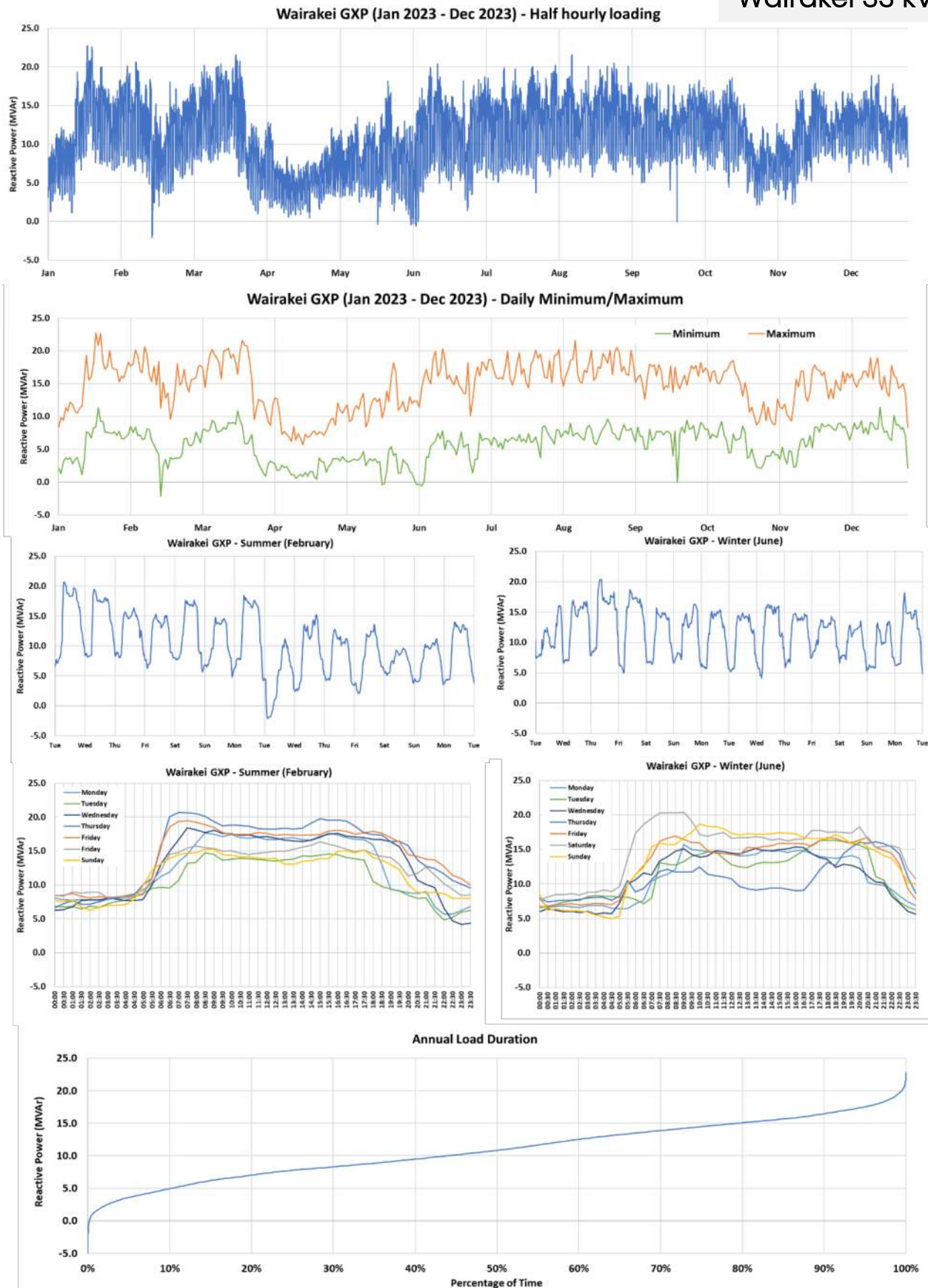


Figure 43. Wairakei 33 kV: Reactive power (MVar) load characteristics.

3. Zone Substations

3.1 Counties Energy

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

- Figure 44. Opaheke 110/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 45. Barber Rd 110/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 46. Pukekohe 110/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 47. Pokeno 110/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 48. Tuakau 110/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 49. Karaka 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 50. Waiuku 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 51. Maioro 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Opaheke MVA

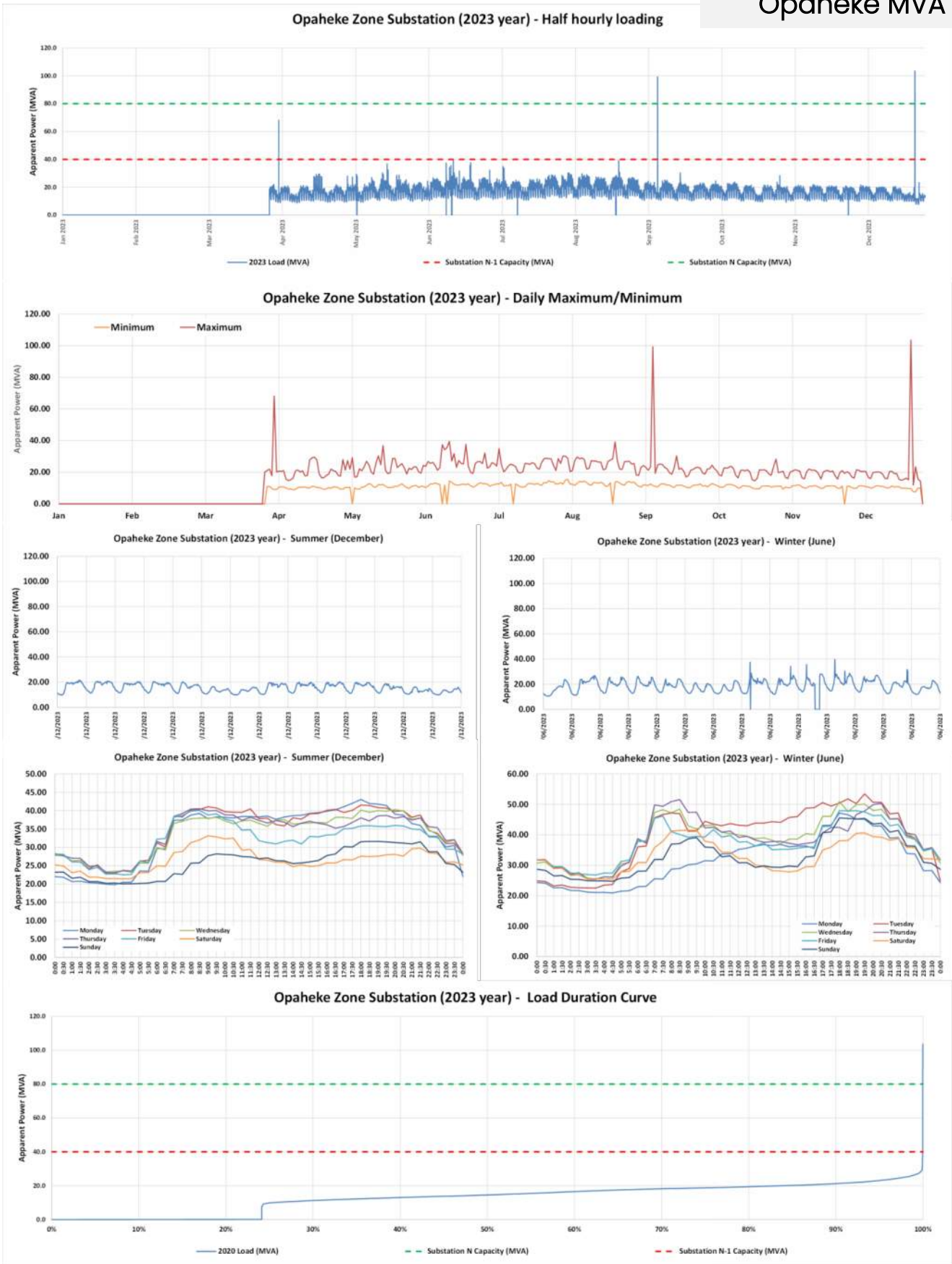


Figure 44. Opaheke 110/11 kV zone substation: Apparent power (MVA) load characteristics.

Barber Rd MVA

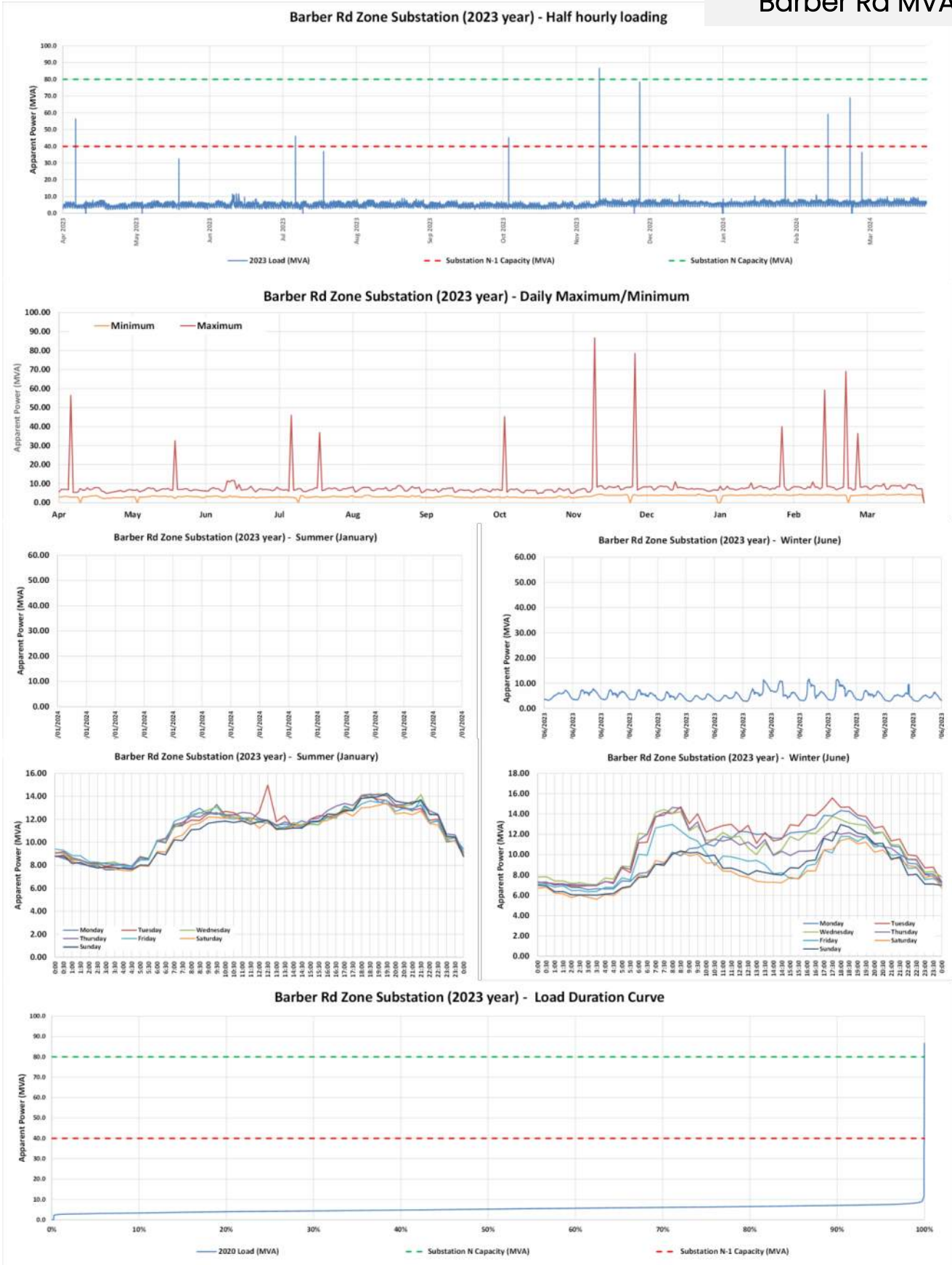


Figure 45. Barber Rd 110/11 kV zone substation: Apparent power (MVA) load characteristics.

Pukekohe MVA

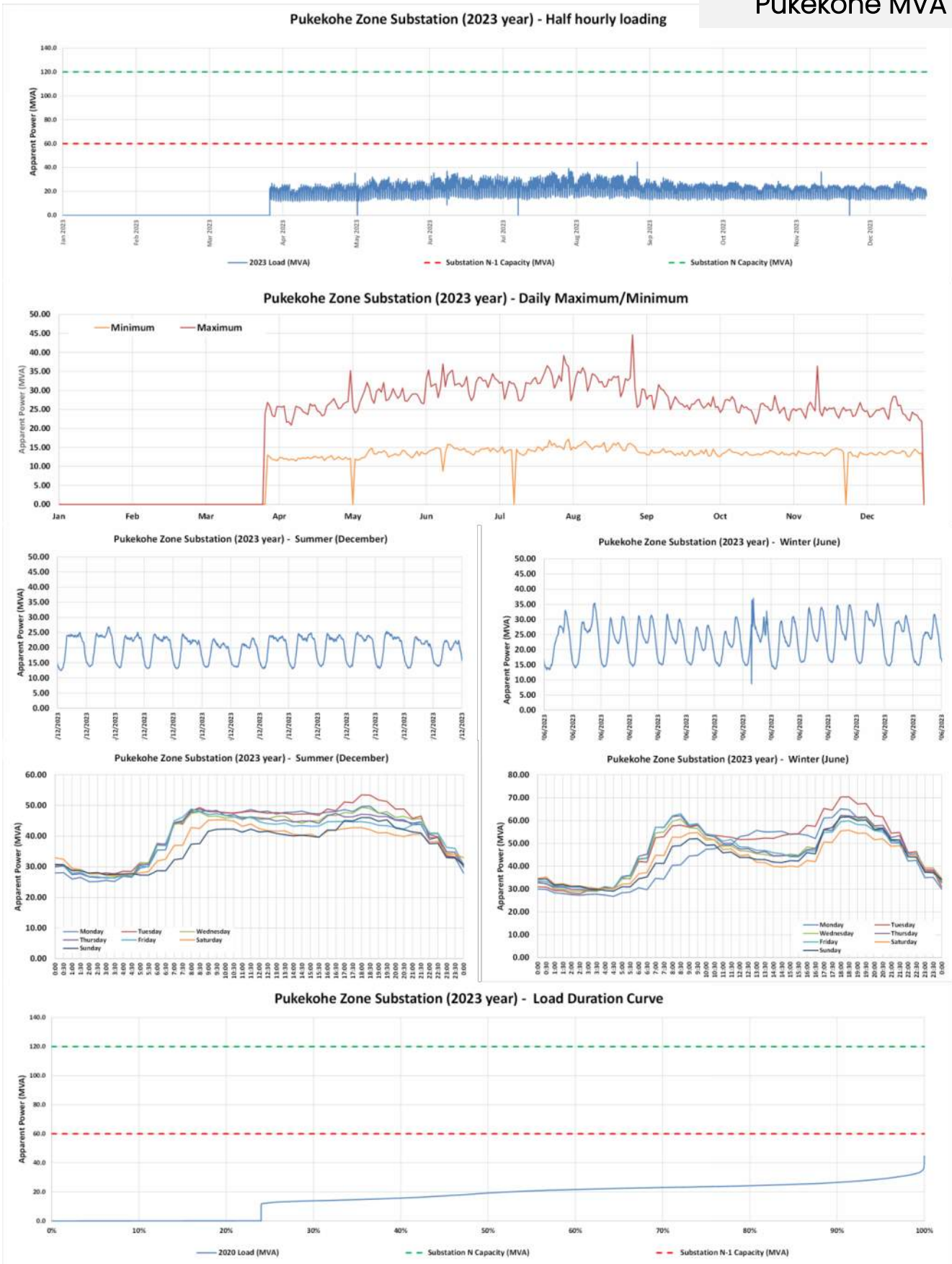


Figure 46. Pukekohe 110/11 kV zone substation: Apparent power (MVA) load characteristics.

Pokeno MVA

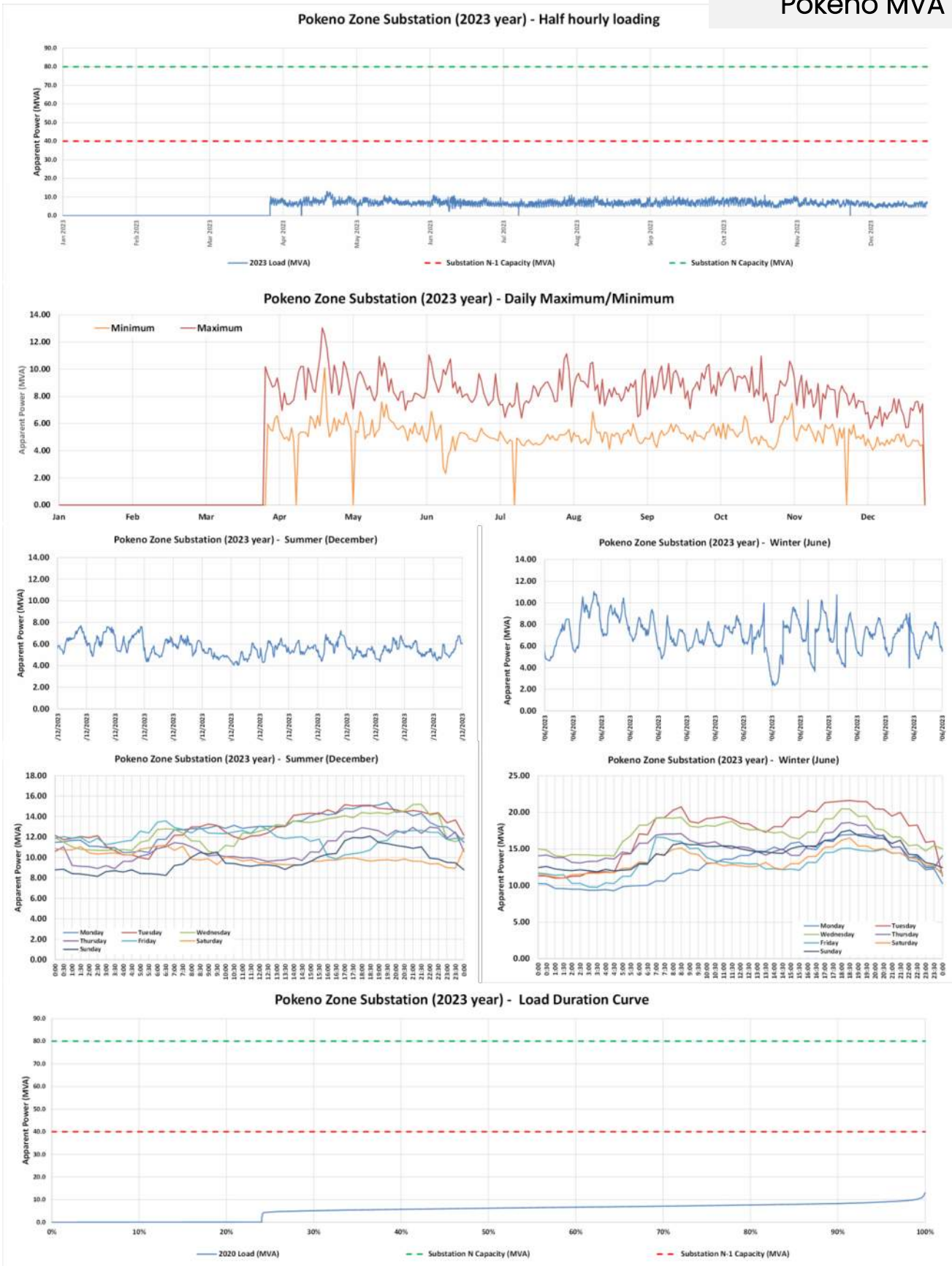


Figure 47. Pokeno 110/11 kV zone substation: Apparent power (MVA) load characteristics.

Tuakau MVA

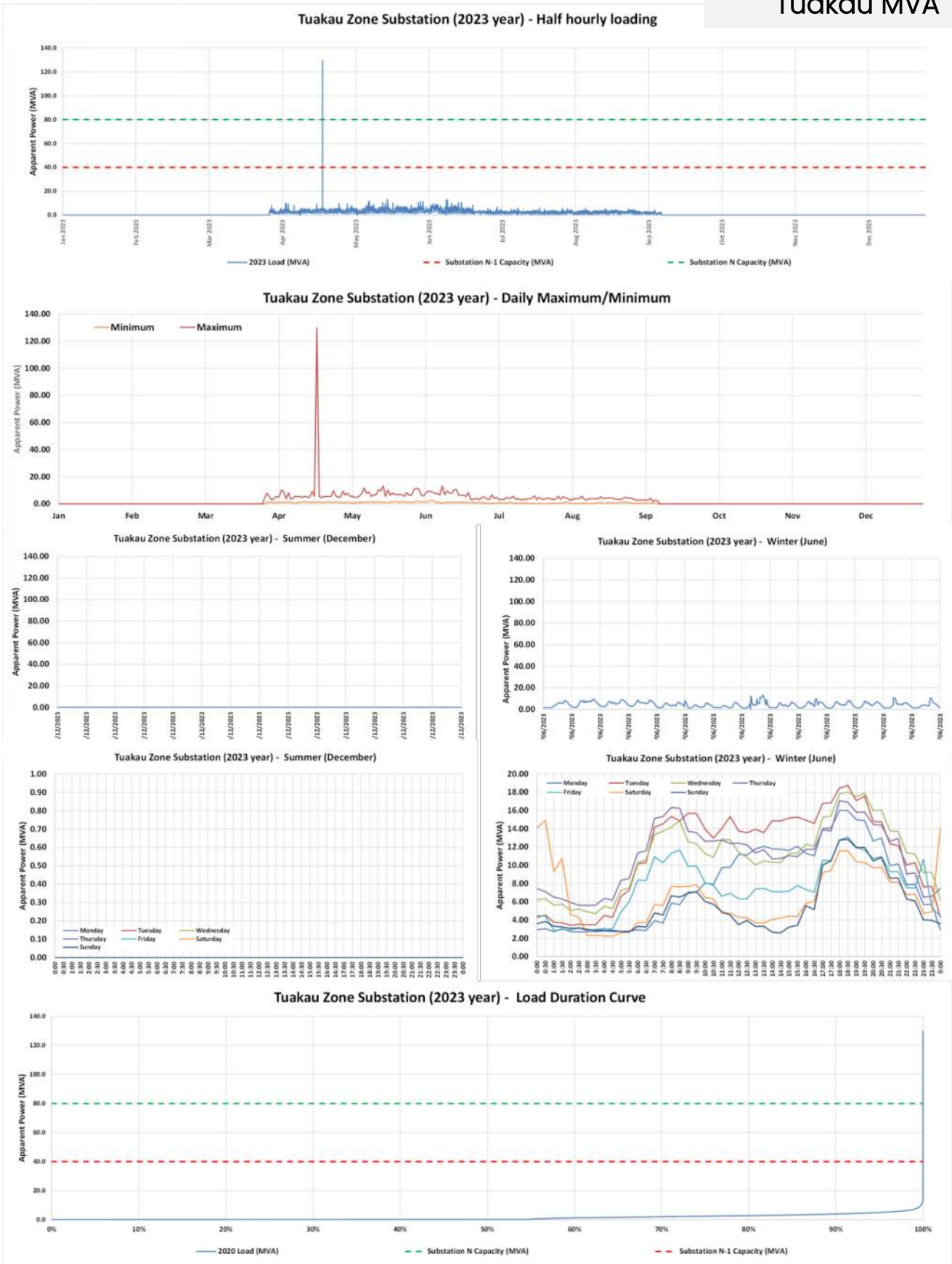


Figure 48. Tuakau 110/11 kV zone substation: Apparent power (MVA) load characteristics.

Karaka MVA

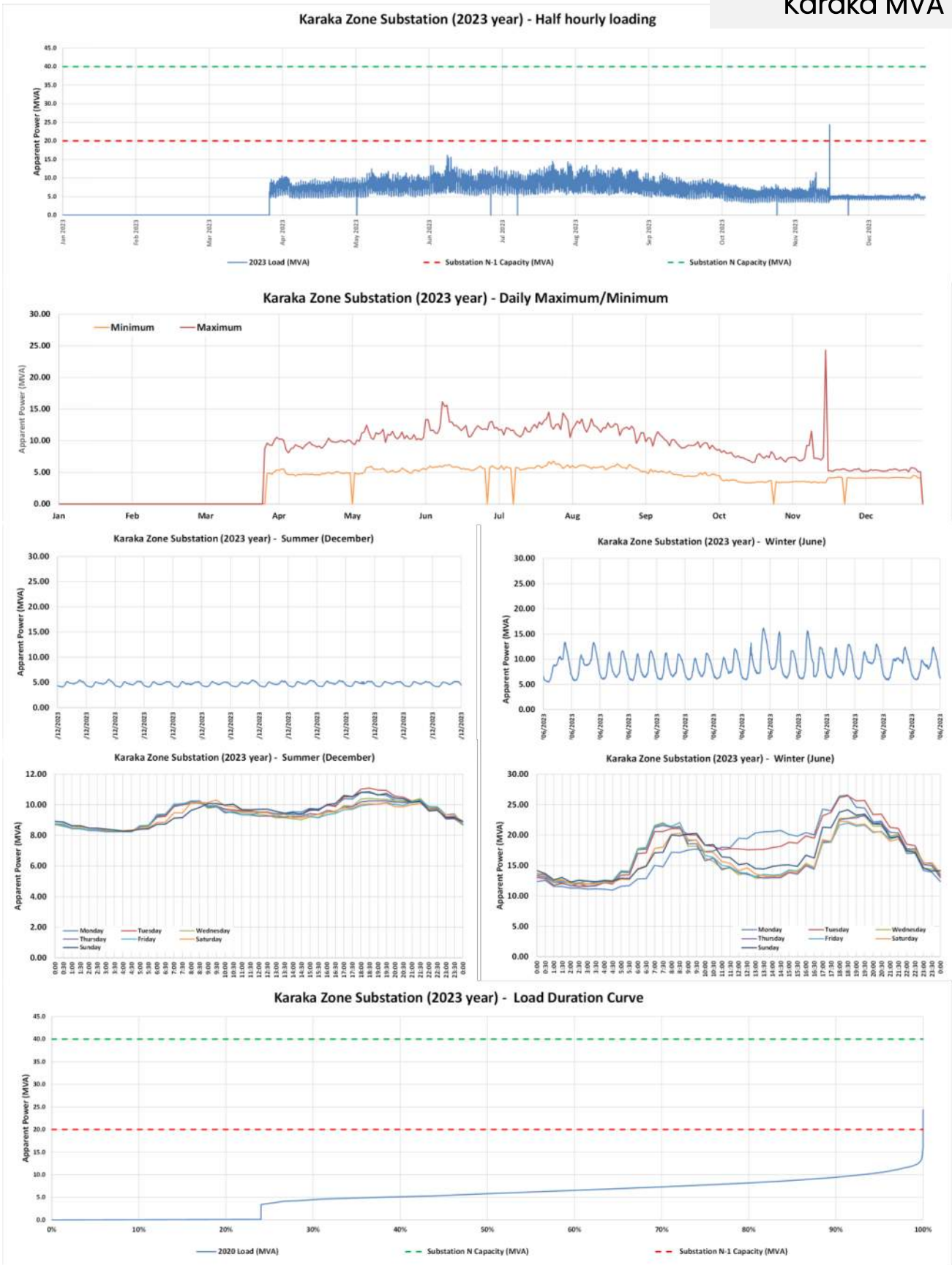


Figure 49. Karaka 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Waiuku MVA

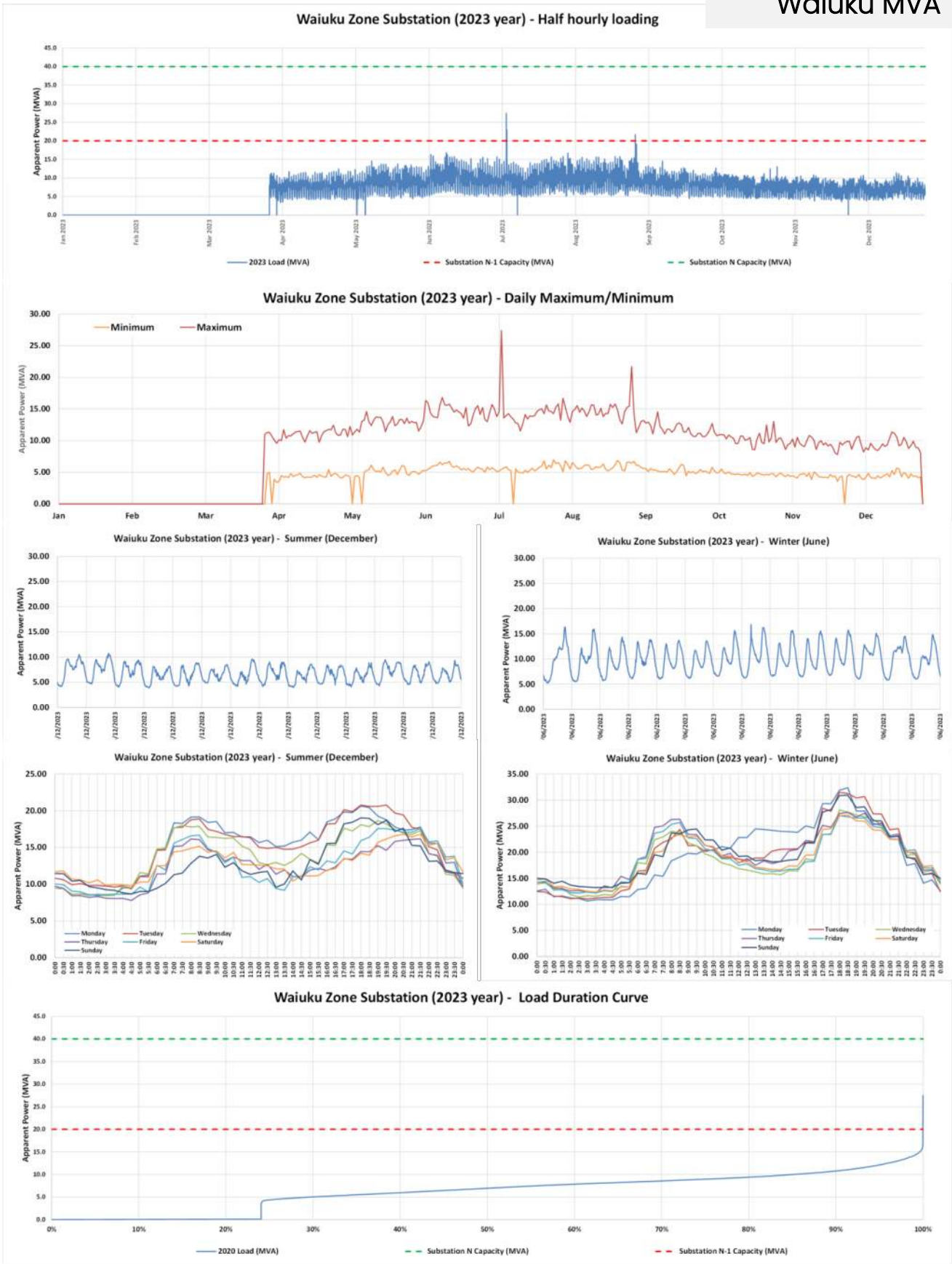


Figure 50. Waiuku 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Maioro MVA

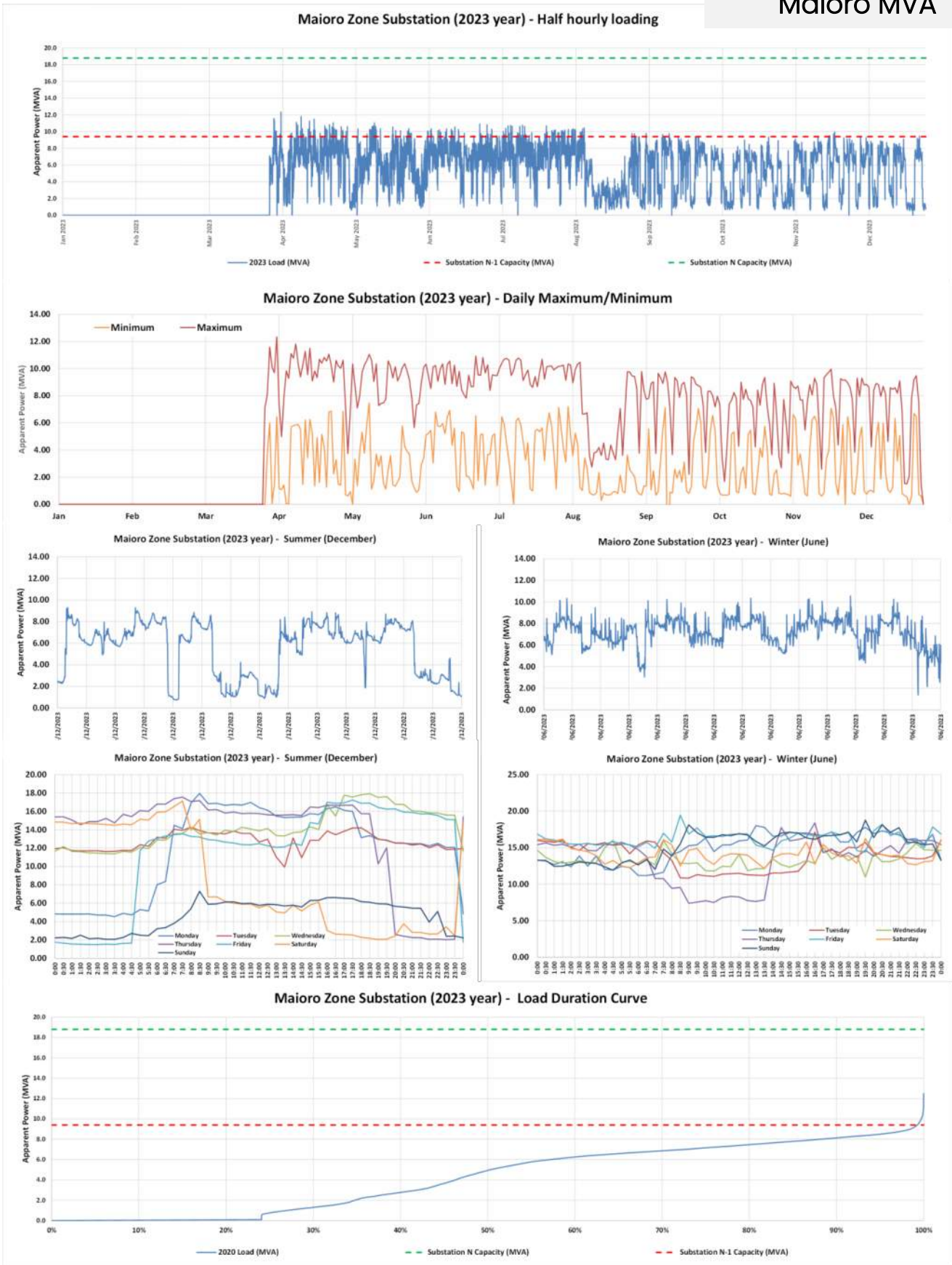


Figure 51. Maioro 33/11 kV zone substation: Apparent power (MVA) load characteristics.

3.2 The Lines Company

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

- Figure 52. Tahāroa 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 53. Tahāroa Village 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 54. Te Anga 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 55. Piri Piri 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 56. Oparure 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 57. Wairere Falls 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 58. Maehoenui 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 59. Gadsby Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 60. Waitete 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 61. Hangatiki 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 62. Te Waireka 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 63. Arohena 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 64. Te Anga 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 65. Kaahu Tee 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 66. Marotiri 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Tahāroa MVA

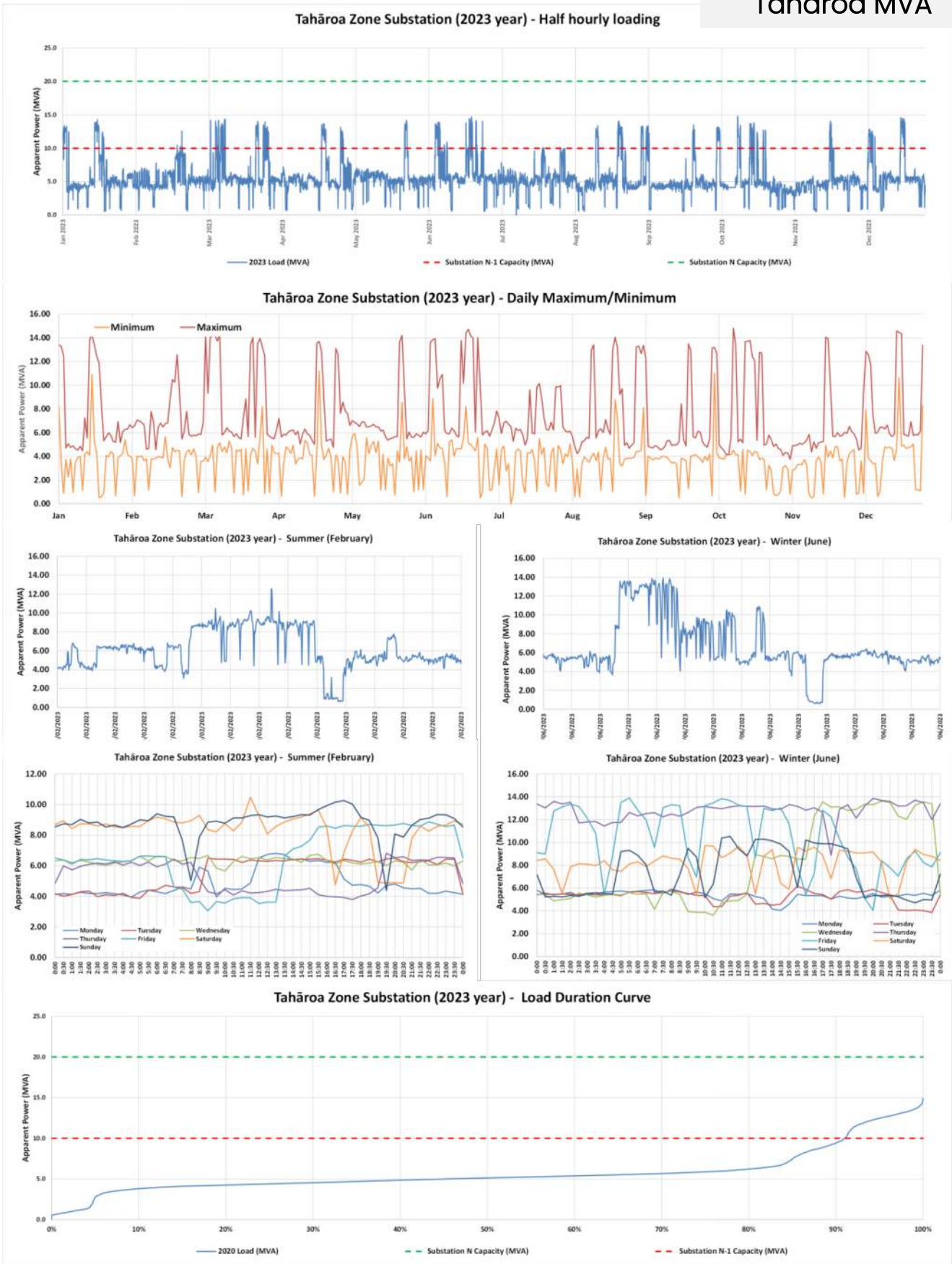


Figure 52. Tahāroa 33/11 kv zone substation: Apparent power (MVA) load characteristics.

Tahāroa Village MVA

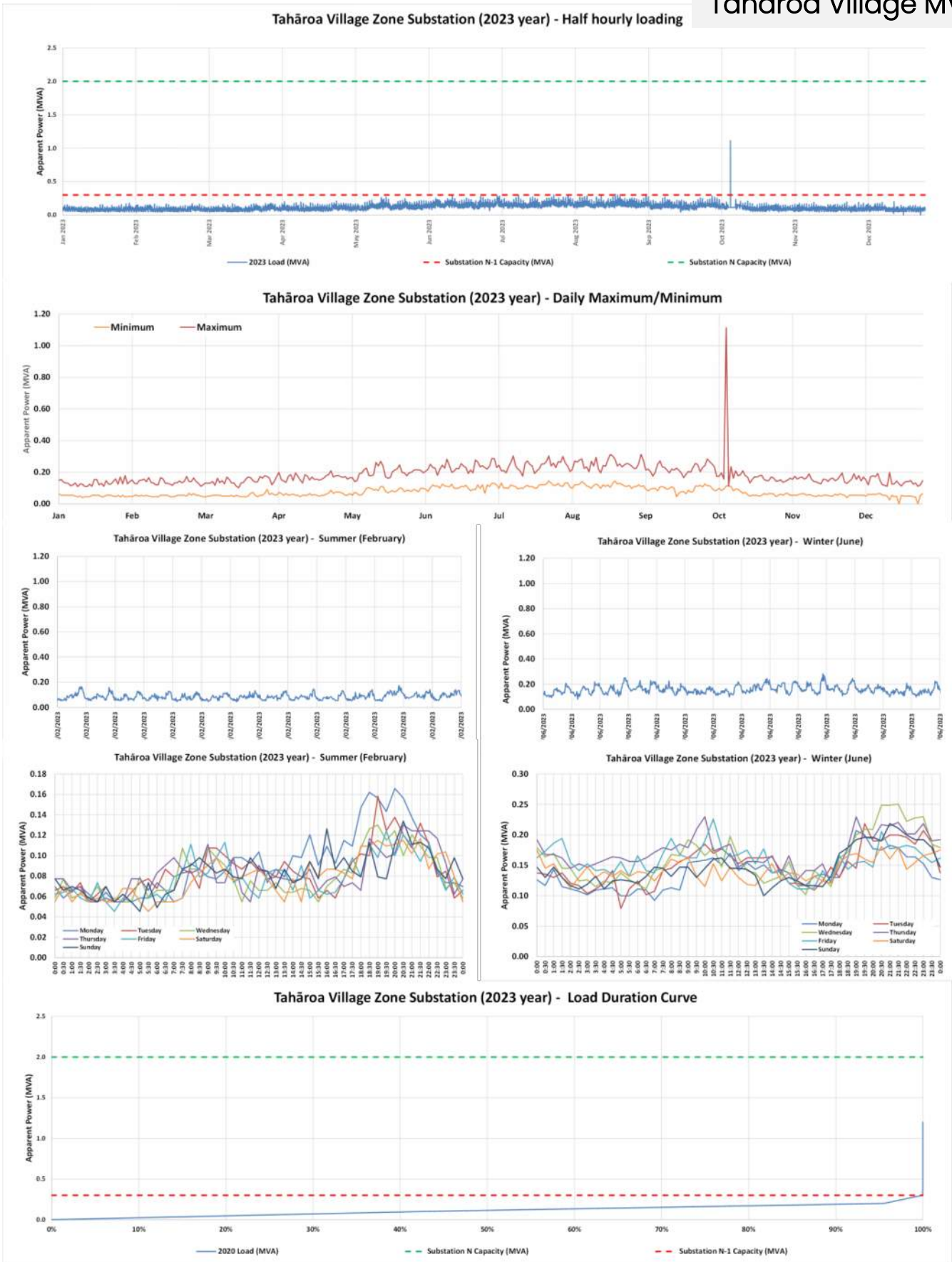


Figure 53. Tahāroa Village 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Te Anga MVA

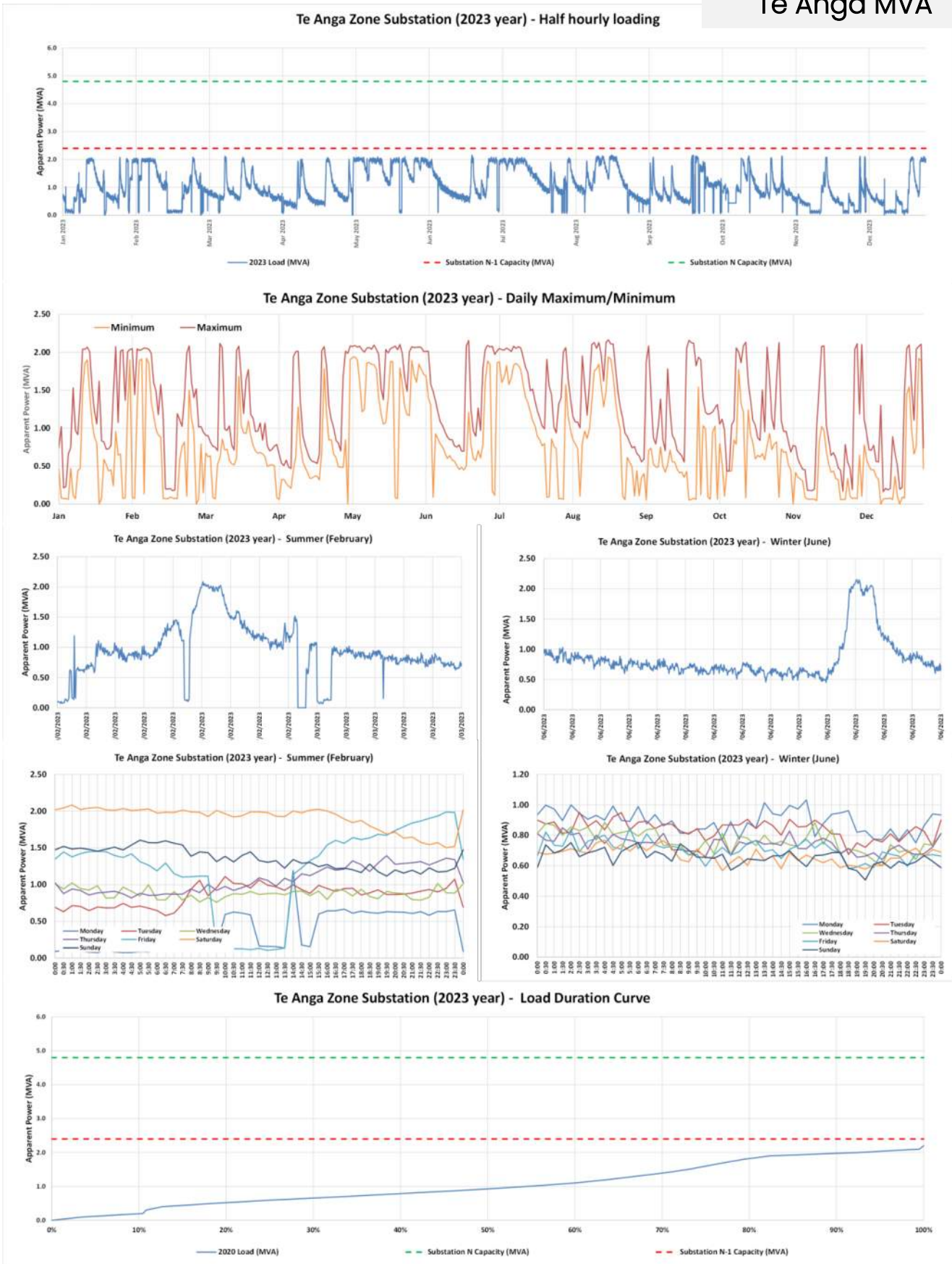


Figure 54. Te Anga 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Unknown

Piri Piri MVA

Figure 55. Piri Piri 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Oparure MVA

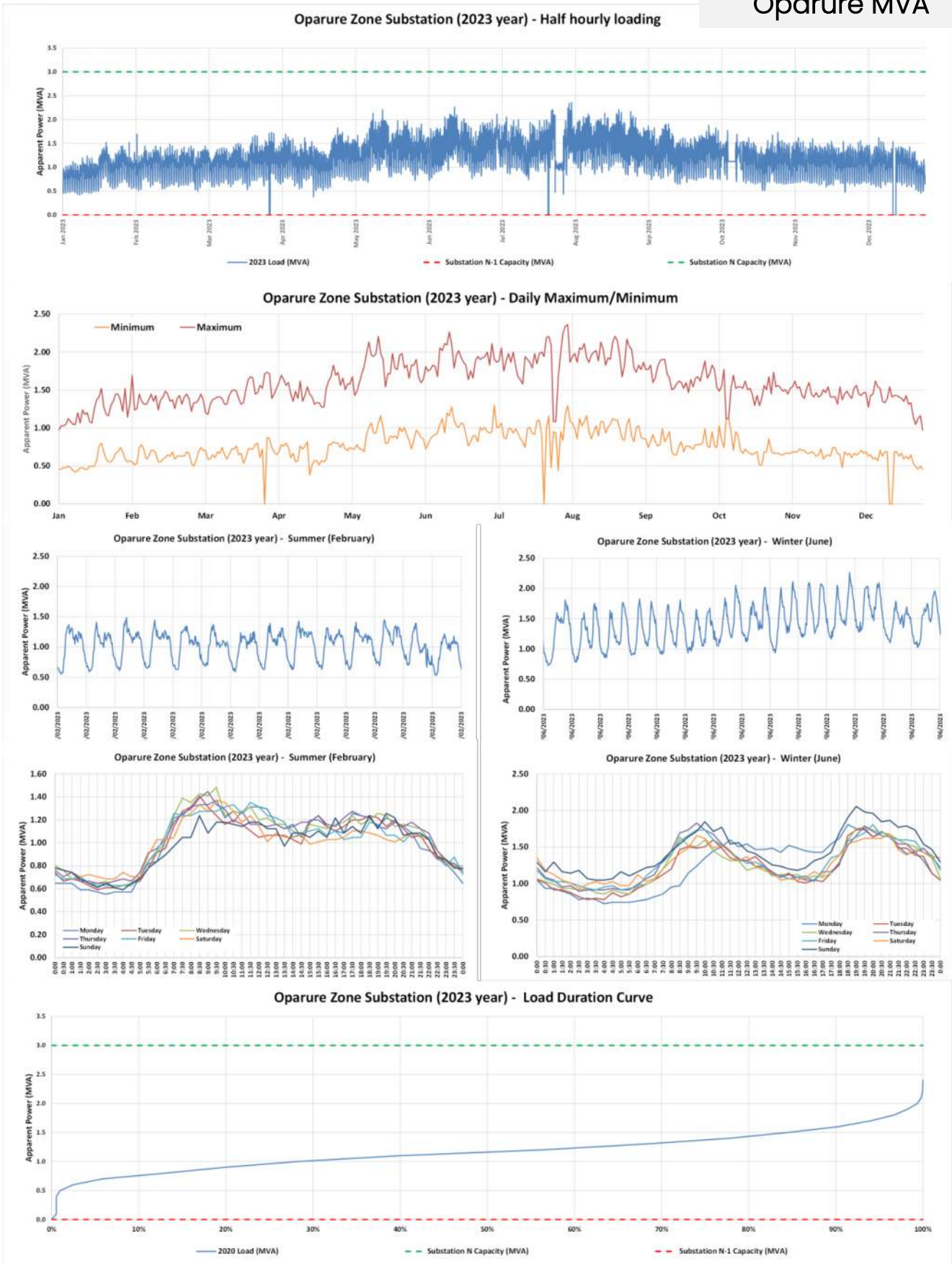


Figure 56. Oparure 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Wairere Falls MVA

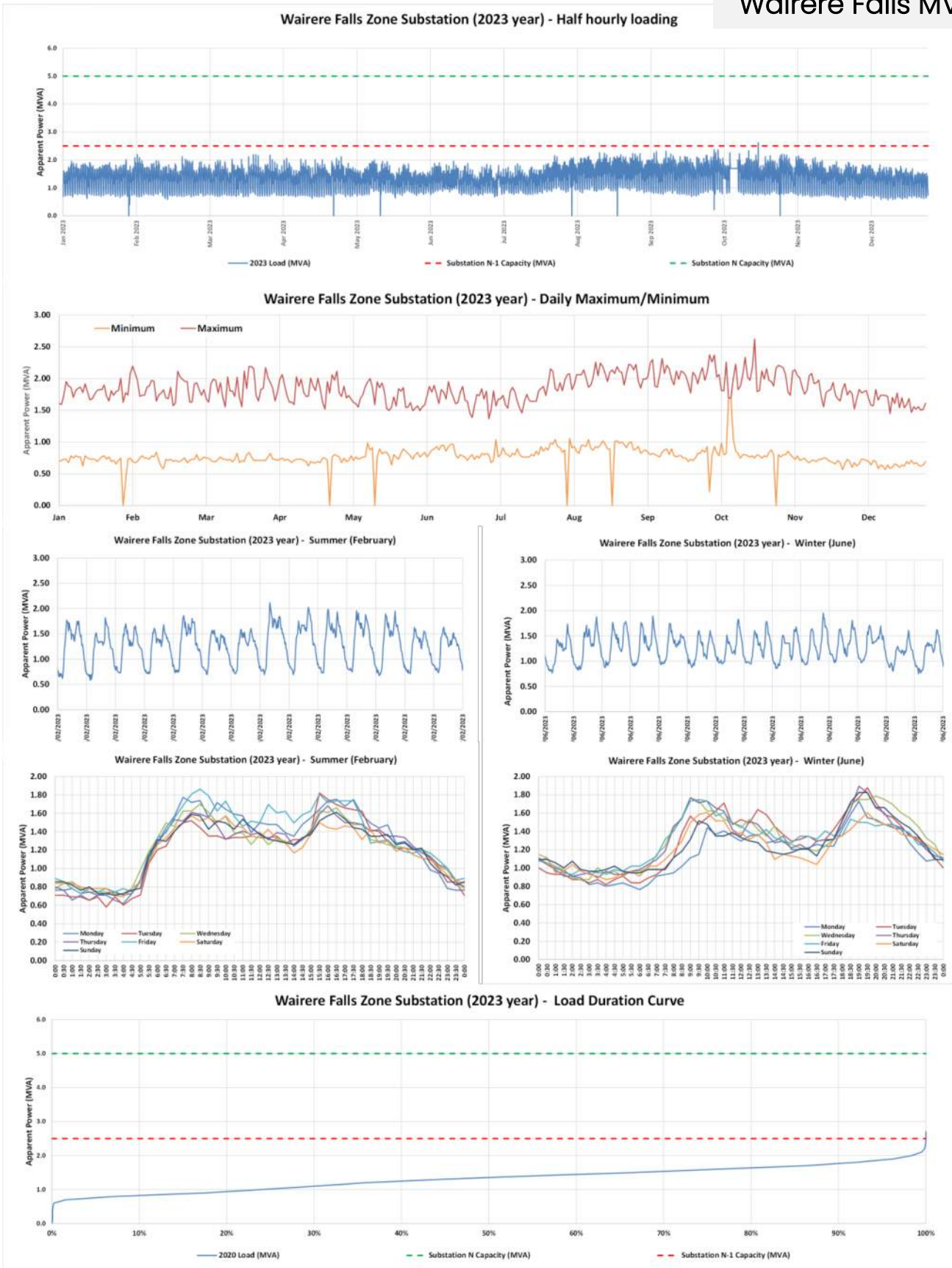


Figure 57. Wairere Falls 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Maehoenui MVA

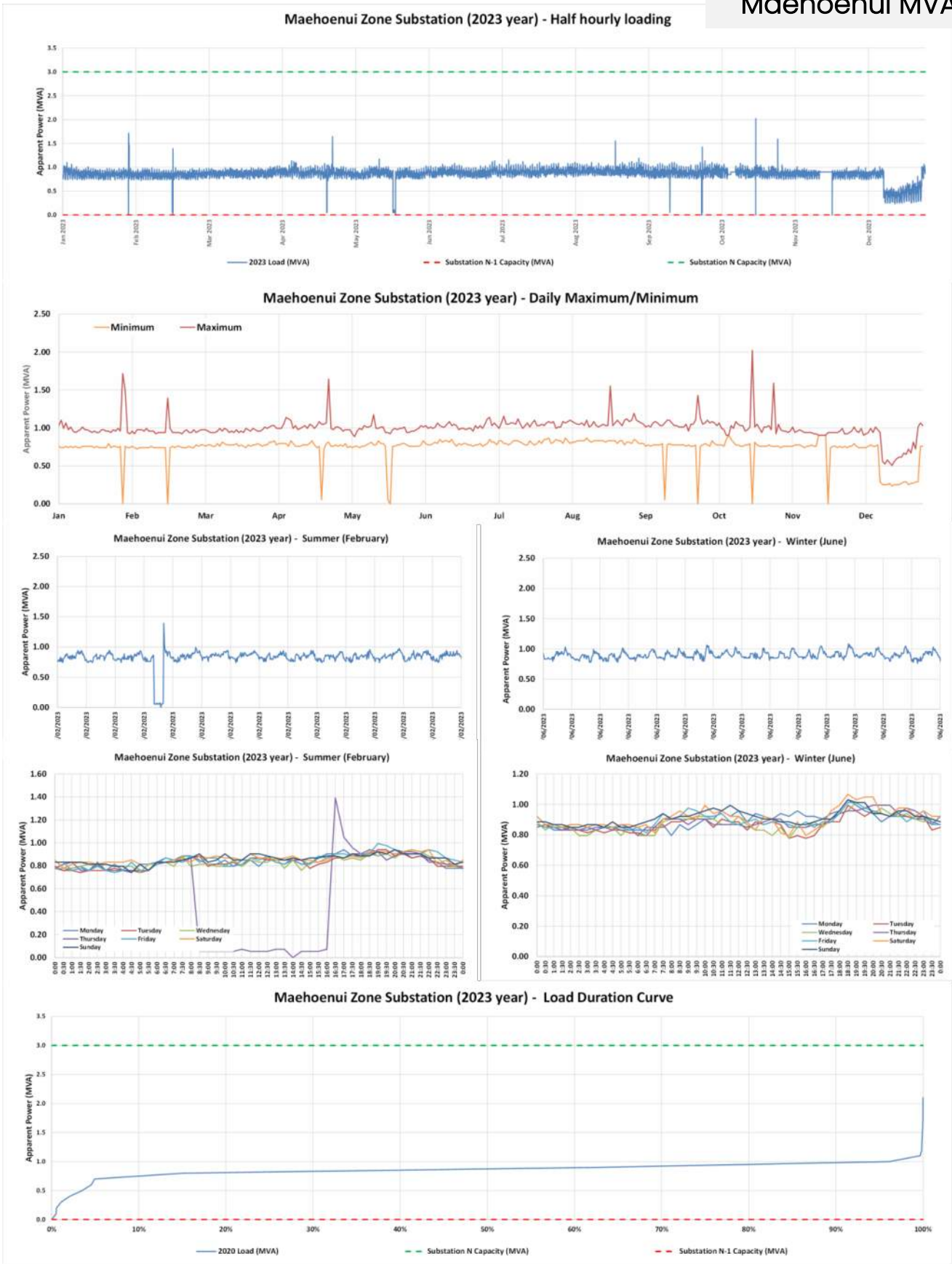


Figure 58. Maehoenui 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Gadsby Road MVA

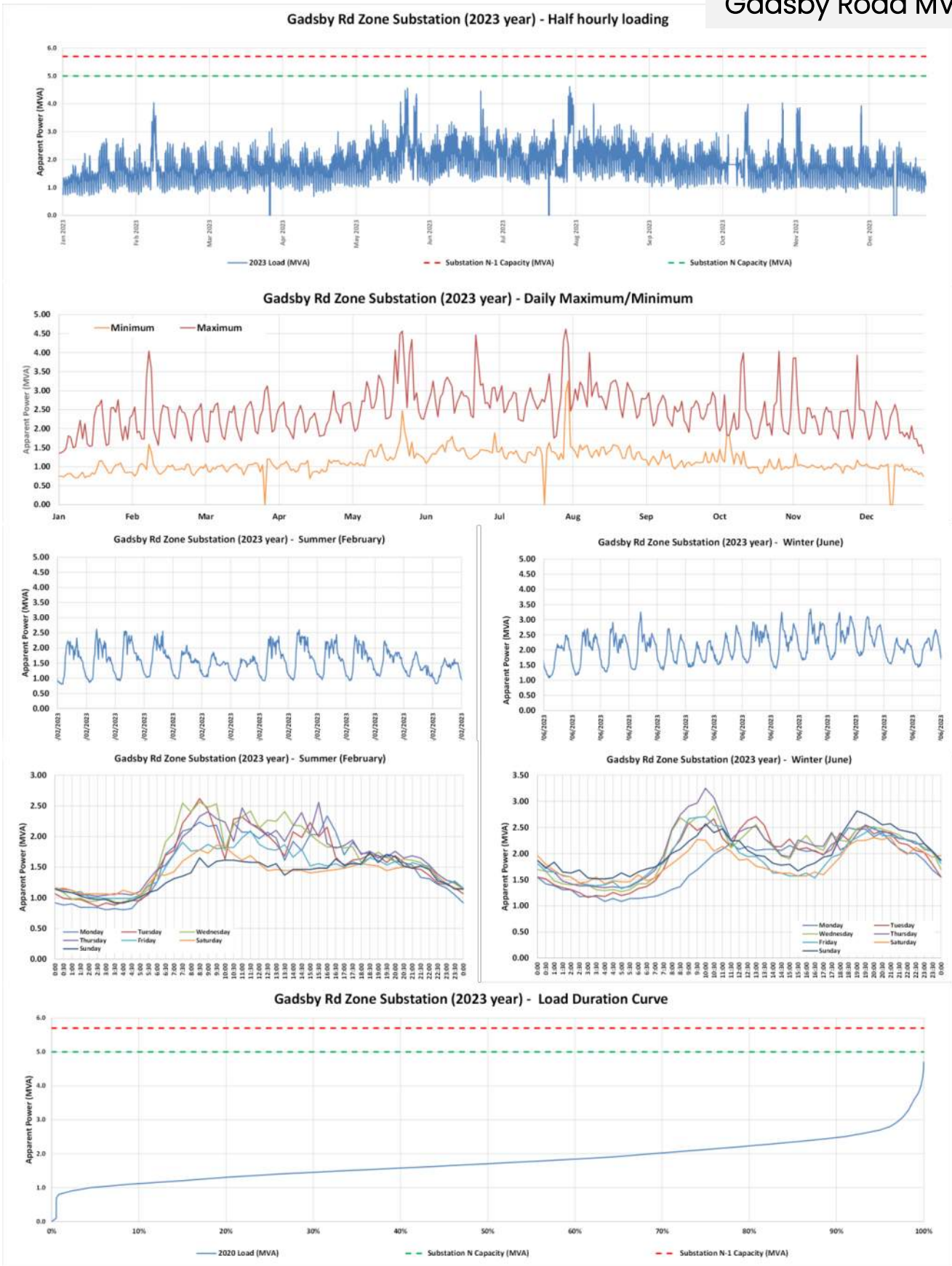


Figure 59. Gadsby Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Unknown

Waitete MVA

Figure 60. Waitete 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Hangatiki MVA

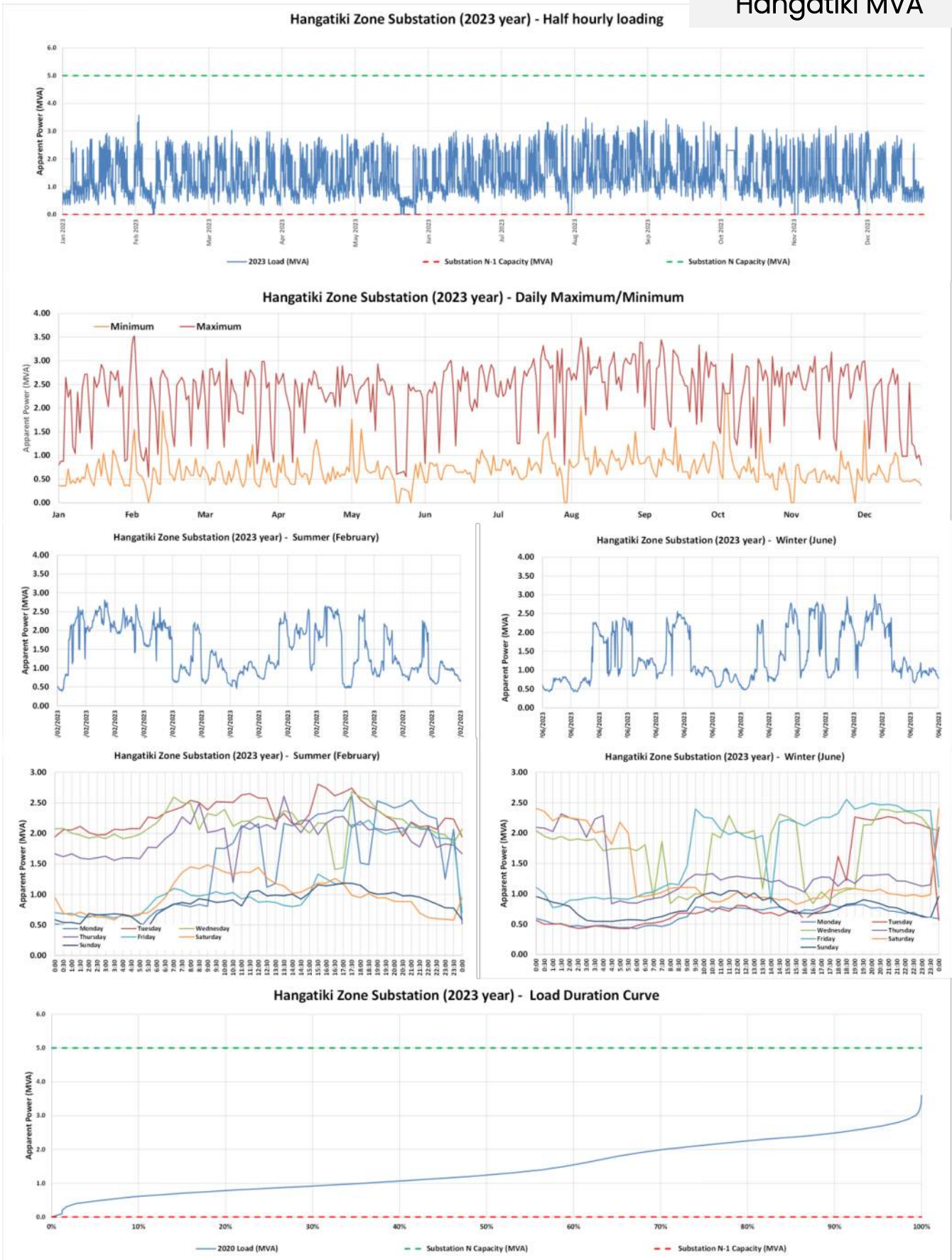


Figure 6i. Hangatiki 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Te Waireka MVA

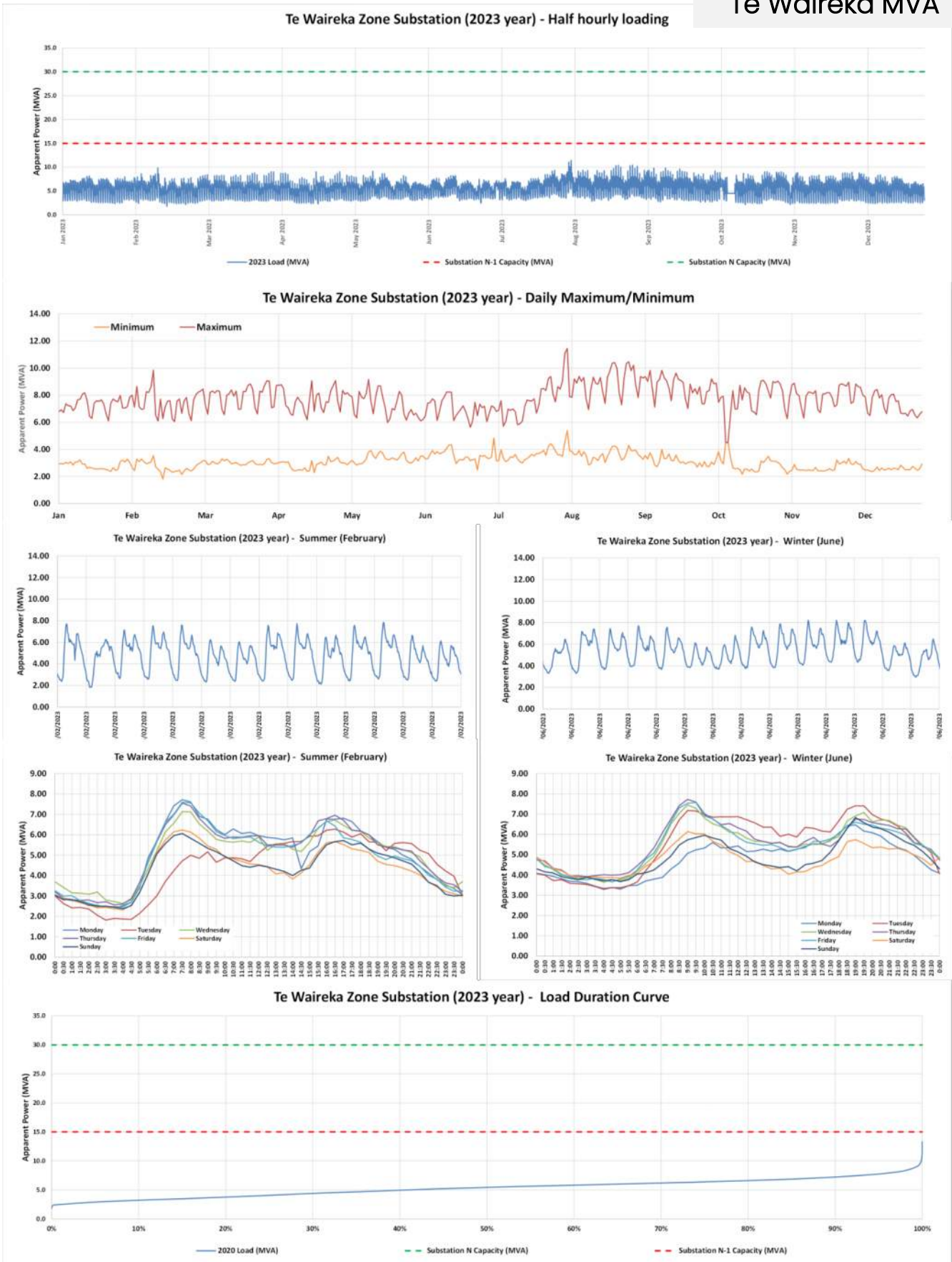


Figure 62. Te Waireka 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Unknown

Arohena MVA

Figure 63. Arohena 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Unknown

Maraetai MVA

Figure 64. Te Anga 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Unknown

Kaahu Tee MVA

Figure 65. Kaahu Tee 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Unknown

Marotiri MVA

Figure 66. Marotiri 33/11 kV zone substation: Apparent power (MVA) load characteristics.

3.3 Powerco

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

- Figure 67. Coromandel 66/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 68. Kerepehi 66/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 69. Matatoki 66/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 70. Tairua 66/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 71. Thames T1&T2 66/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 73. Whitianga 66/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 74. Paeroa 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 75. Waihi 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 76. Waihi Beach 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 77. Whangamatā 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 78. Farmer Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 79. Inghams 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 80. Mikkelson Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 81. Morrinsville 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 82. Piako 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 83. Tahuna 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 84. Tatua 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 85. Waitoa 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 86. Walton 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 87. Browne Street 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 88. Lake Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 89. Tīrau 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 90. Putāruru 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 91. Tower Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 92. Waharoa North 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 94. Baird Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 95. Midway 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 96. Lakeside Pumps 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 97. Maraetai 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Coromandel MVA

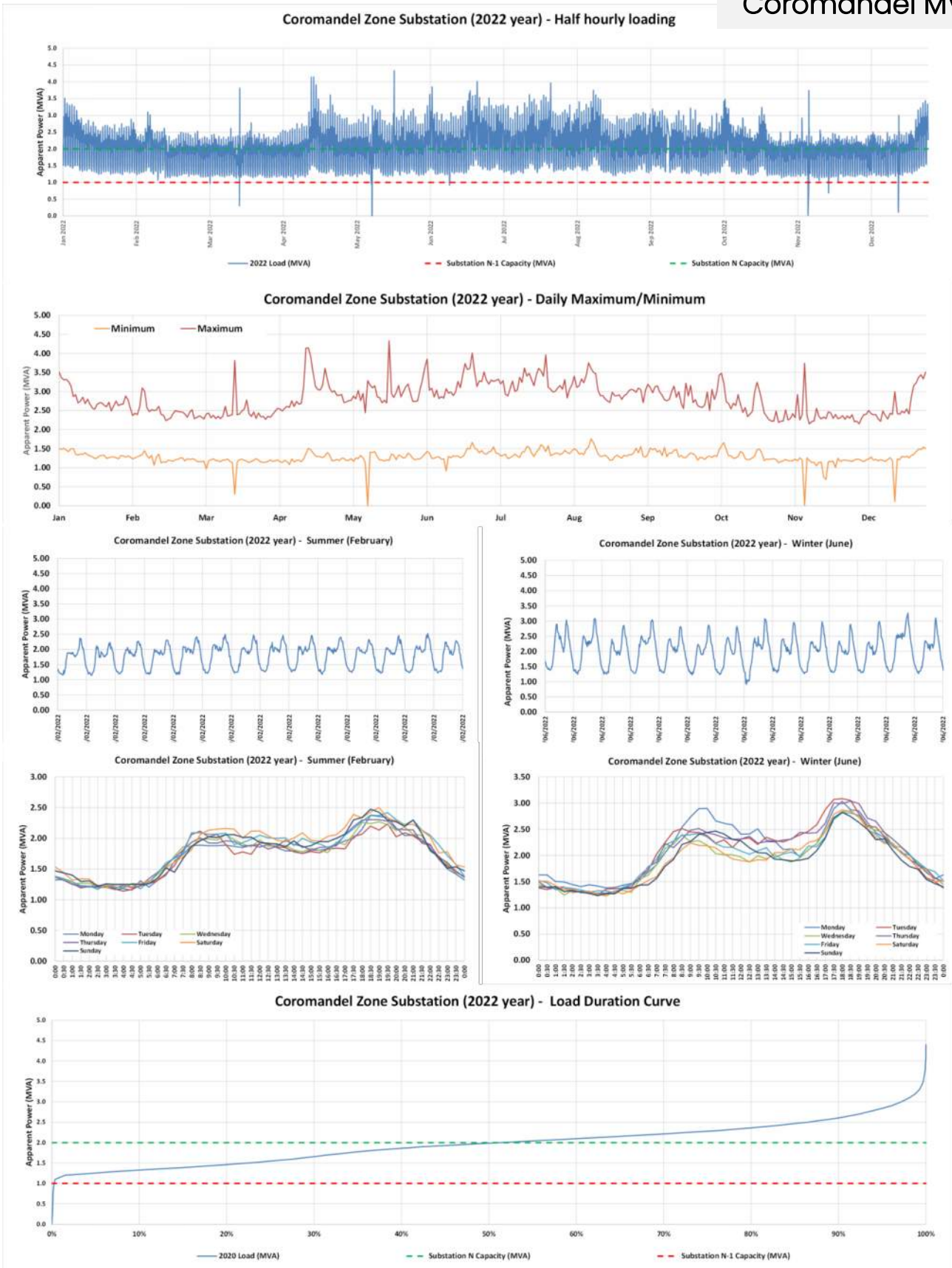


Figure 67. Coromandel 66/11 kV zone substation: Apparent power (MVA) load characteristics.

Kerepehi MVA

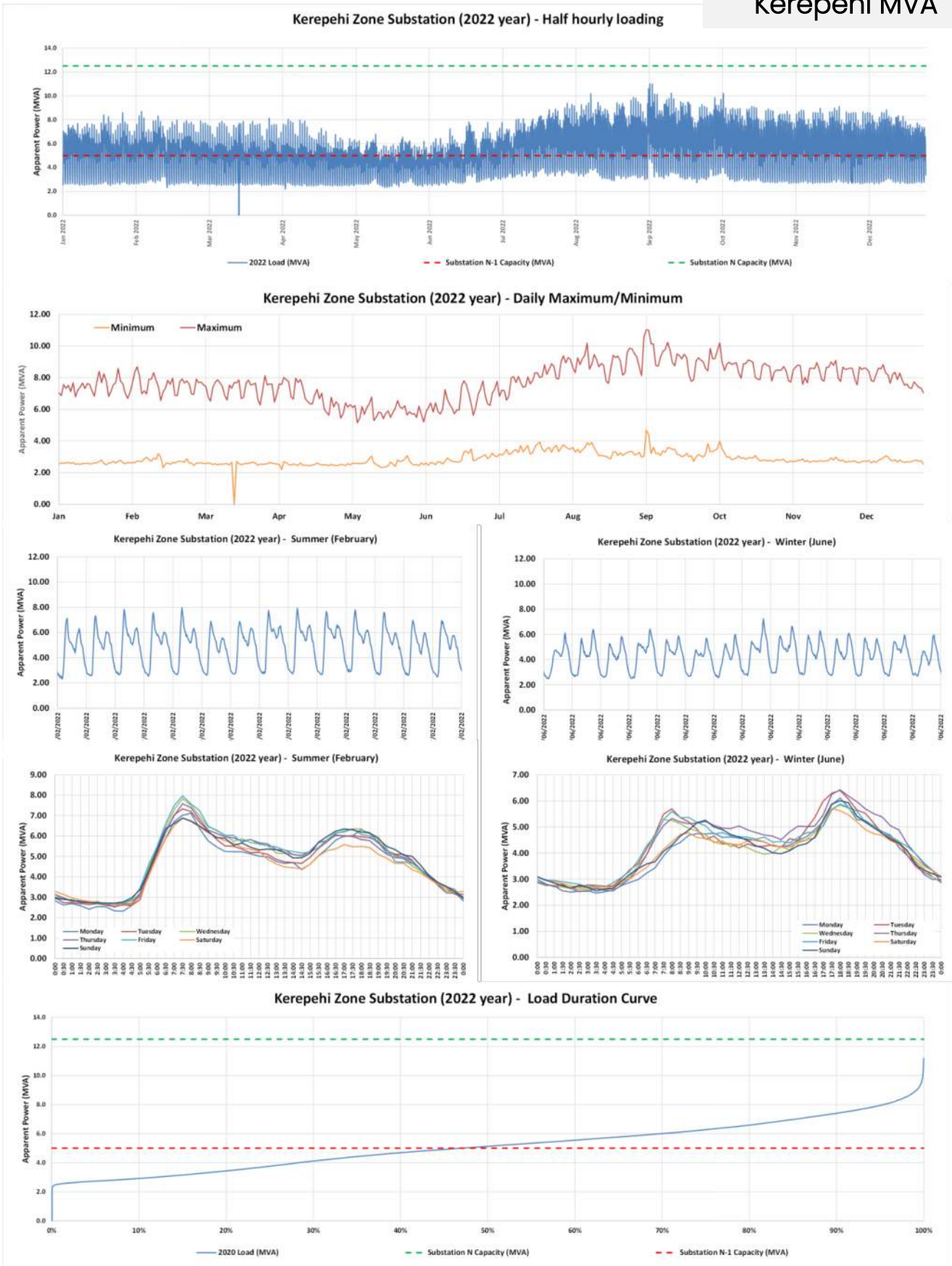


Figure 68. Kerepehi 66/11 kV zone substation: Apparent power (MVA) load characteristics.

Matatoki MVA

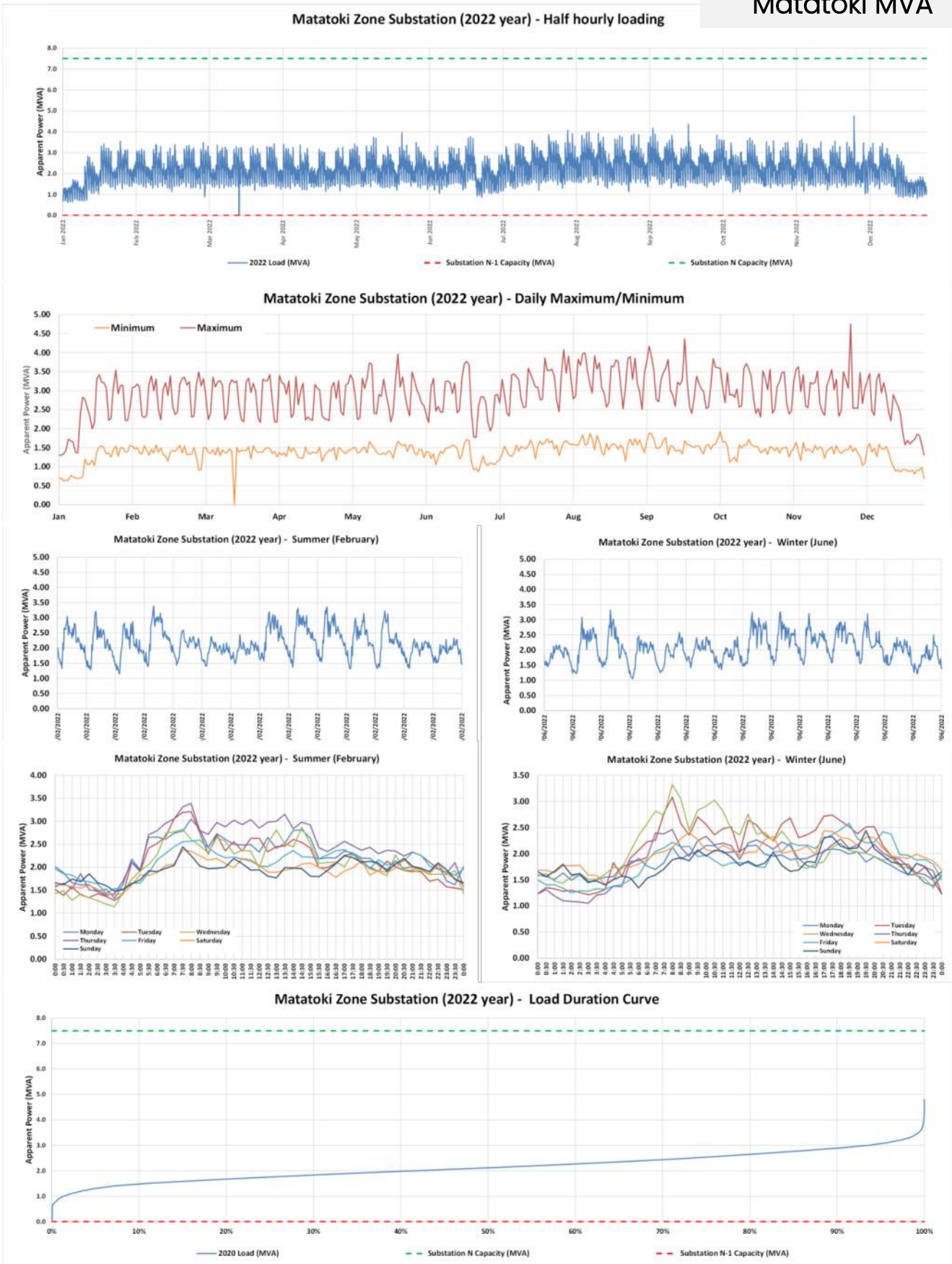


Figure 69. Matatoki 66/11 kV zone substation: Apparent power (MVA) load characteristics.

Tairua MVA

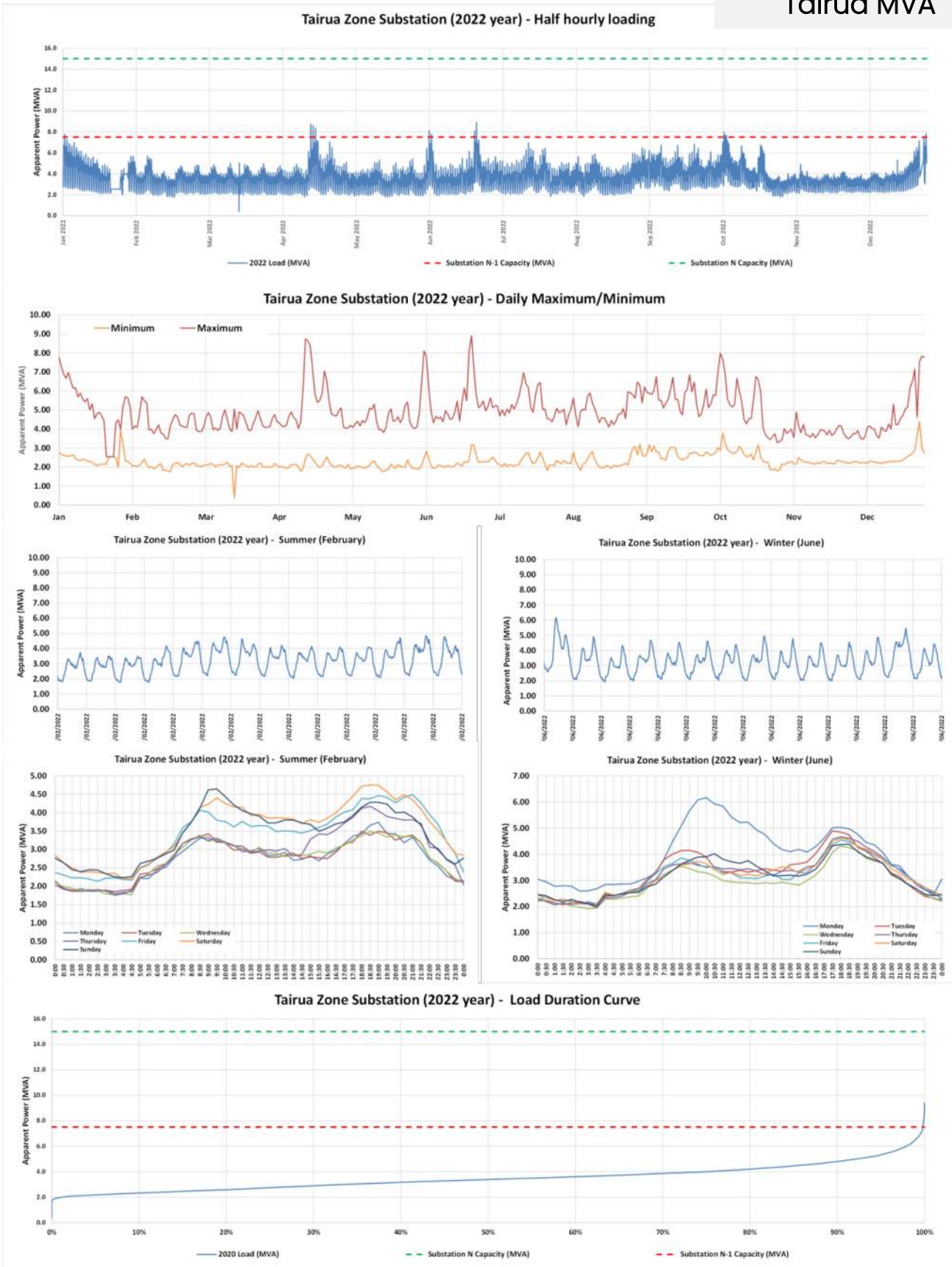


Figure 70. Tairua 66/11 kV zone substation: Apparent power (MVA) load characteristics.

Thames T1&T2 MVA

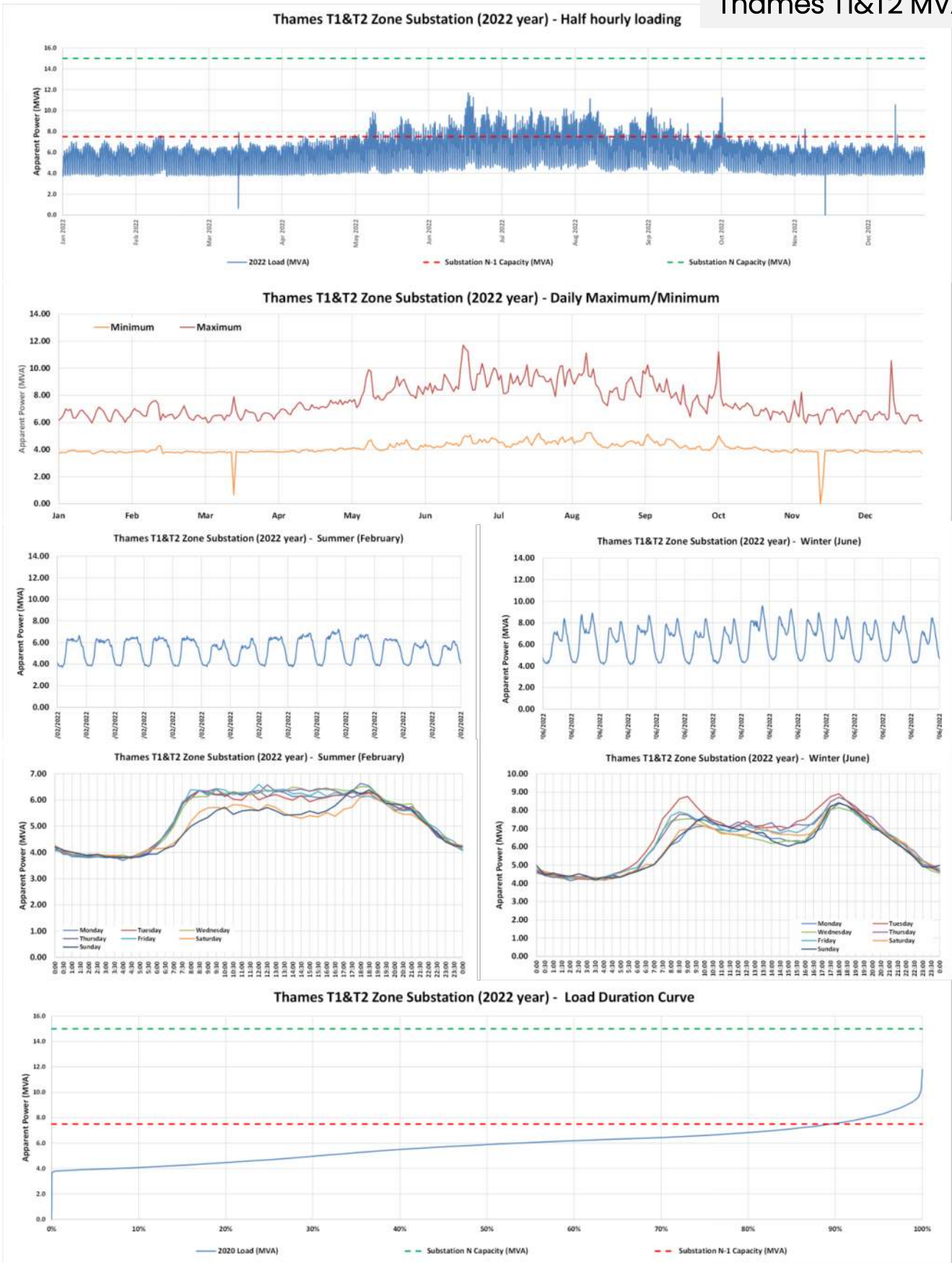


Figure 71. Thames T1&T2 66/11 kV zone substation: Apparent power (MVA) load characteristics.

Thames T3 MVA

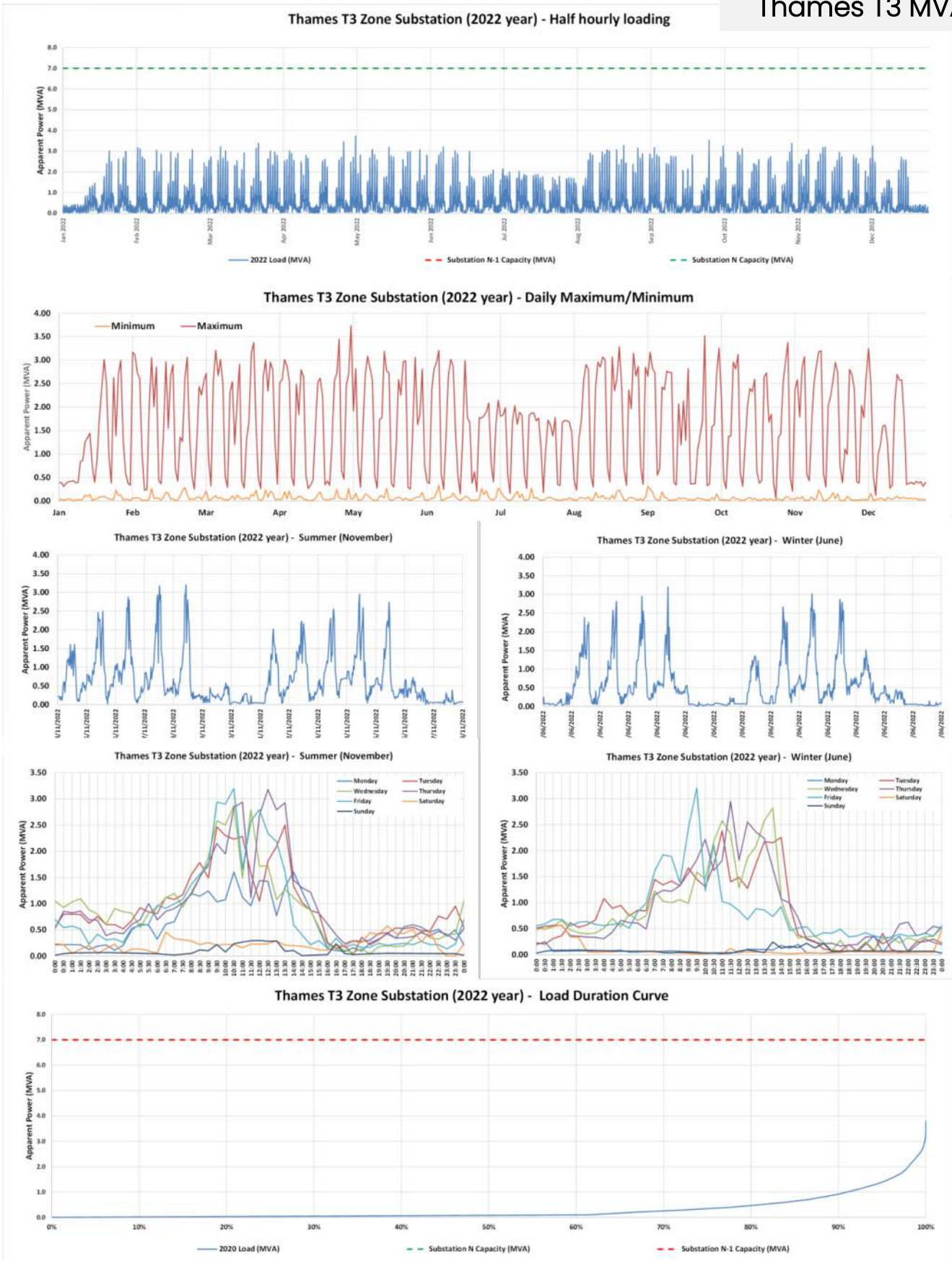


Figure 72. Thames T3 66/11 kV zone substation: Apparent power (MVA) load characteristics.

Whitianga MVA

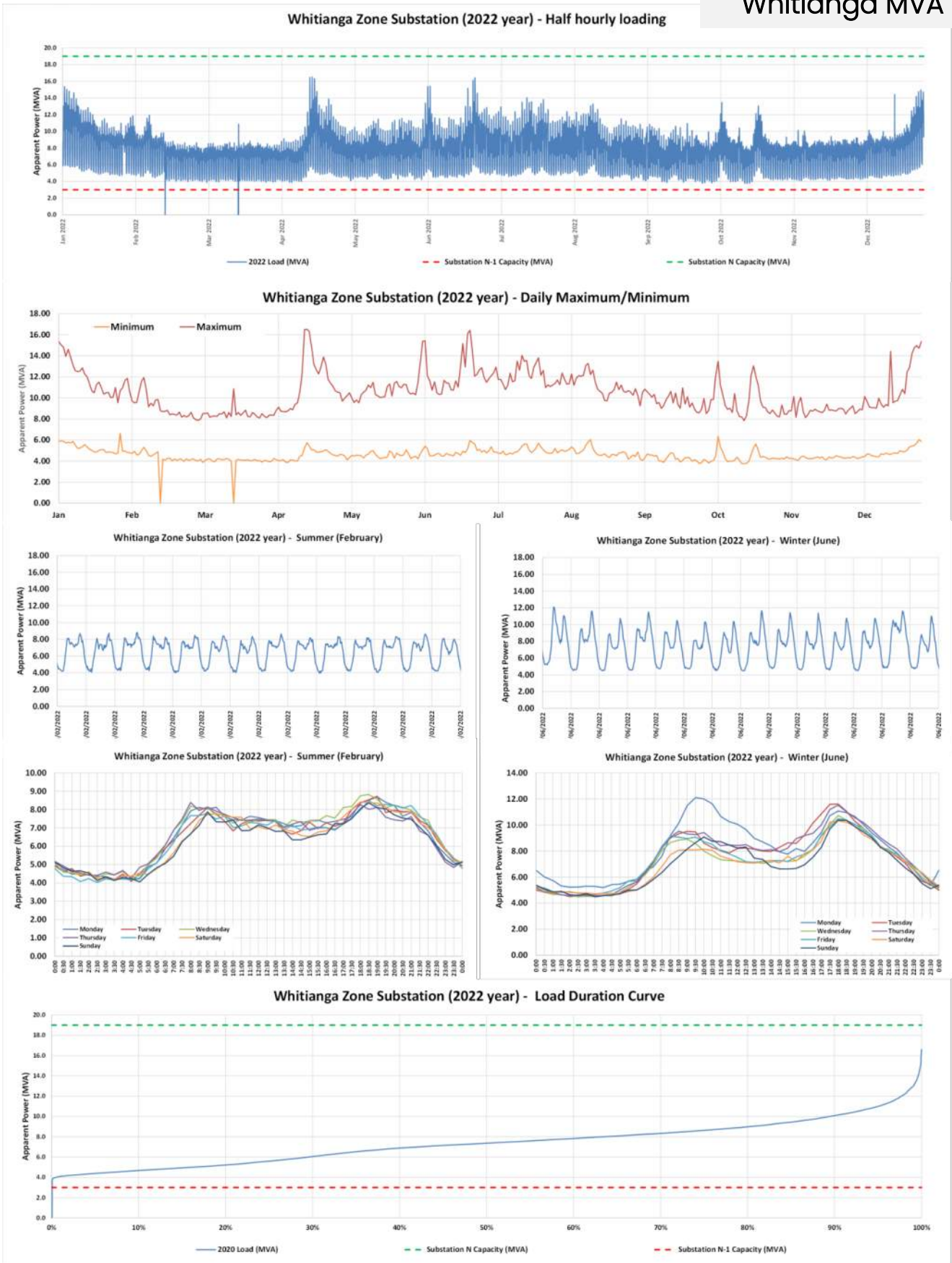


Figure 73. Whitianga 66/11 kV zone substation: Apparent power (MVA) load characteristics.

Paeroa MVA

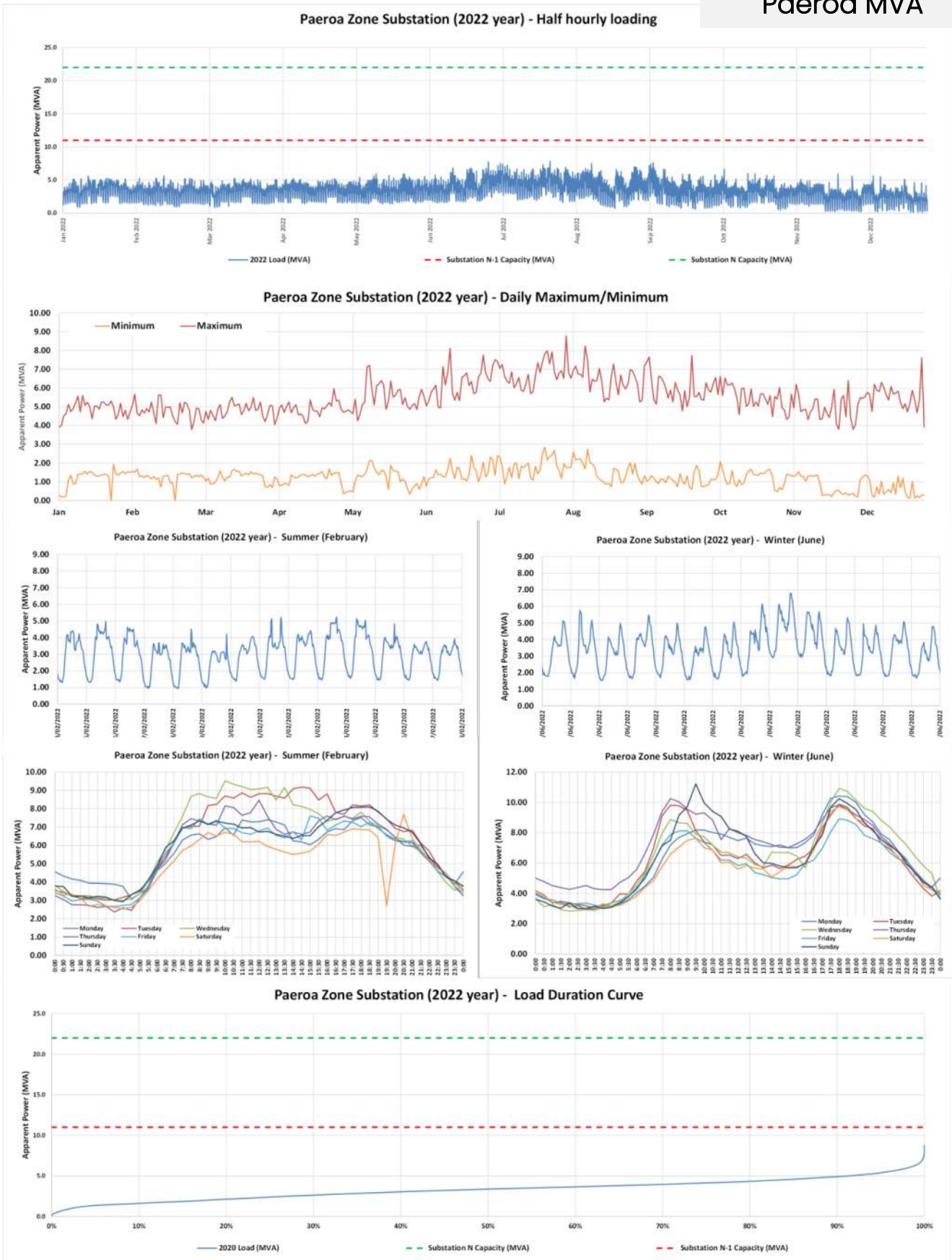


Figure 74. Paeroa 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Waihi MVA

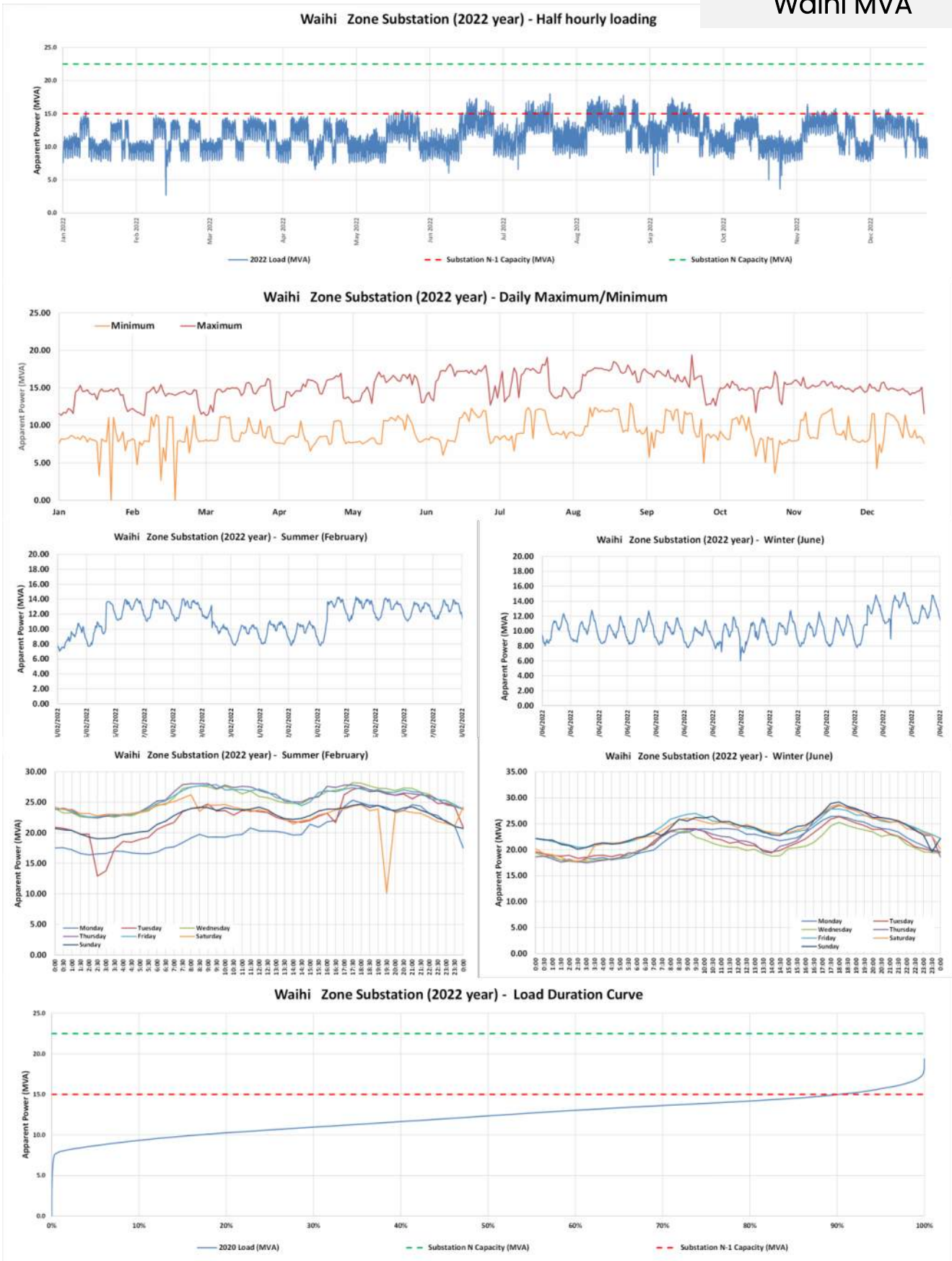


Figure 75. Waihi 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Unknown.

Waihi Beach MVA

Figure 76. Waihi Beach 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Whangamatā MVA

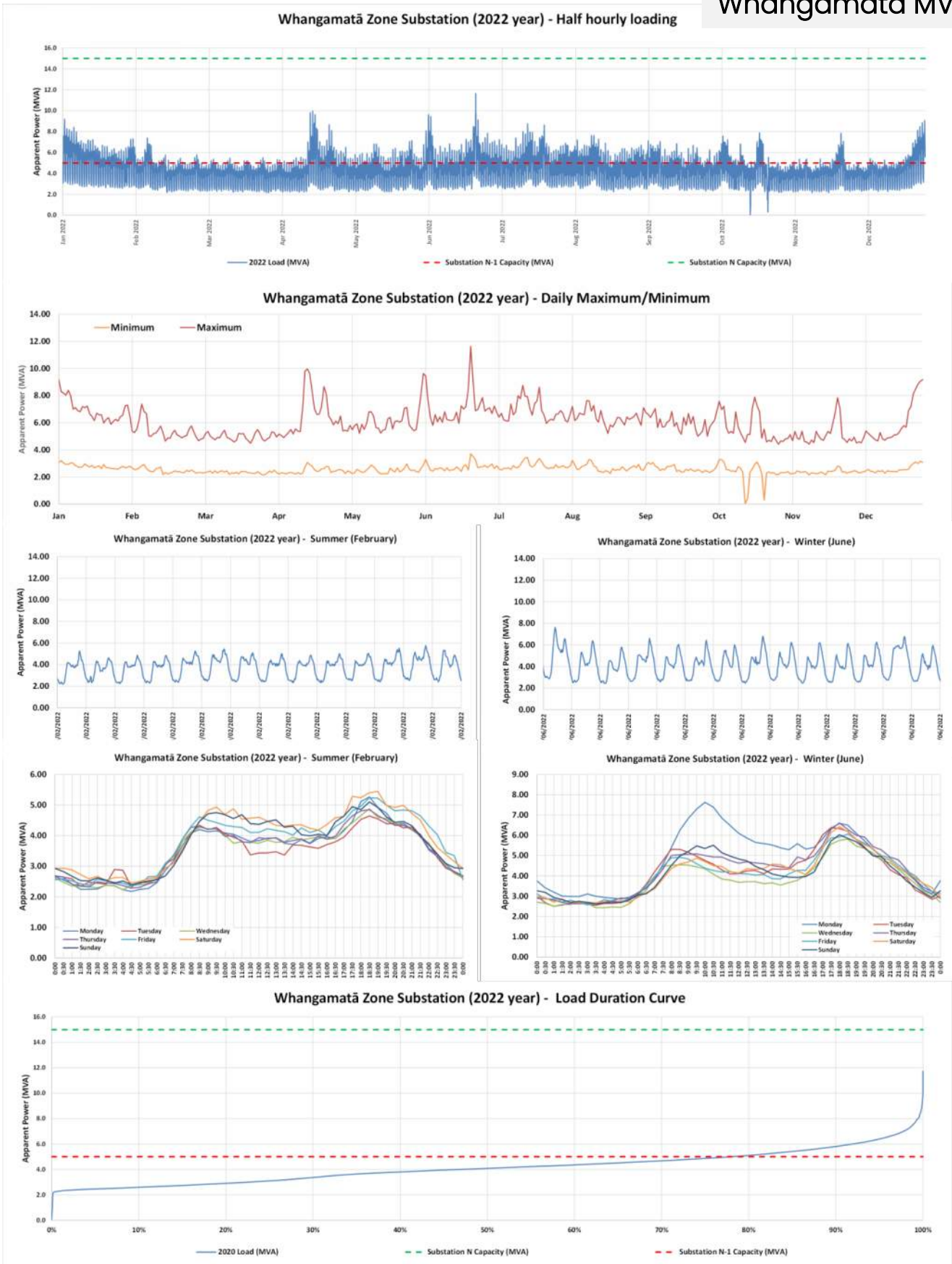


Figure 77. Whangamatā 33/11 kv zone substation: Apparent power (MVA) load characteristics.

Farmer Road MVA

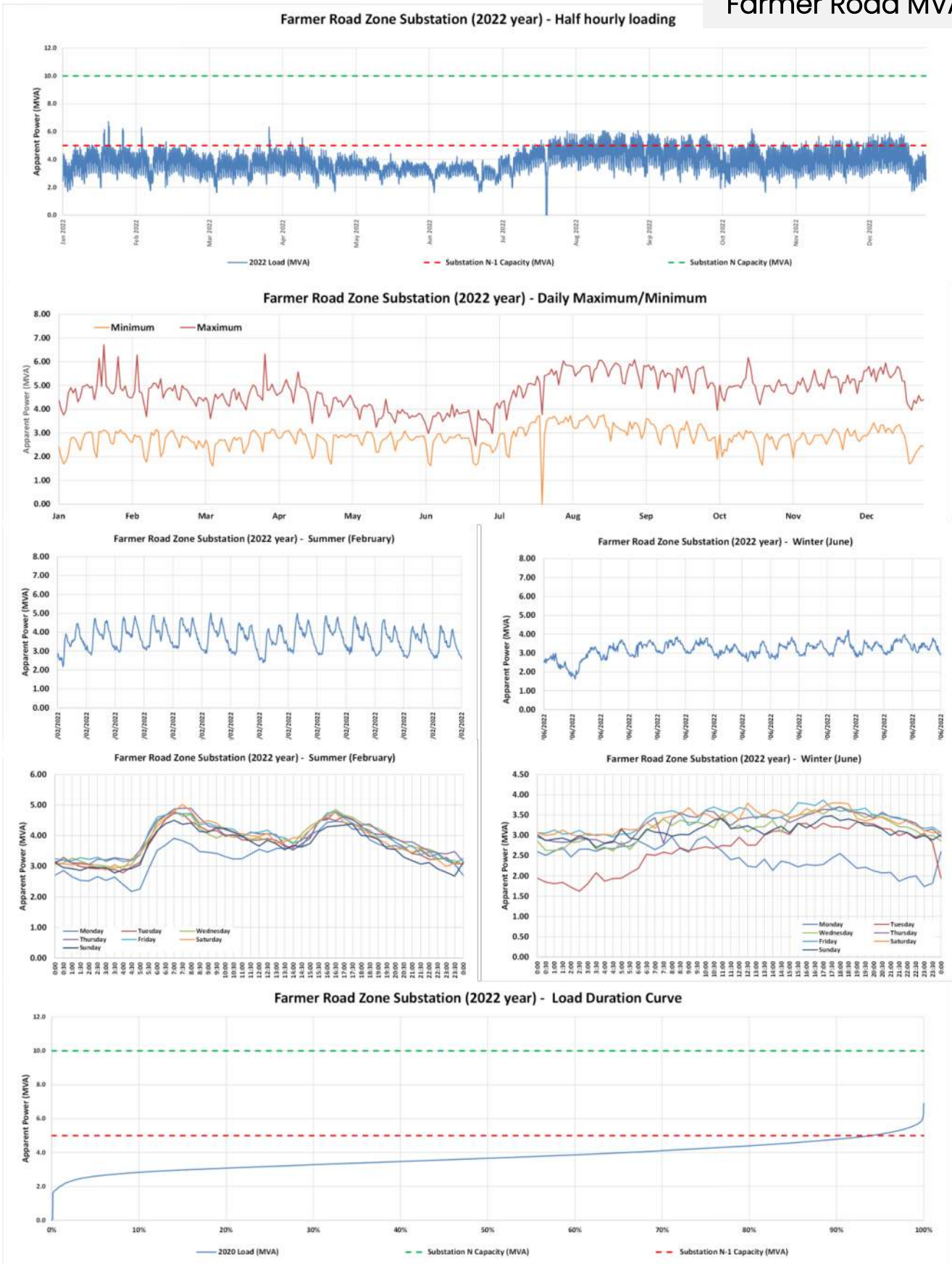


Figure 78. Farmer Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Inghams MVA

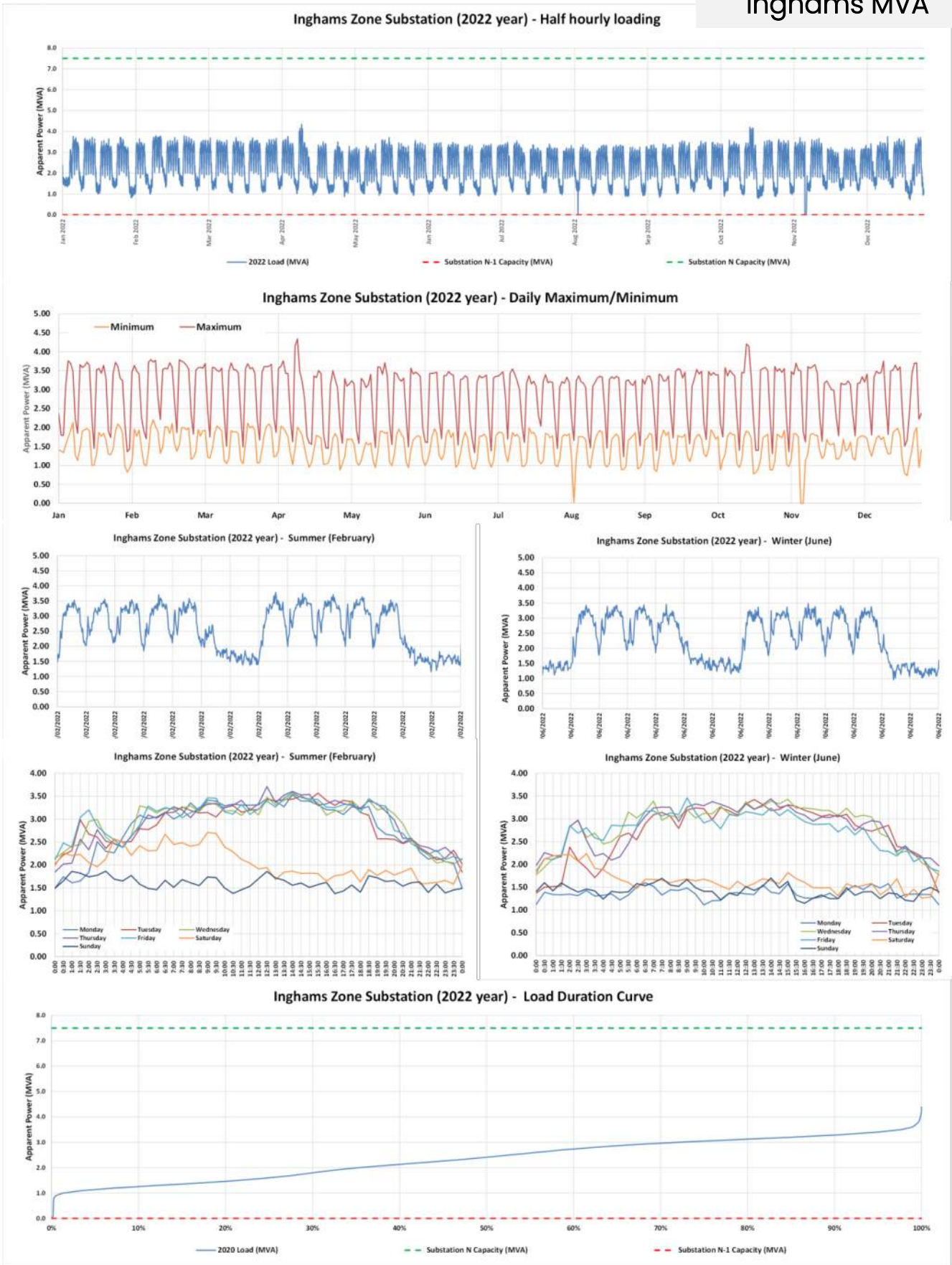


Figure 79. Inghams 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Mikkelson Road MVA

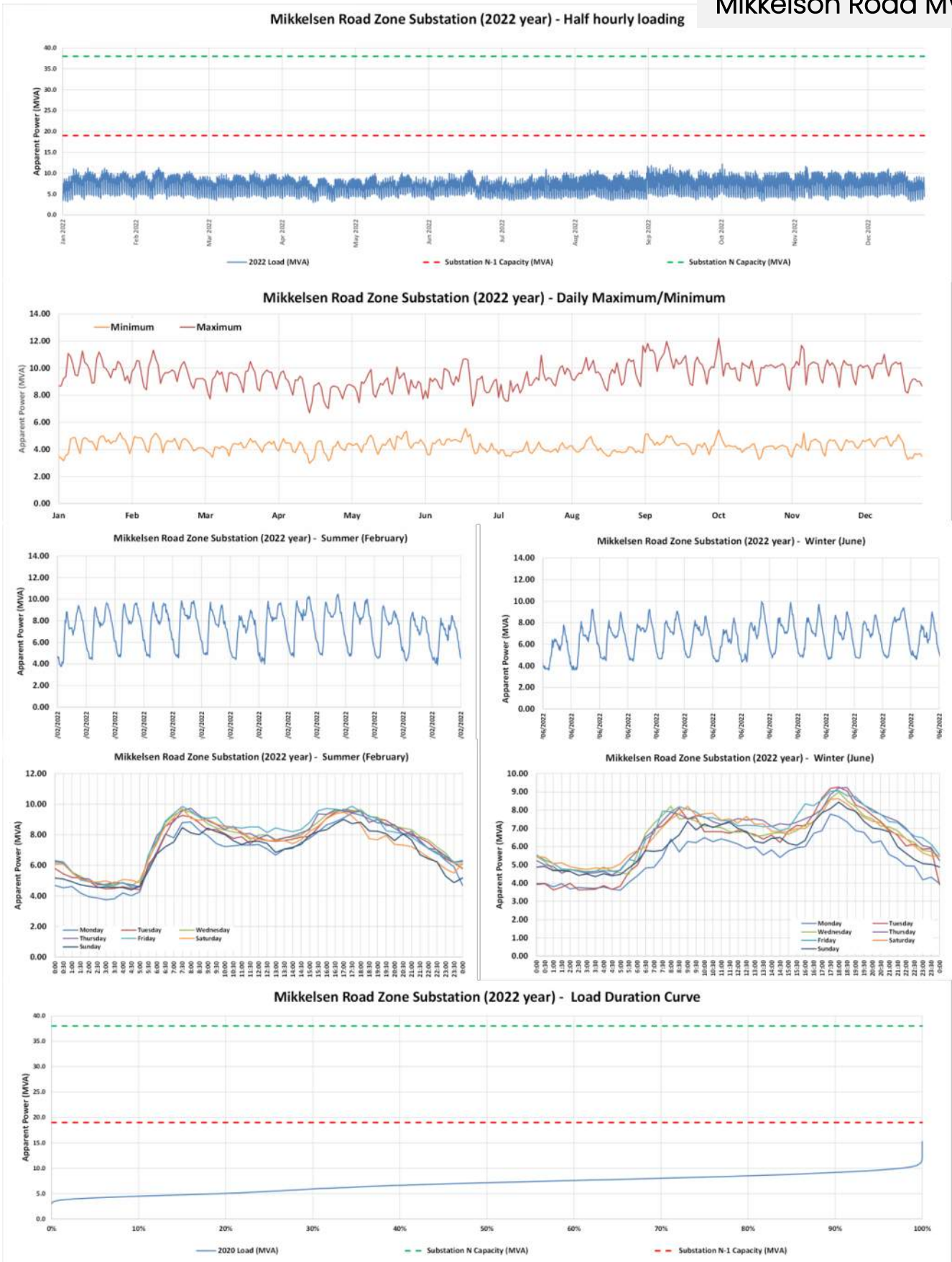


Figure 80. Mikkelson Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Morrinsville MVA

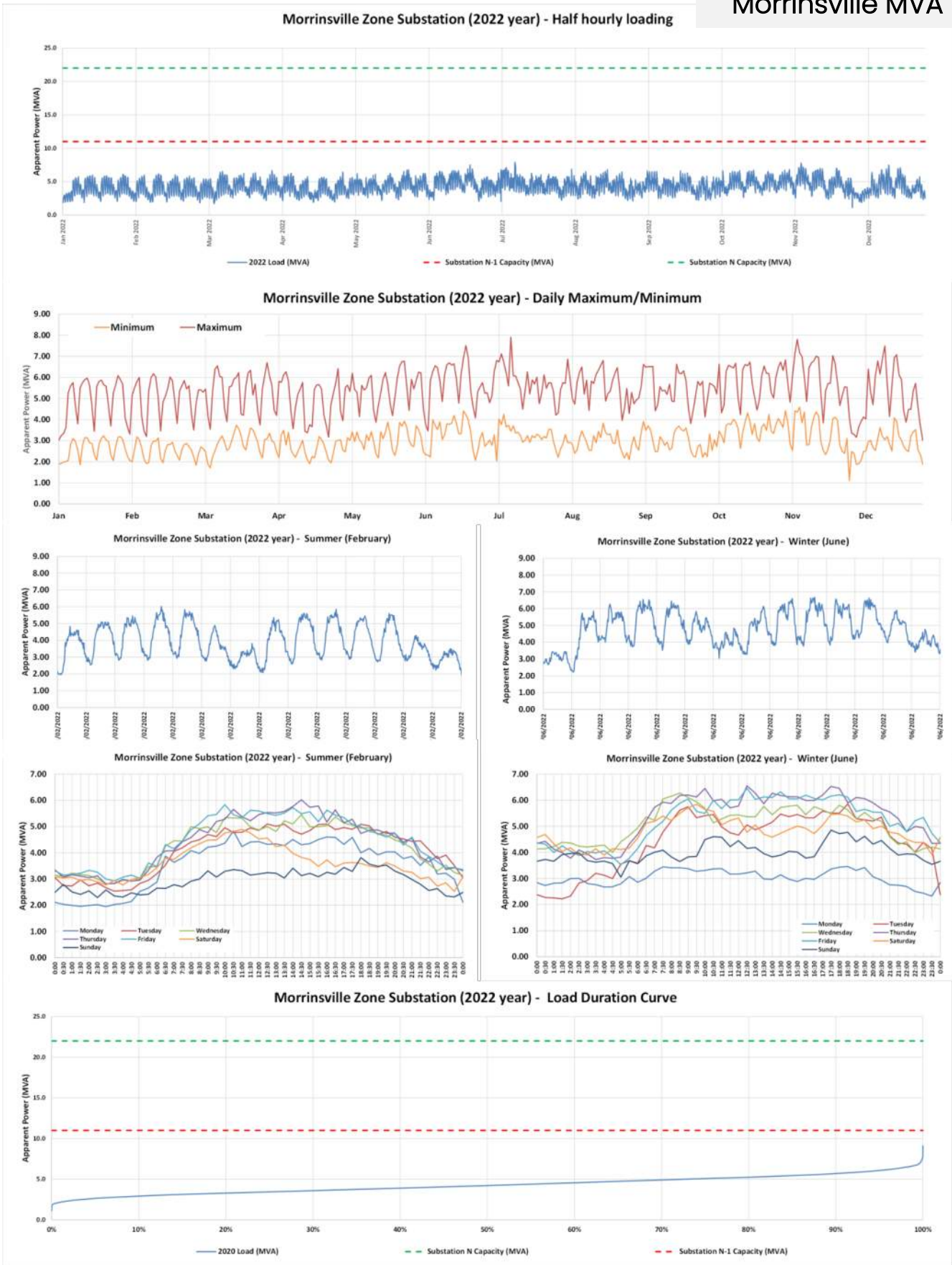


Figure 81. Morrinsville 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Piako MVA

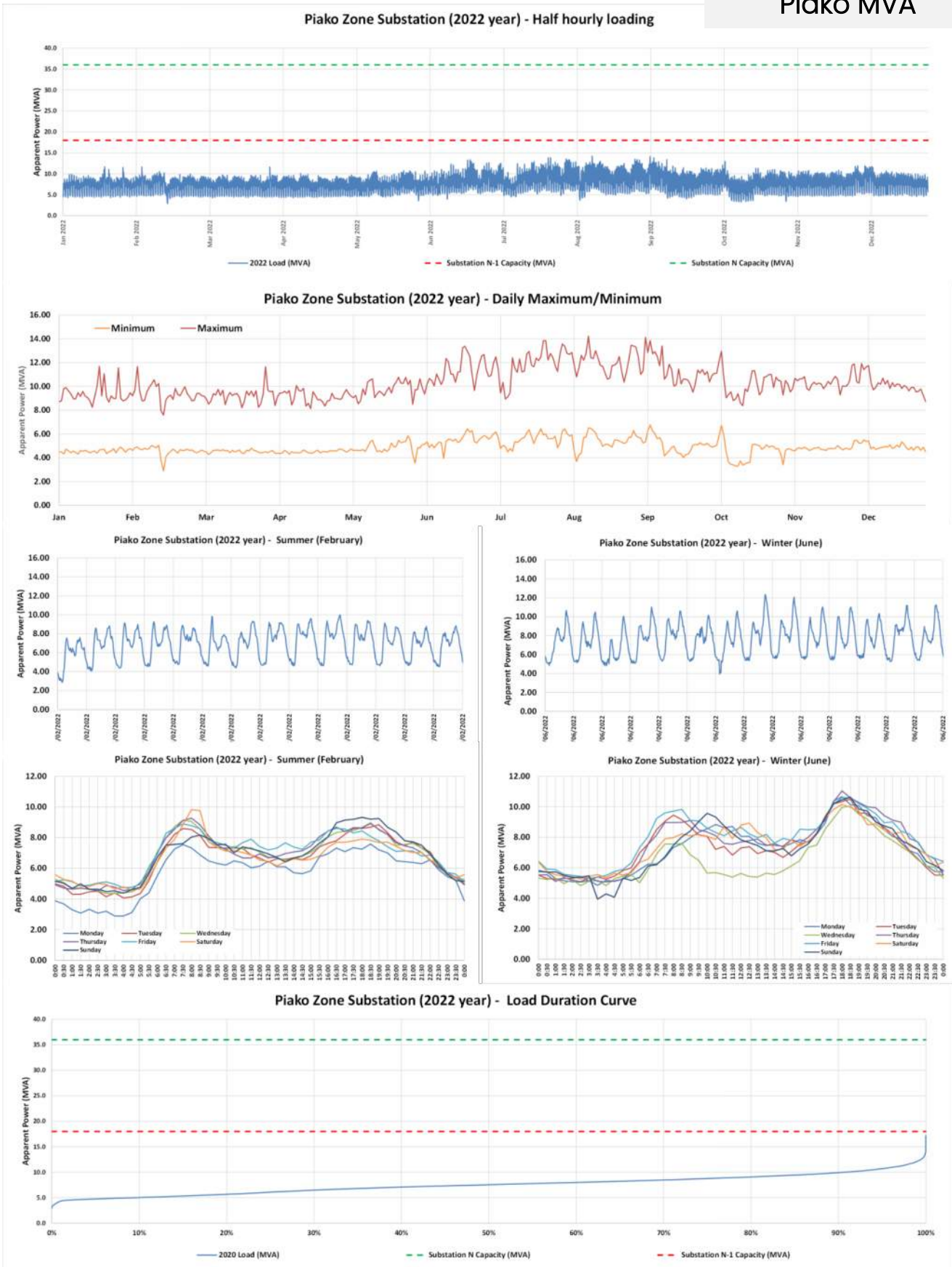


Figure 82. Piako 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Tahuna MVA

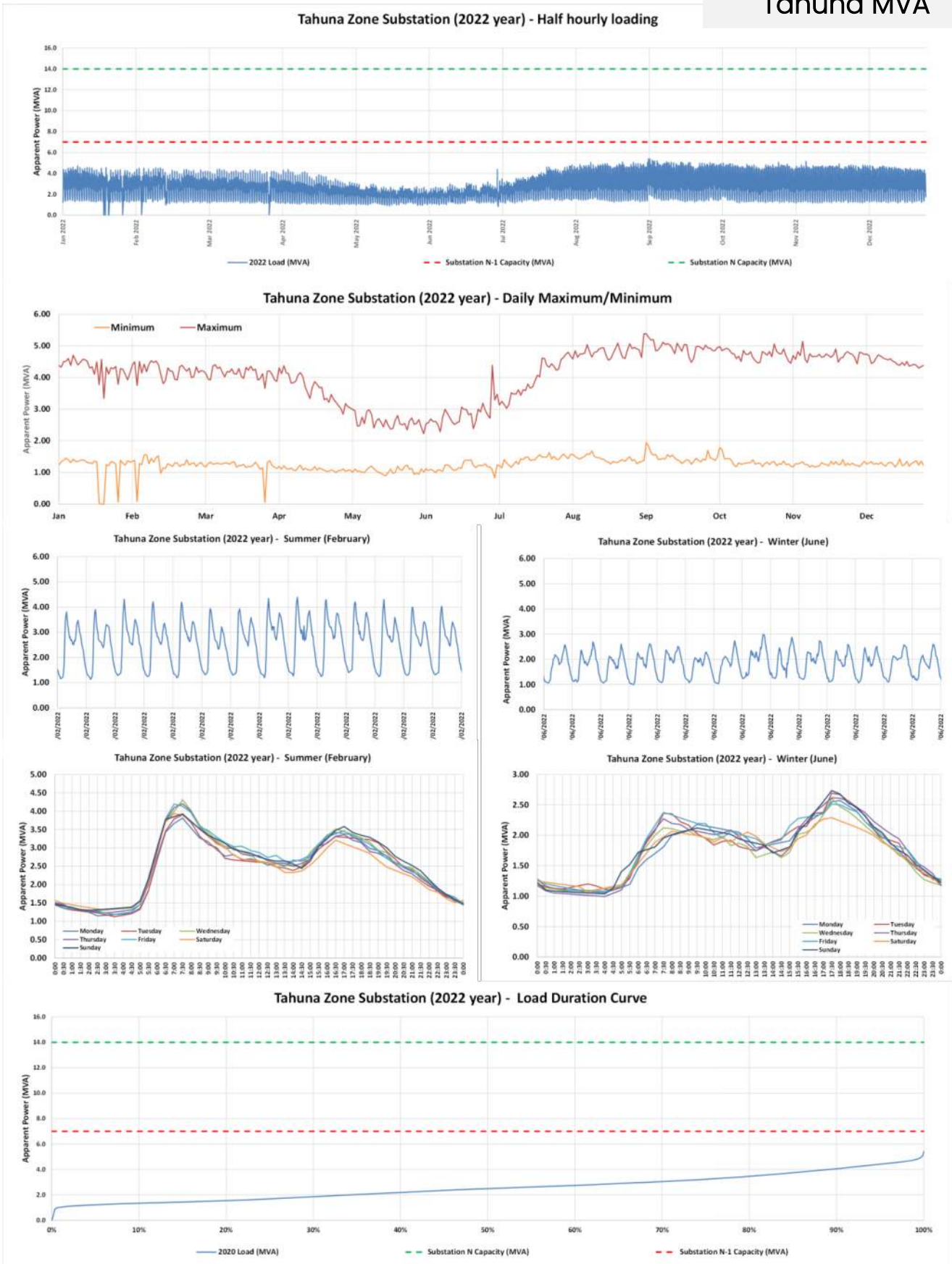


Figure 83. Tahuna 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Tatua MVA

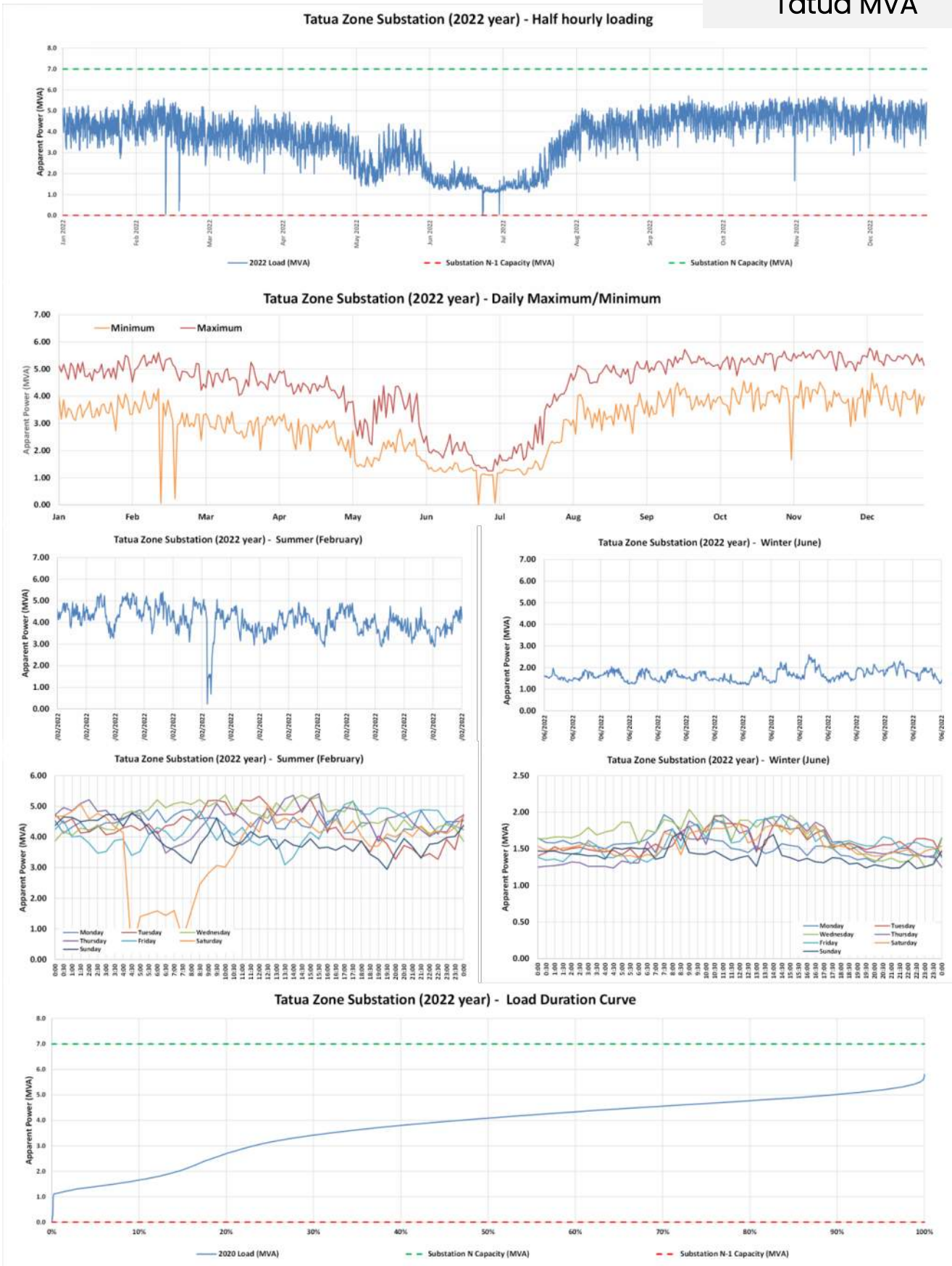


Figure 84. Tatua 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Unknown

Waitoa MVA

Figure 85. Waitoa 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Walton MVA

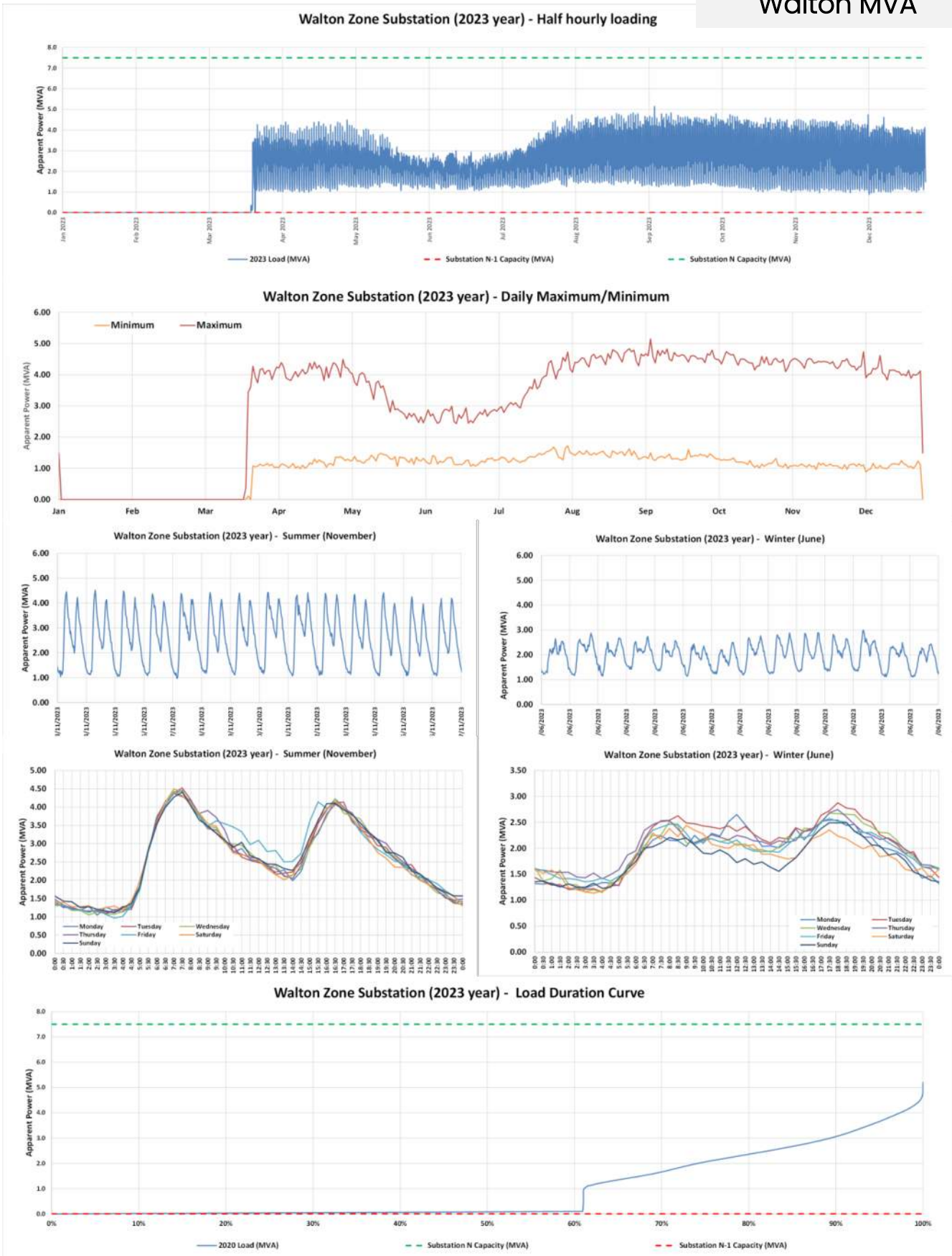


Figure 86. Walton 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Browne Street MVA

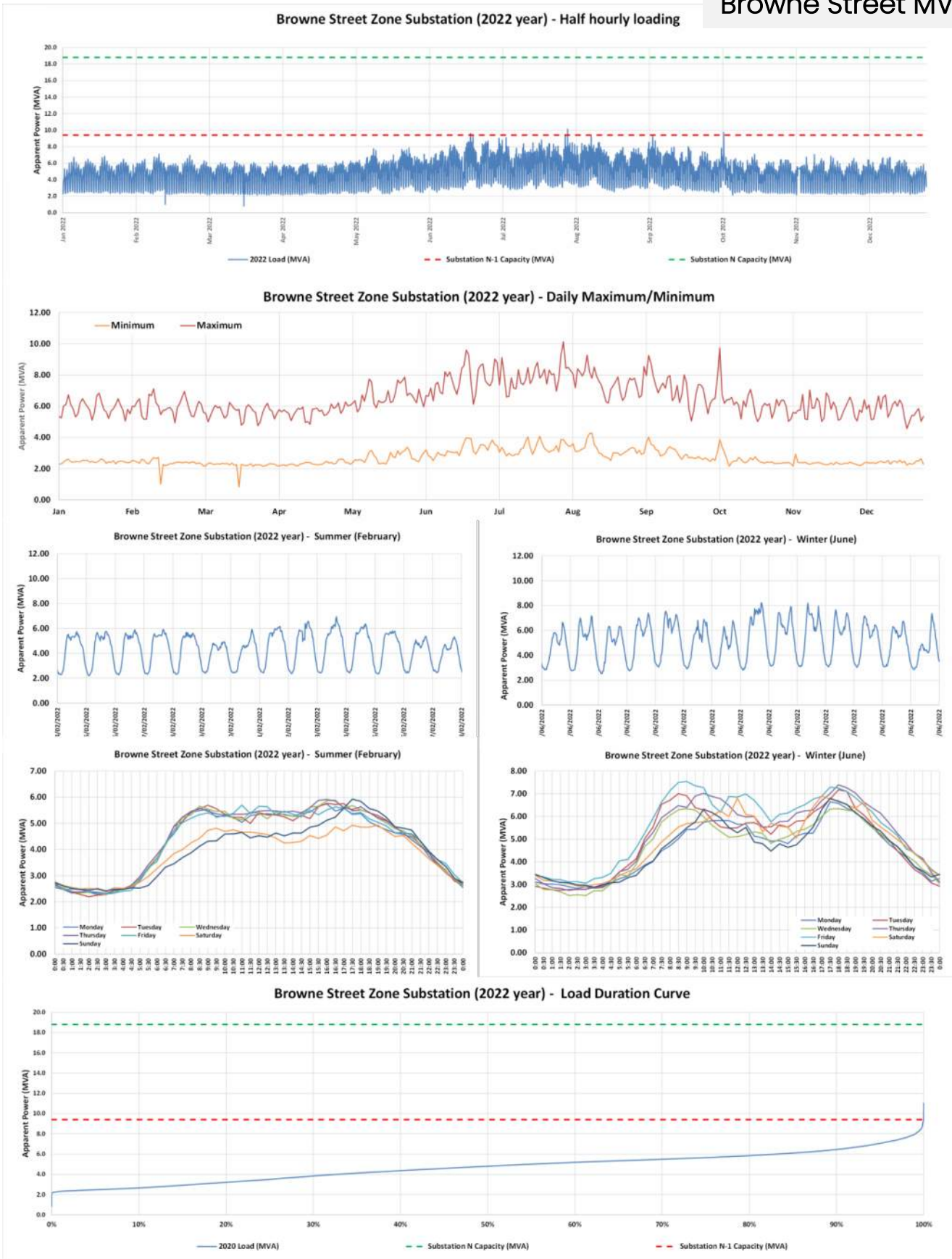


Figure 87. Browne Street 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Lake Road MVA

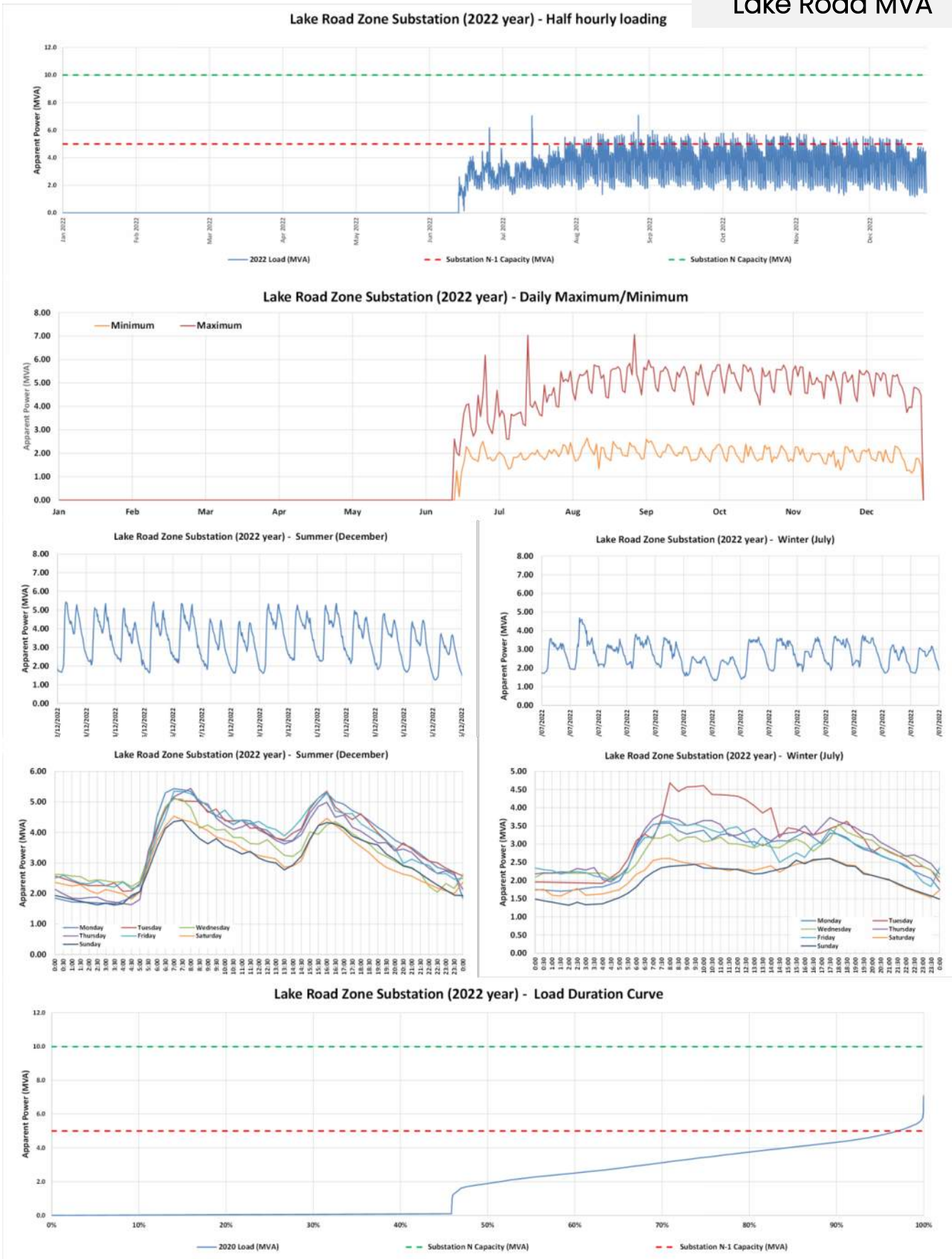


Figure 88. Lake Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Tirau MVA

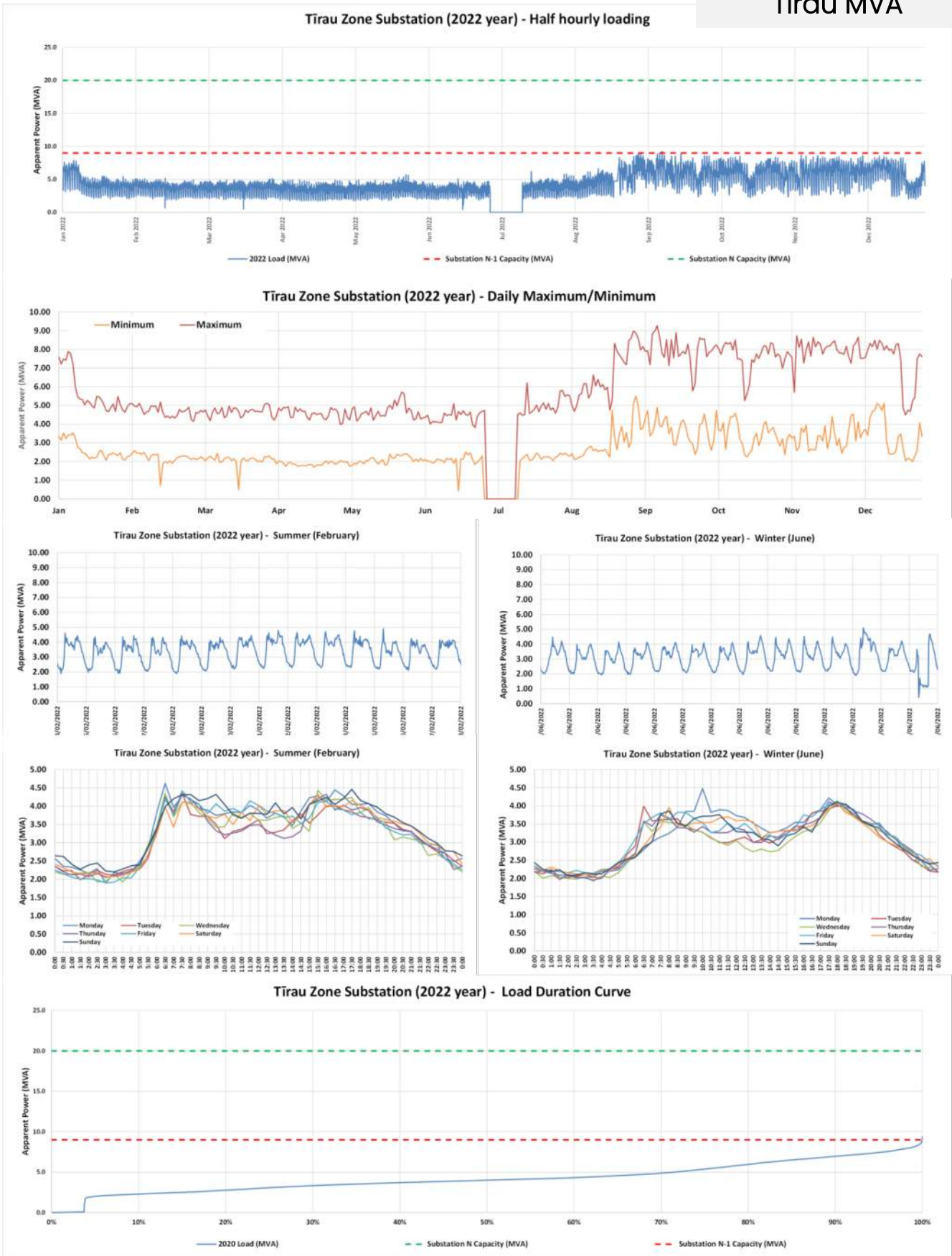


Figure 89. Tirau 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Putāruru MVA

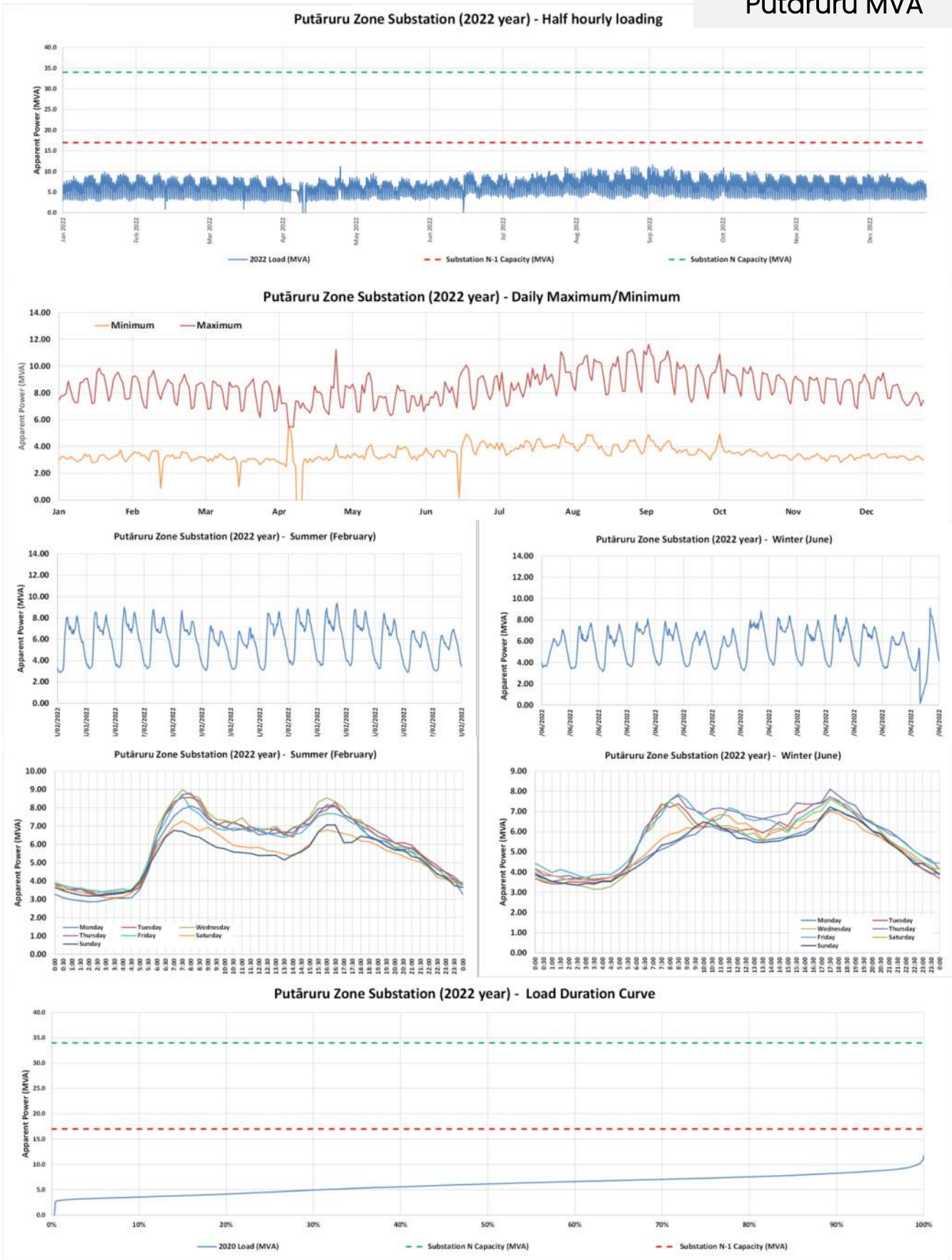


Figure 90. Putāruru 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Tower Road MVA

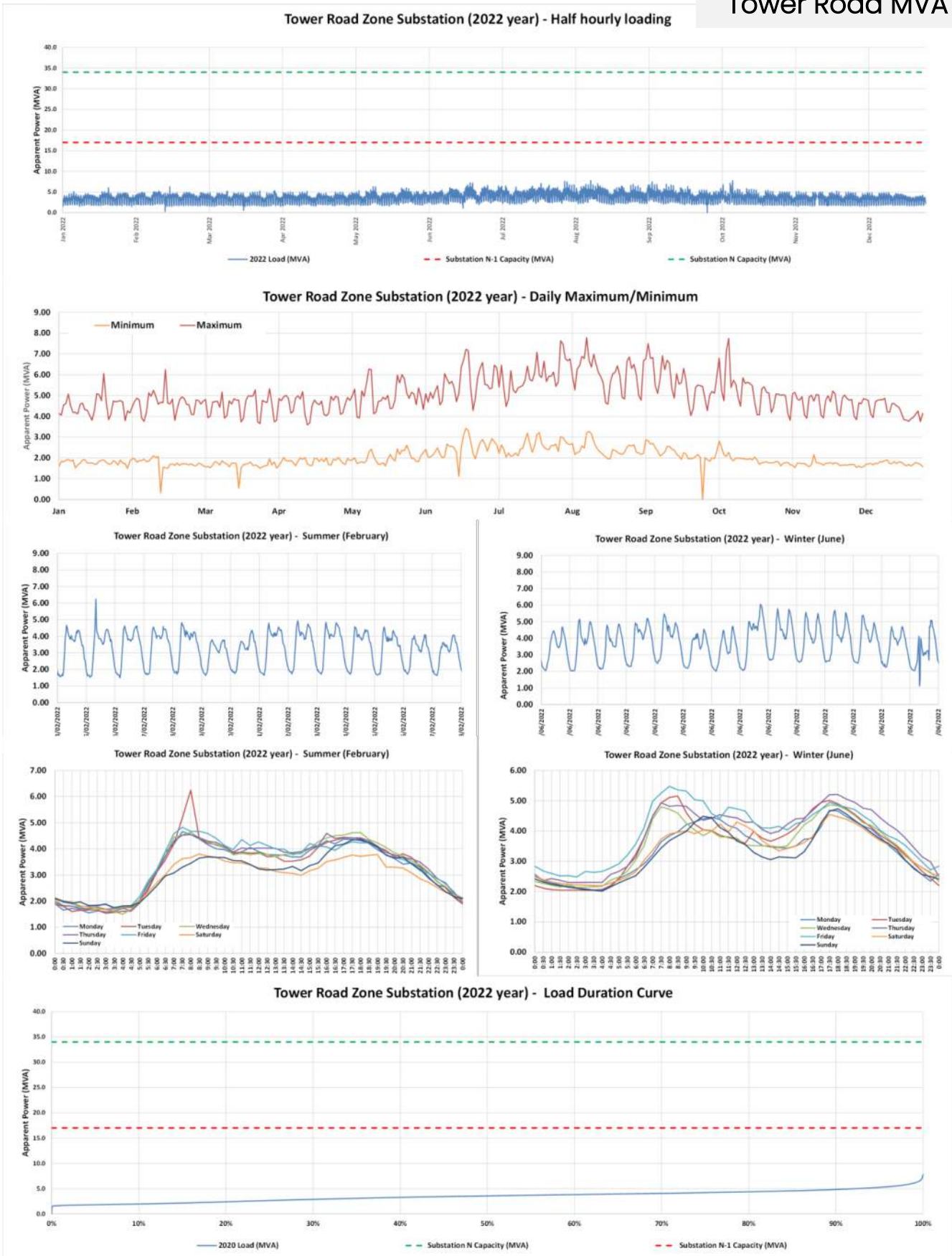


Figure 91. Tower Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Waharoa Nth MVA

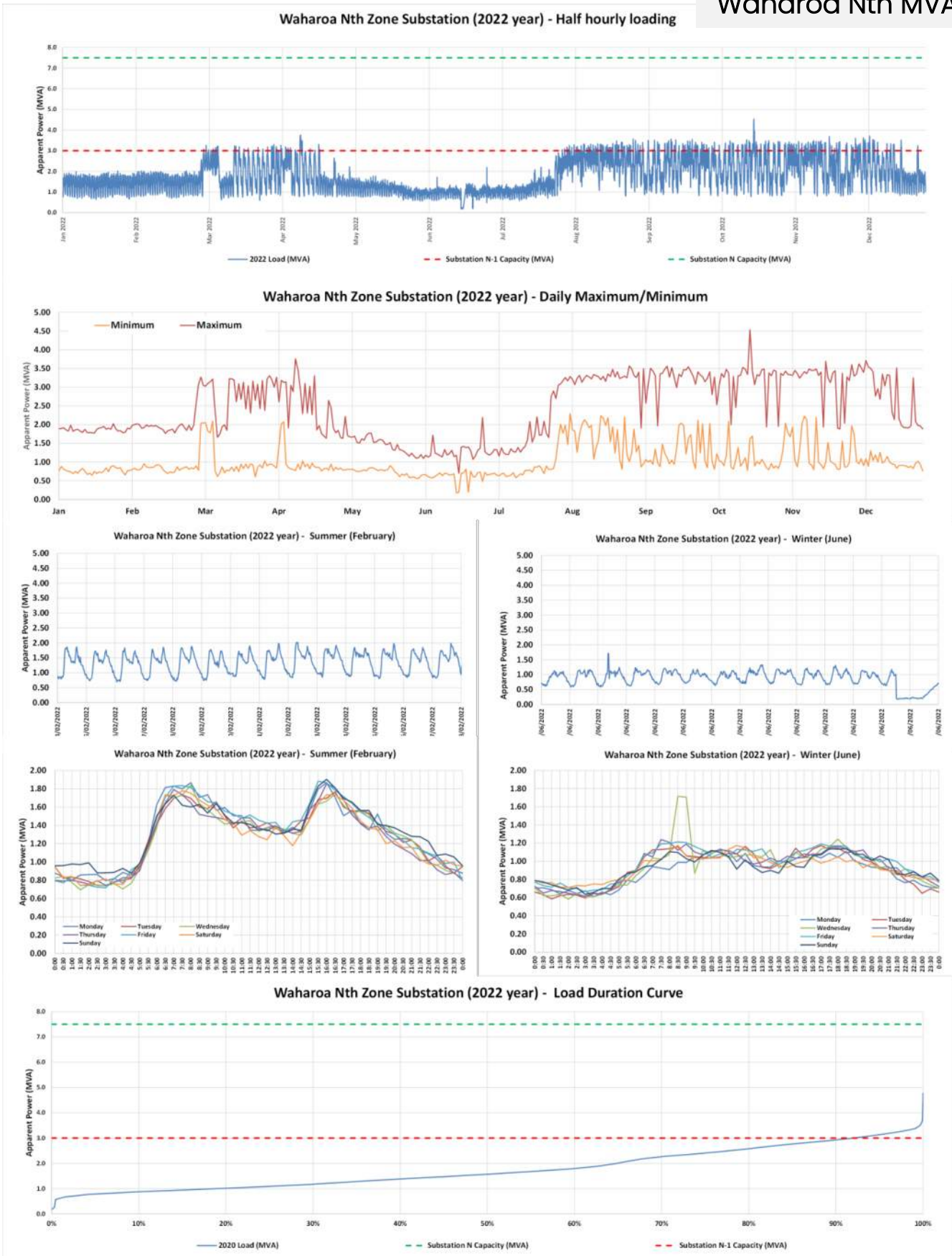


Figure 92. Waharoa North 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Waharoa Sth MVA

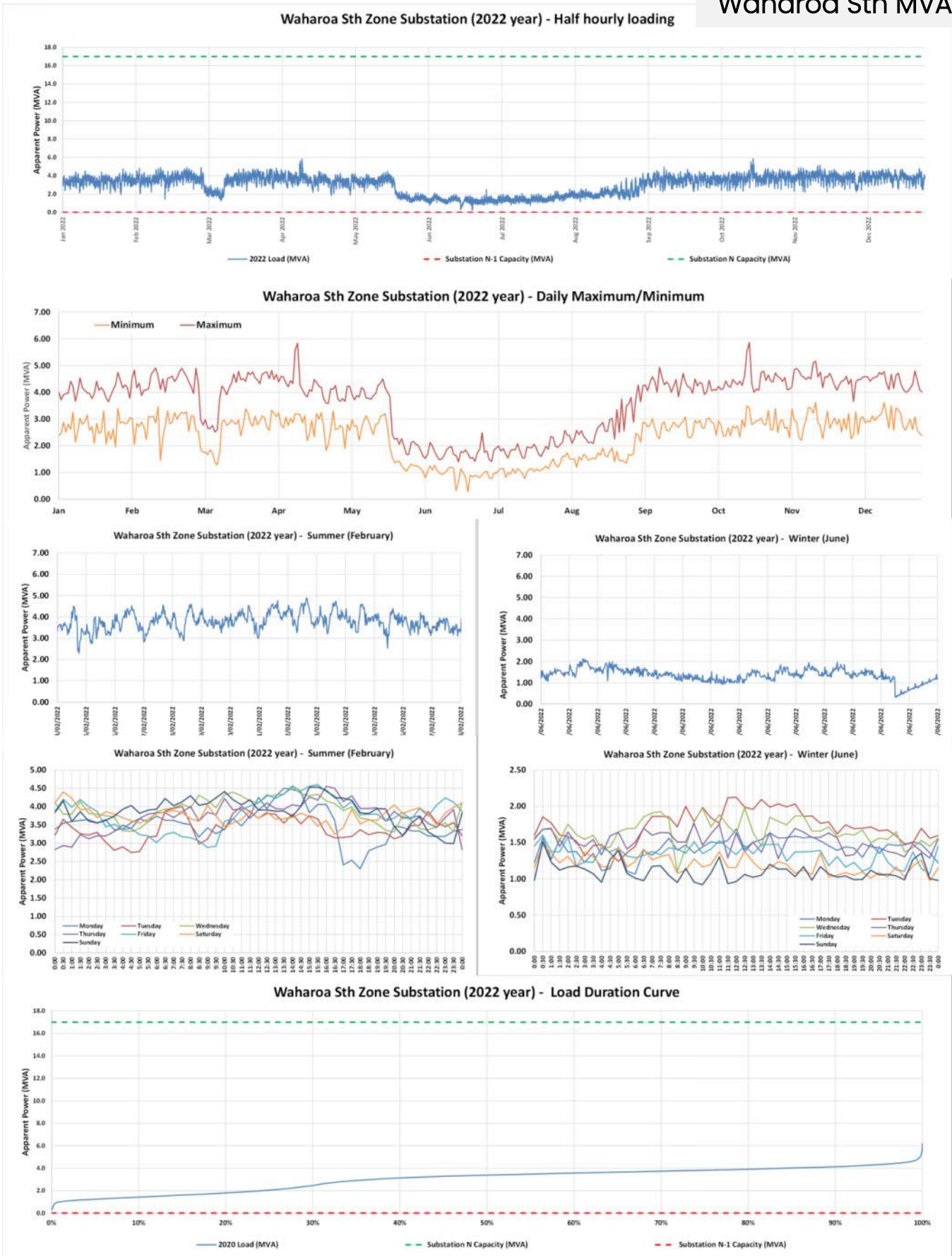


Figure 93. Waharoa South 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Baird Road MVA

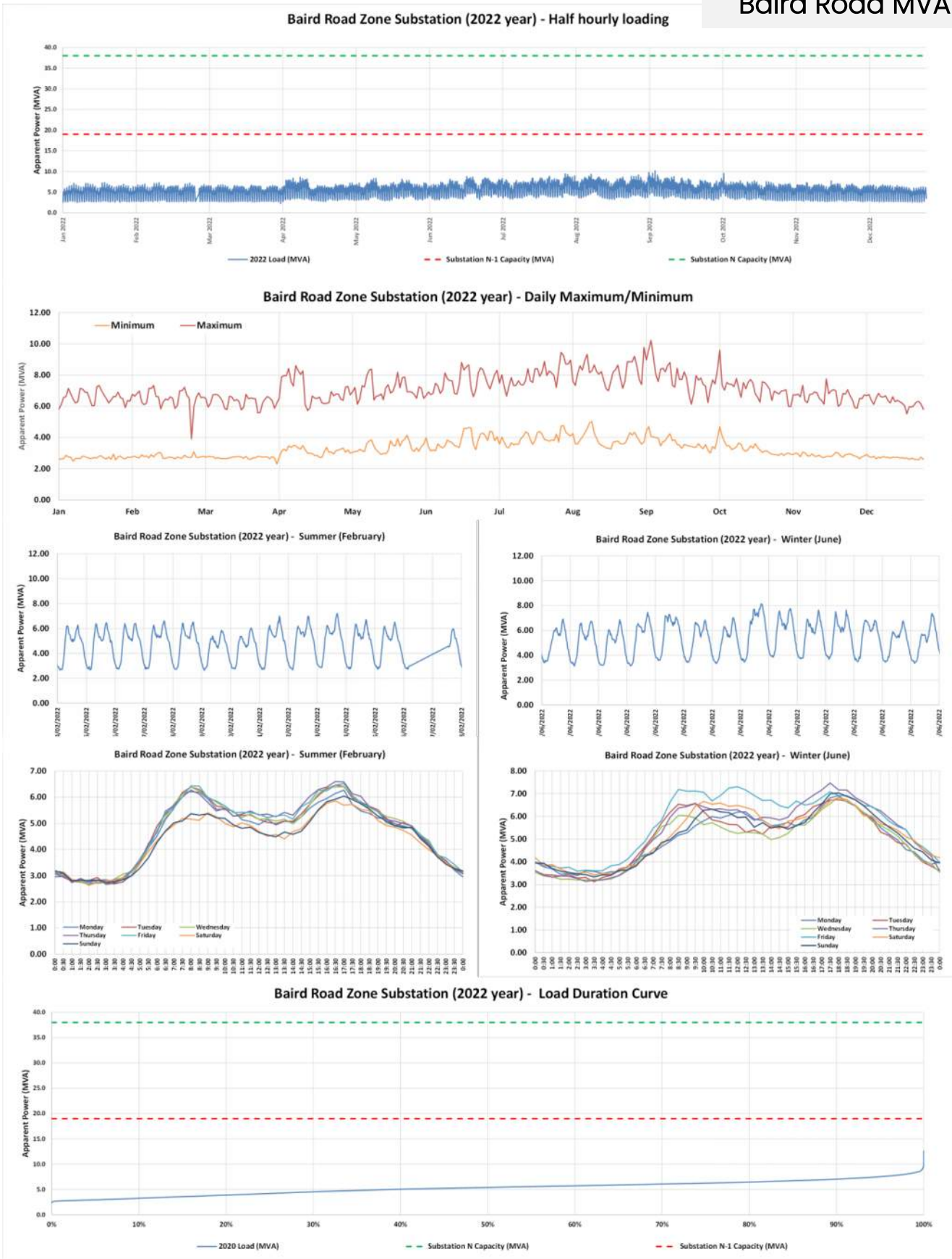


Figure 94. Baird Road 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Midway MVA

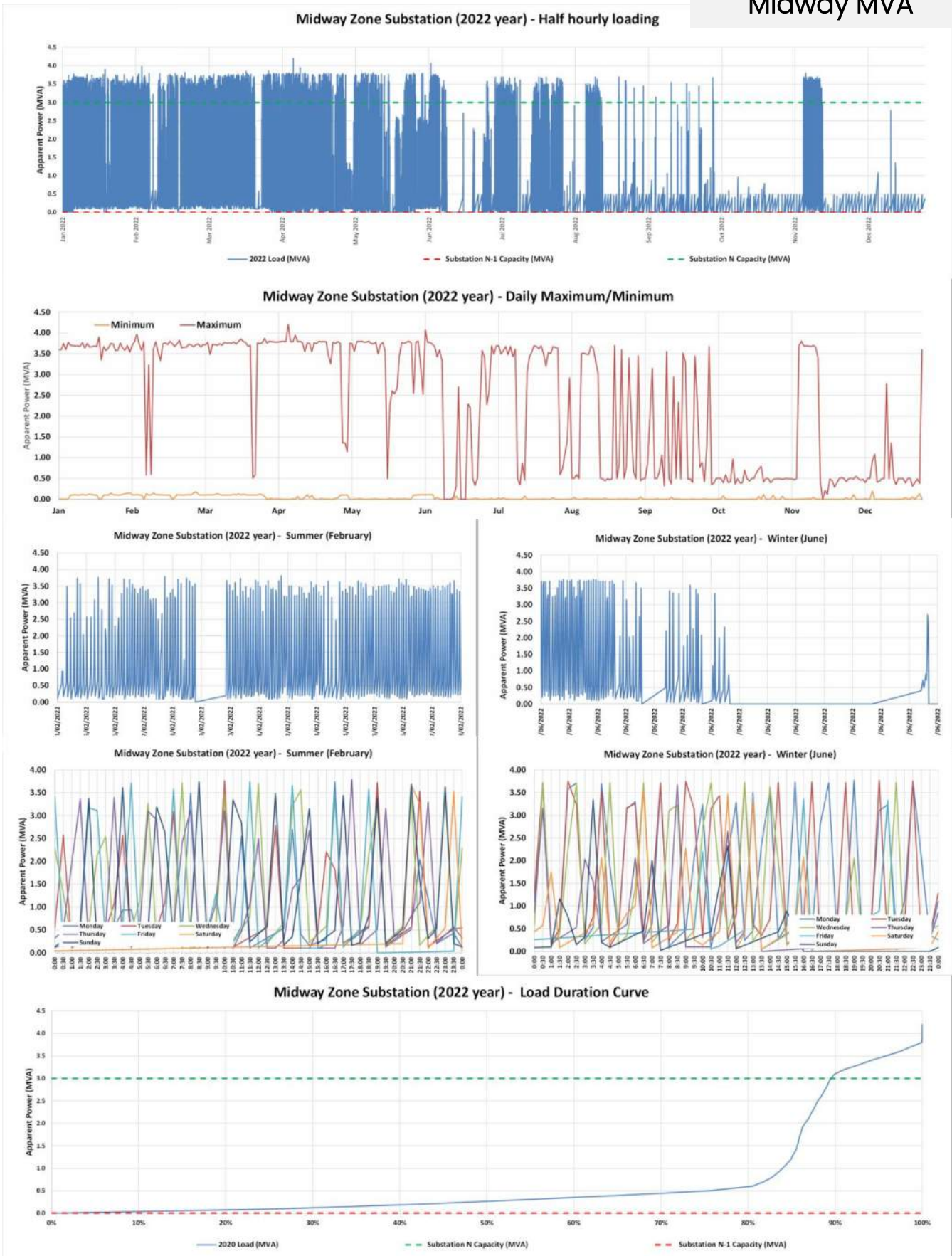


Figure 95. Midway 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Lakeside Pumps Load profile is included in the Midway Substation load graph.

**Lakeside
Pumps MVA**

Figure 96. Lakeside Pumps 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Maraetai MVA

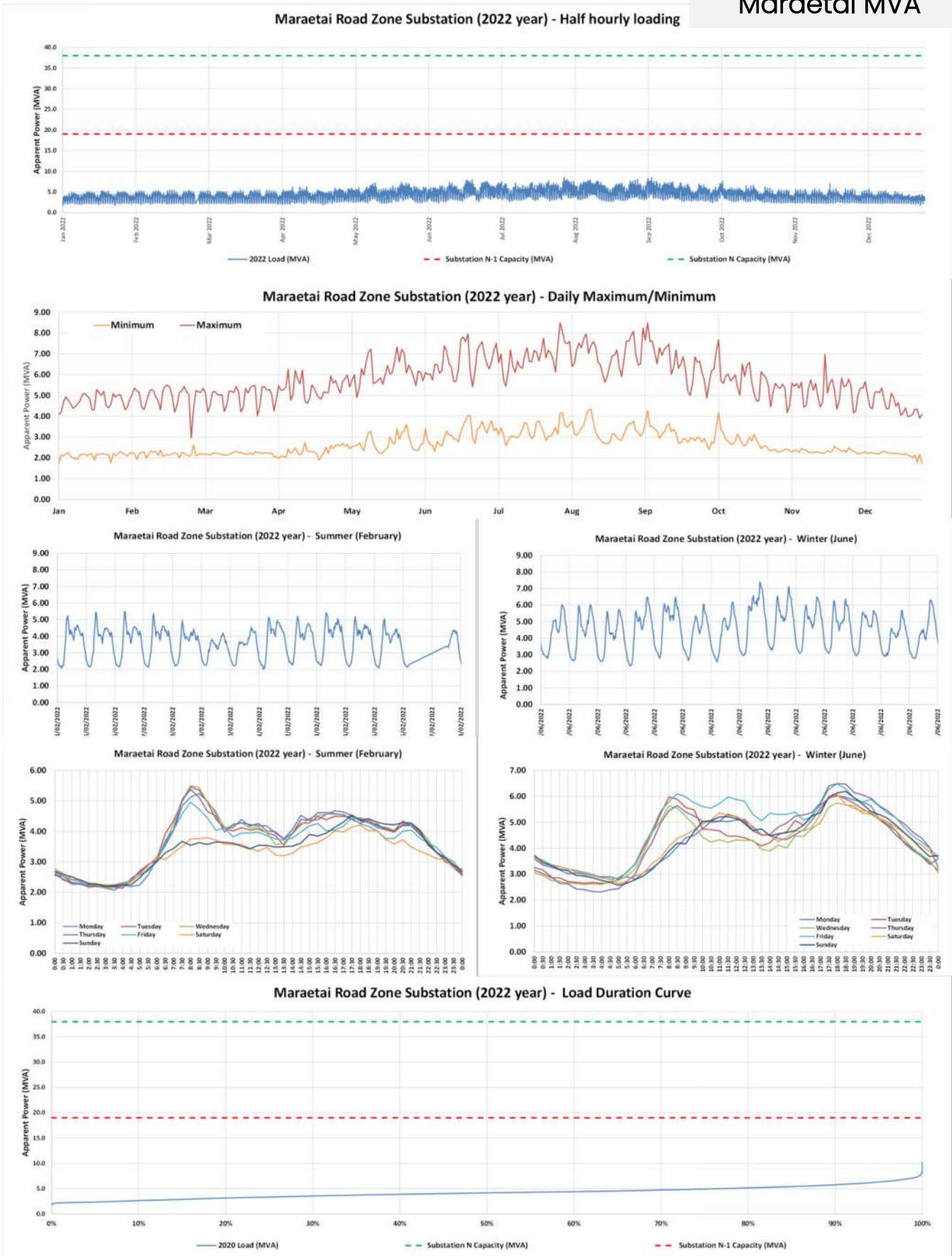


Figure 97. Maraetai 33/11 kV zone substation: Apparent power (MVA) load characteristics.

3.4 Unison

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

- Figure 98. Fletchers 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 99. Runanga Street 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 100. Taupō South 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 101. Fleet Street 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 102. Ohaaki 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 103. Te Toke 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Unknown

Fletchers MVA

Figure 98. Fletchers 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Unknown

Runanga Street MVA

Figure 99. Runanga Street 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Unknown

Taupō South MVA

Figure 100. Taupō South 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Unknown

Fleet Street MVA

Figure 101. Fleet Street 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Unknown

Ohaaki MVA

Figure 102. Ohaaki 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Unknown

Te Toke MVA

Figure 103. Te Toke 33/11 kV zone substation: Apparent power (MVA) load characteristics.

3.5 Waipā Networks

Waipā Networks does not presently own subtransmission assets or zone substations, and it takes supply at 11 kV from the two GXPs in the area (Cambridge and Te Awamutu). As such, no load characteristics are shown for Waipā assets. Refer to the GXP graphs in Section 2 for these loads.

3.6 WEL Networks

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

- Figure 104. Avalon Dr 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 105. Borman 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 106. Bryce St 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 107. Chartwell 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 108. Claudelands 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 109. Cobham 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 110. Hoeka Rd 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 111. Latham Court 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 112. Peacockes Rd 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 113. Wallace Rd 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 114. Finlayson Rd 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 115. Glasgow St 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 116. Hampton Downs 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 117. Ngaruawahia 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 118. Te Kauwhata 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 119. Weavers 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 120. Gordonton 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 121. Horotiu 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 122. Kent St 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 123. Pukete 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 124. Raglan 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 125. Sandwich Rd 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 126. Tasman 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 127. Te Uku 33/11 kV zone substation: Apparent power (MVA) load characteristics.
- Figure 128. Whatawhata 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Avalon Dr MVA

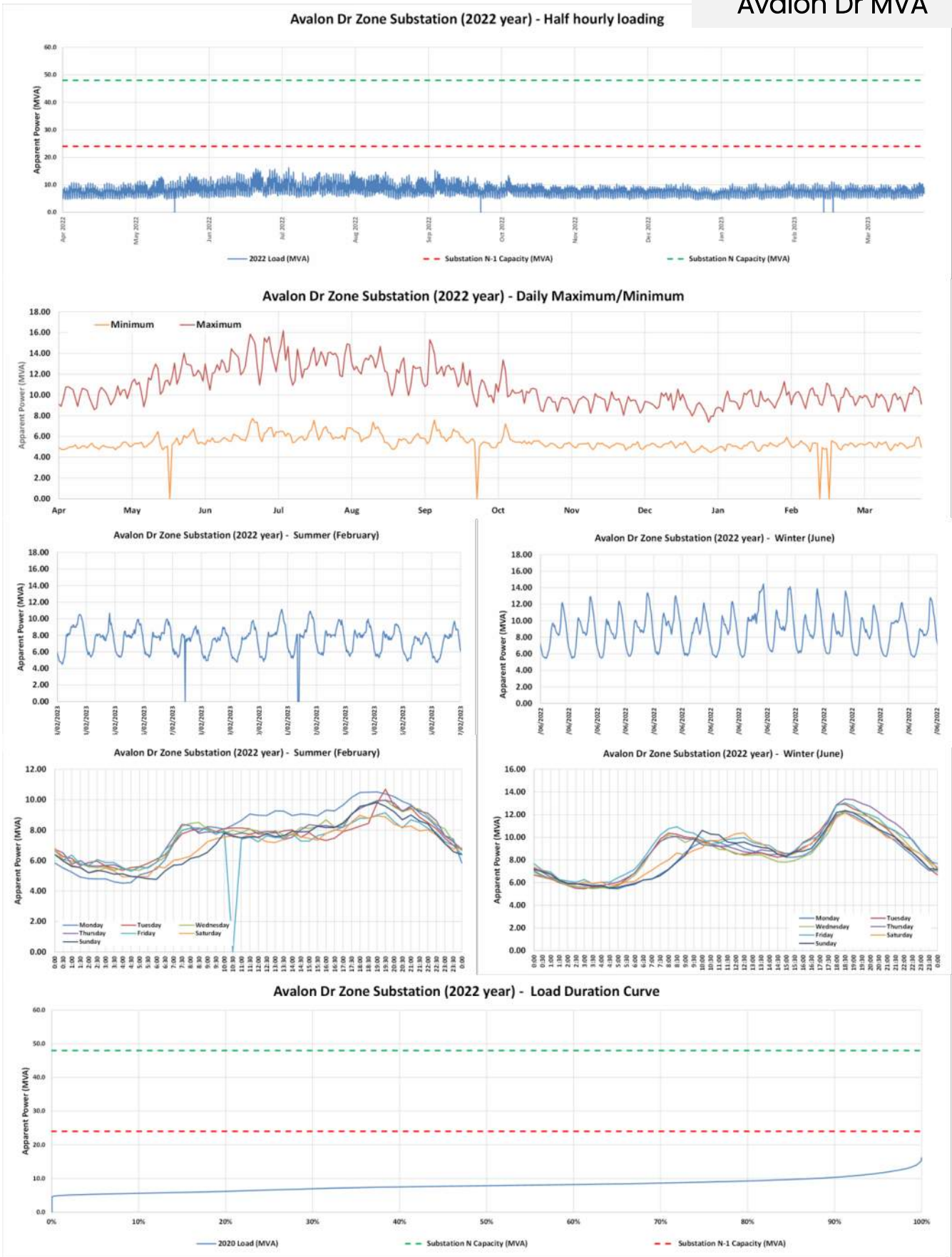


Figure 104. Avalon Dr 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Borman MVA

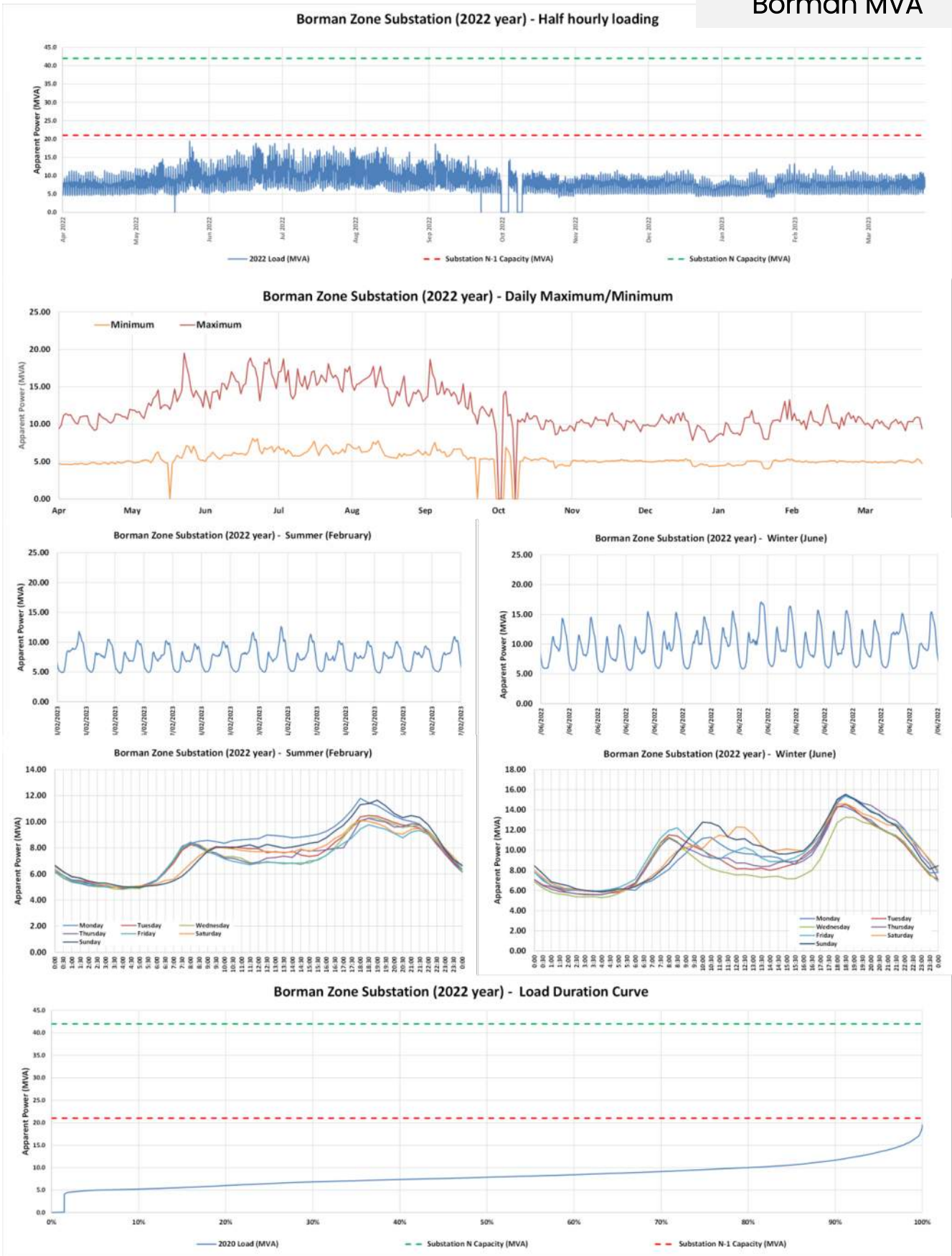


Figure 105. Borman 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Bryce St MVA

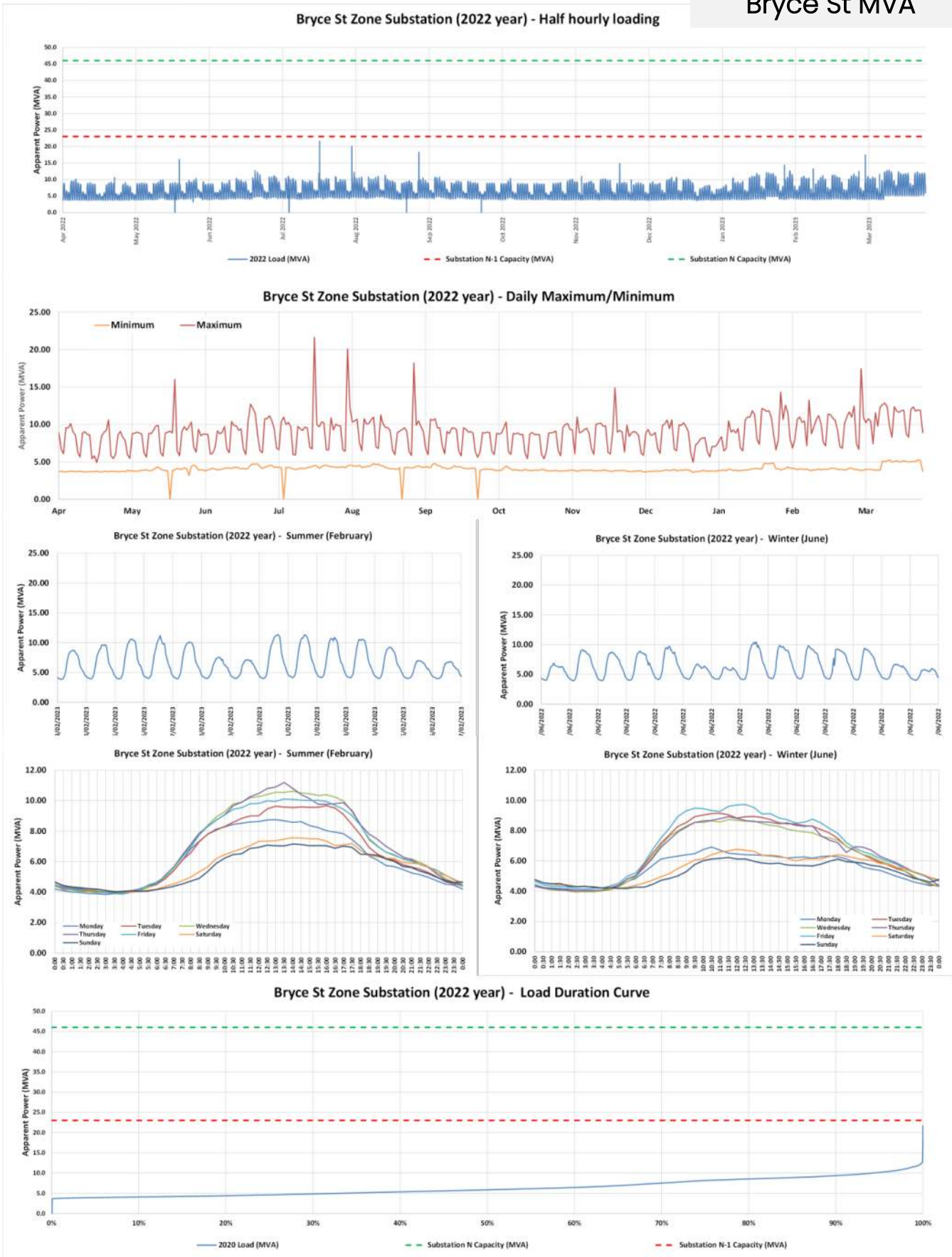


Figure 106. Bryce St 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Chartwell MVA

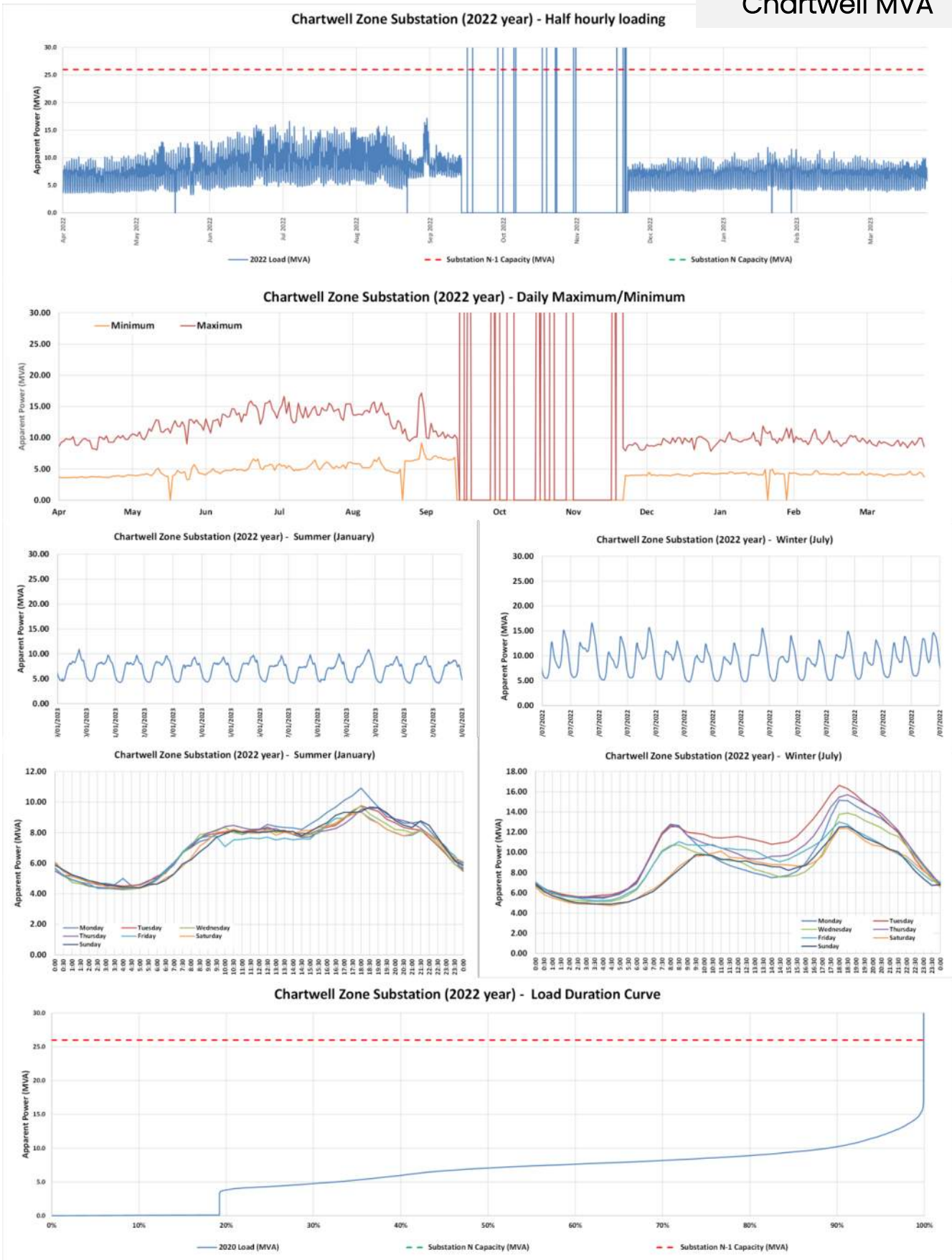


Figure 107. Chartwell 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Claudlands MVA

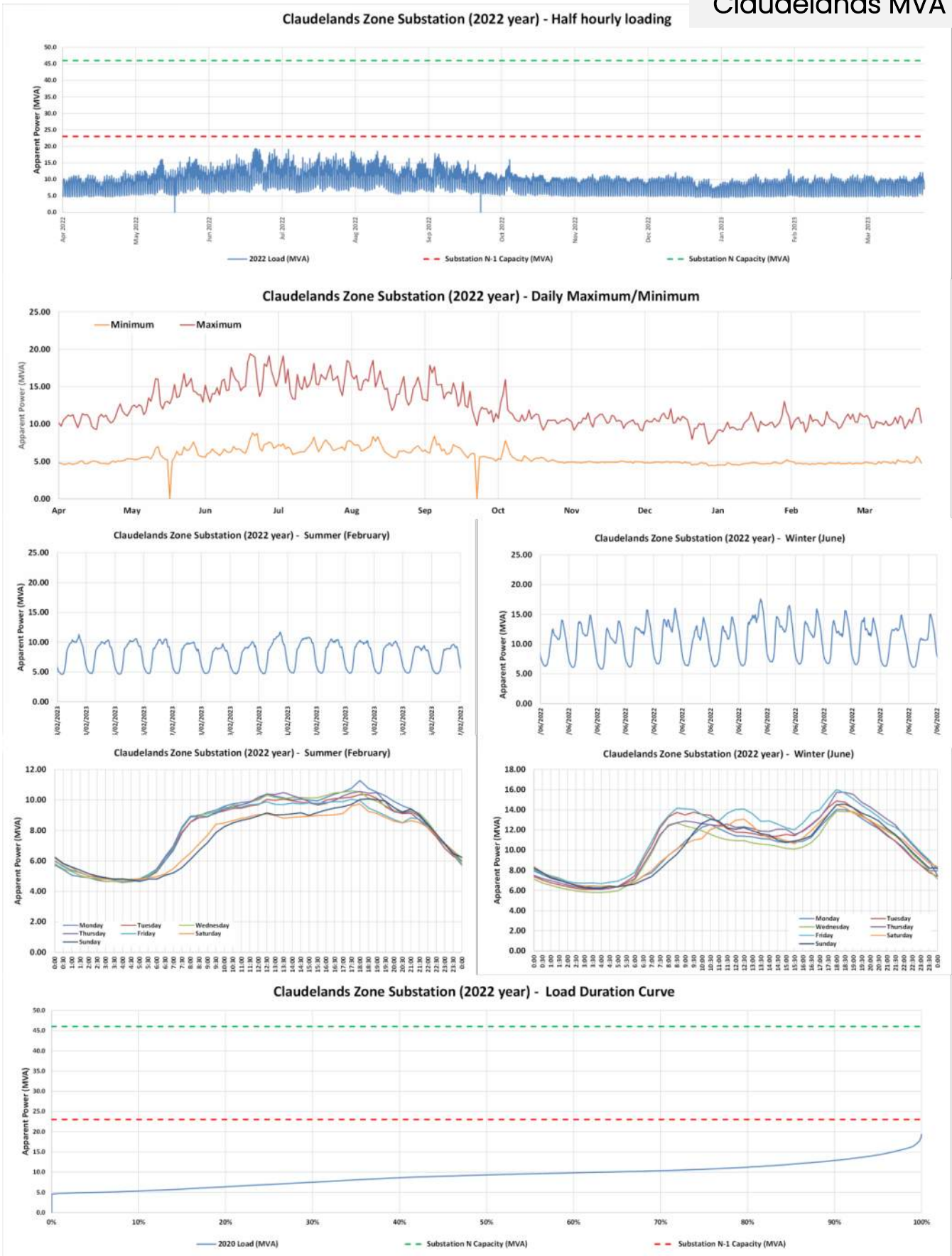


Figure 108. Claudlands 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Cobham MVA

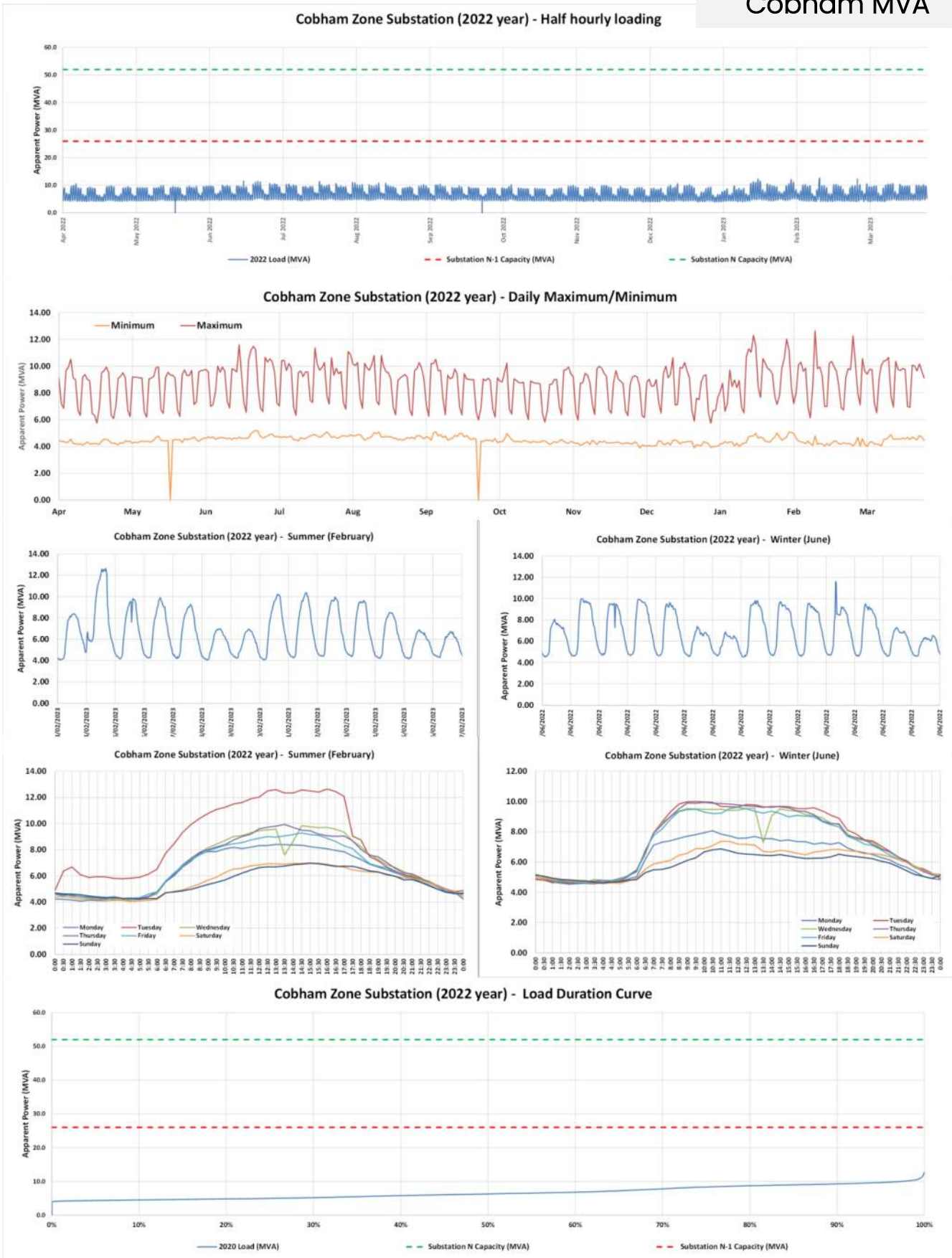


Figure 109. Cobham 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Hoeka Rd MVA

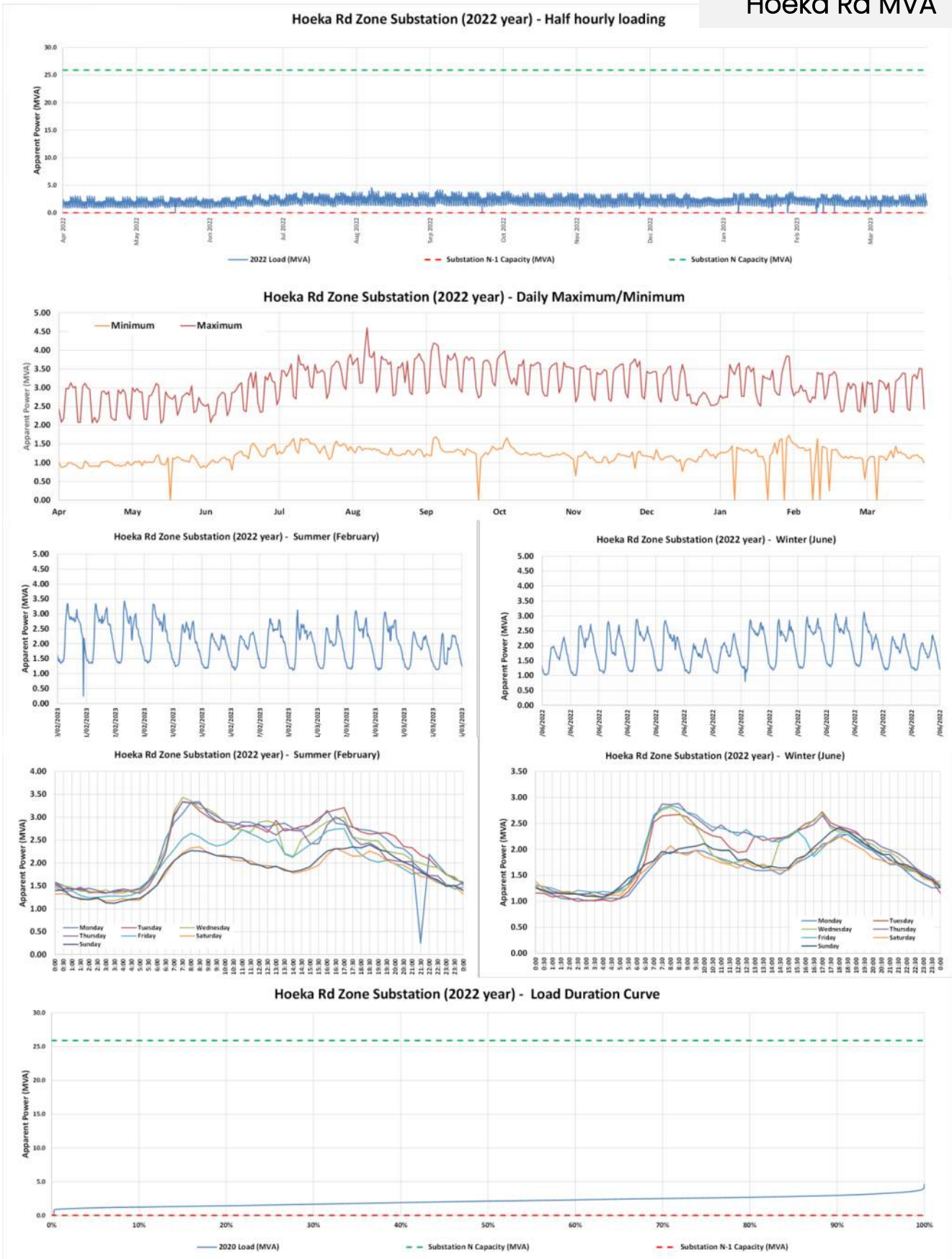


Figure 110. Hoeka Rd 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Latham Court MVA

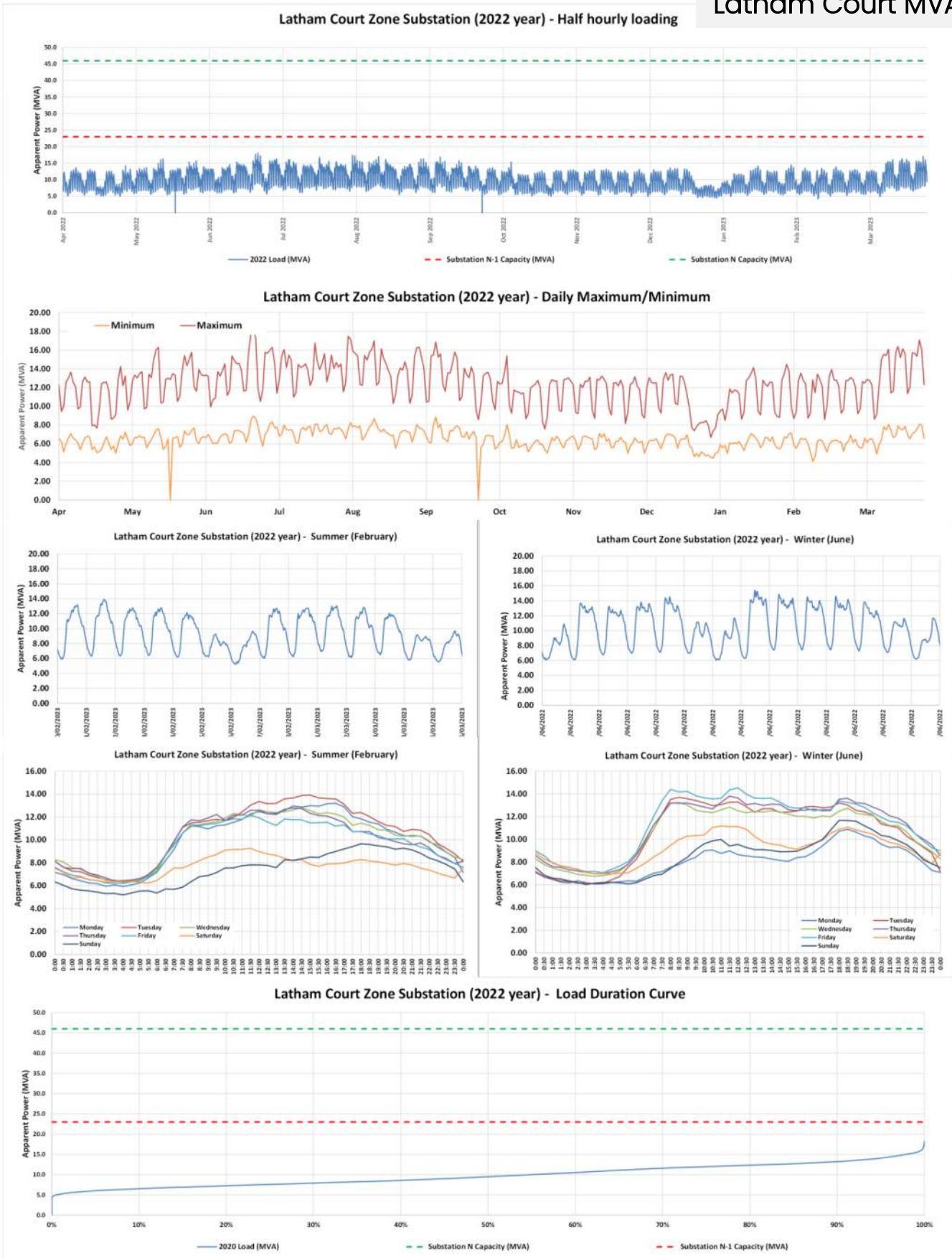


Figure III. Latham Court 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Peacocks Rd MVA

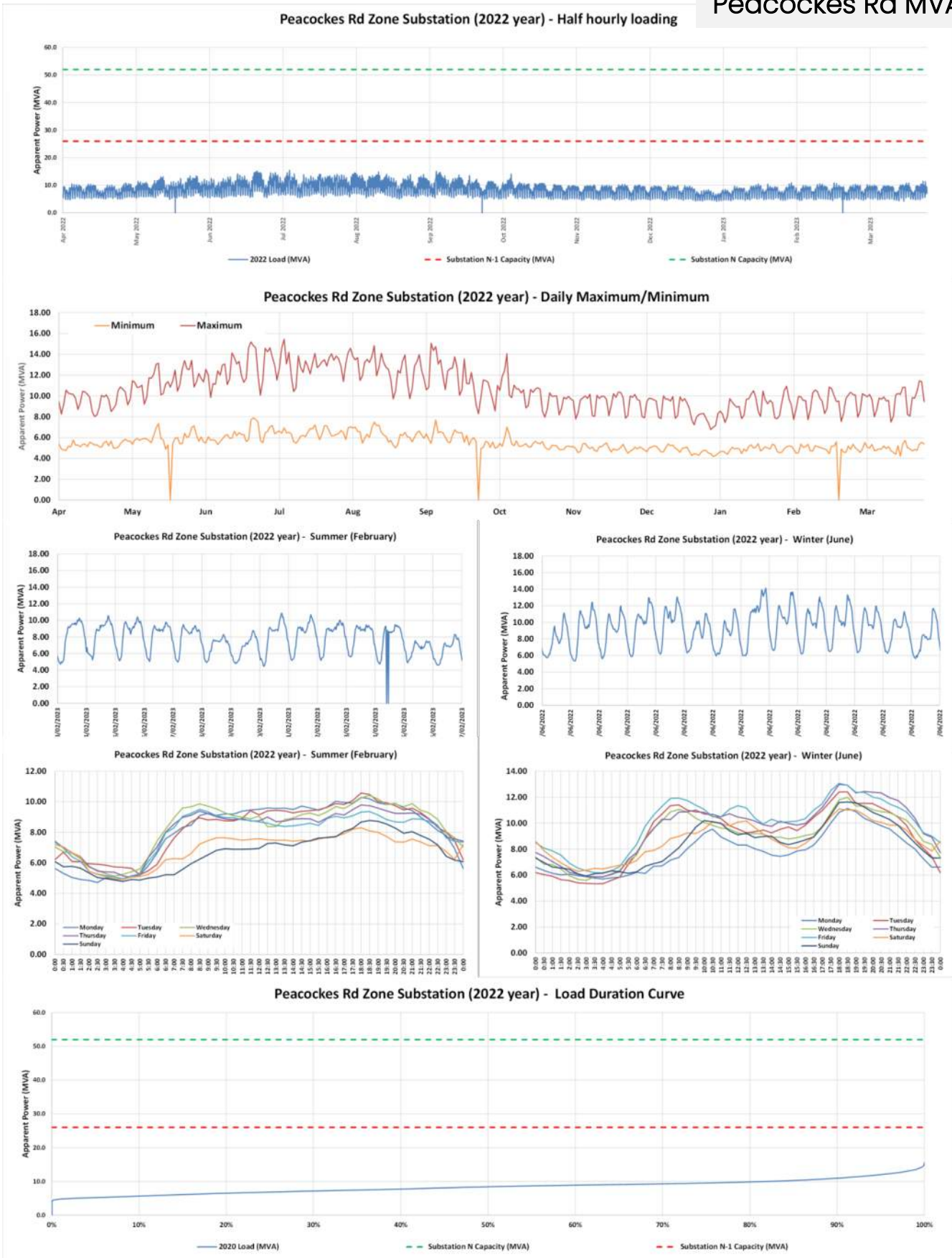


Figure 112. Peacocks Rd 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Wallace Rd MVA

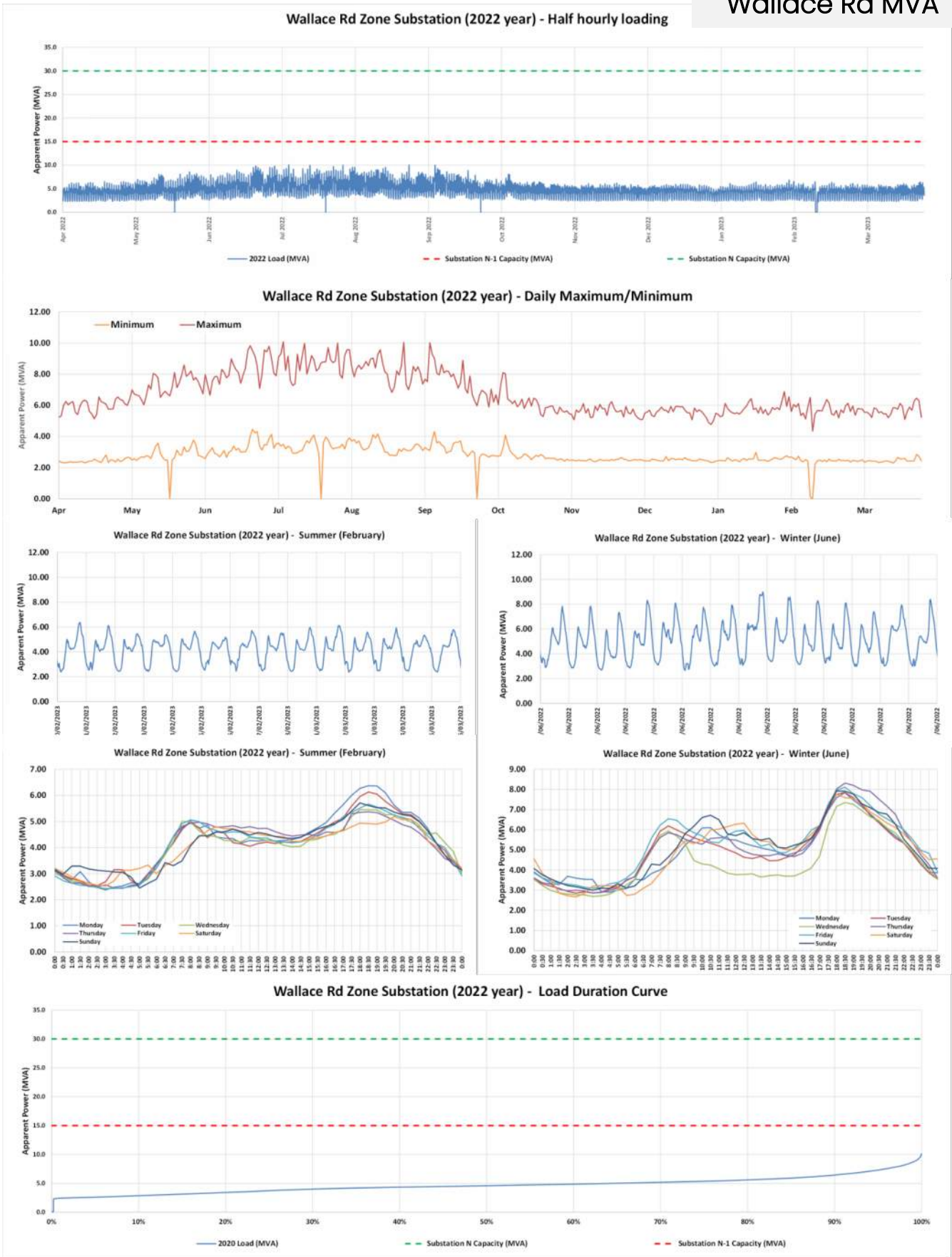


Figure 113. Wallace Rd 33/11 kv zone substation: Apparent power (MVA) load characteristics.

Finlayson Rd MVA

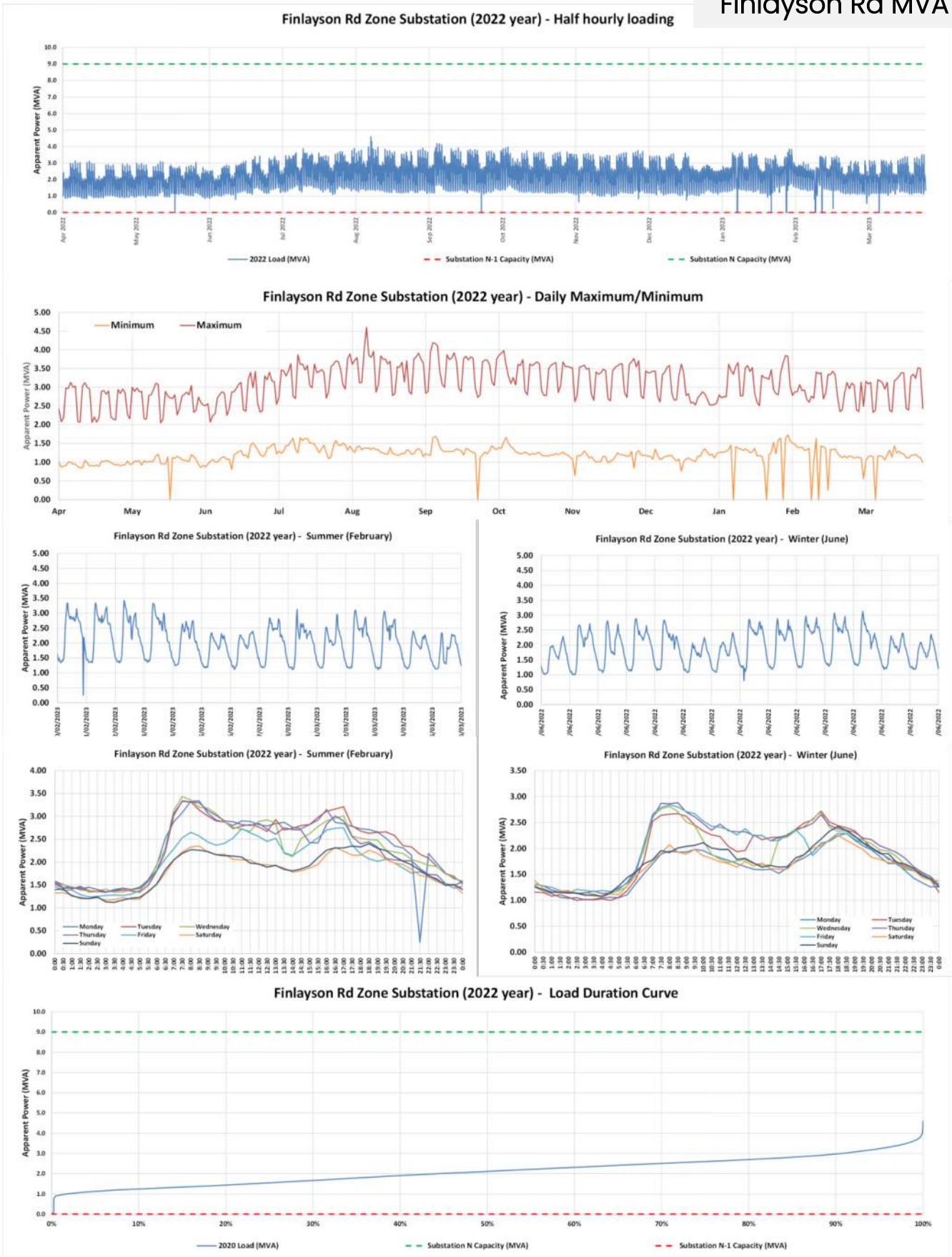


Figure 114. Finlayson Rd 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Glasgow St MVA

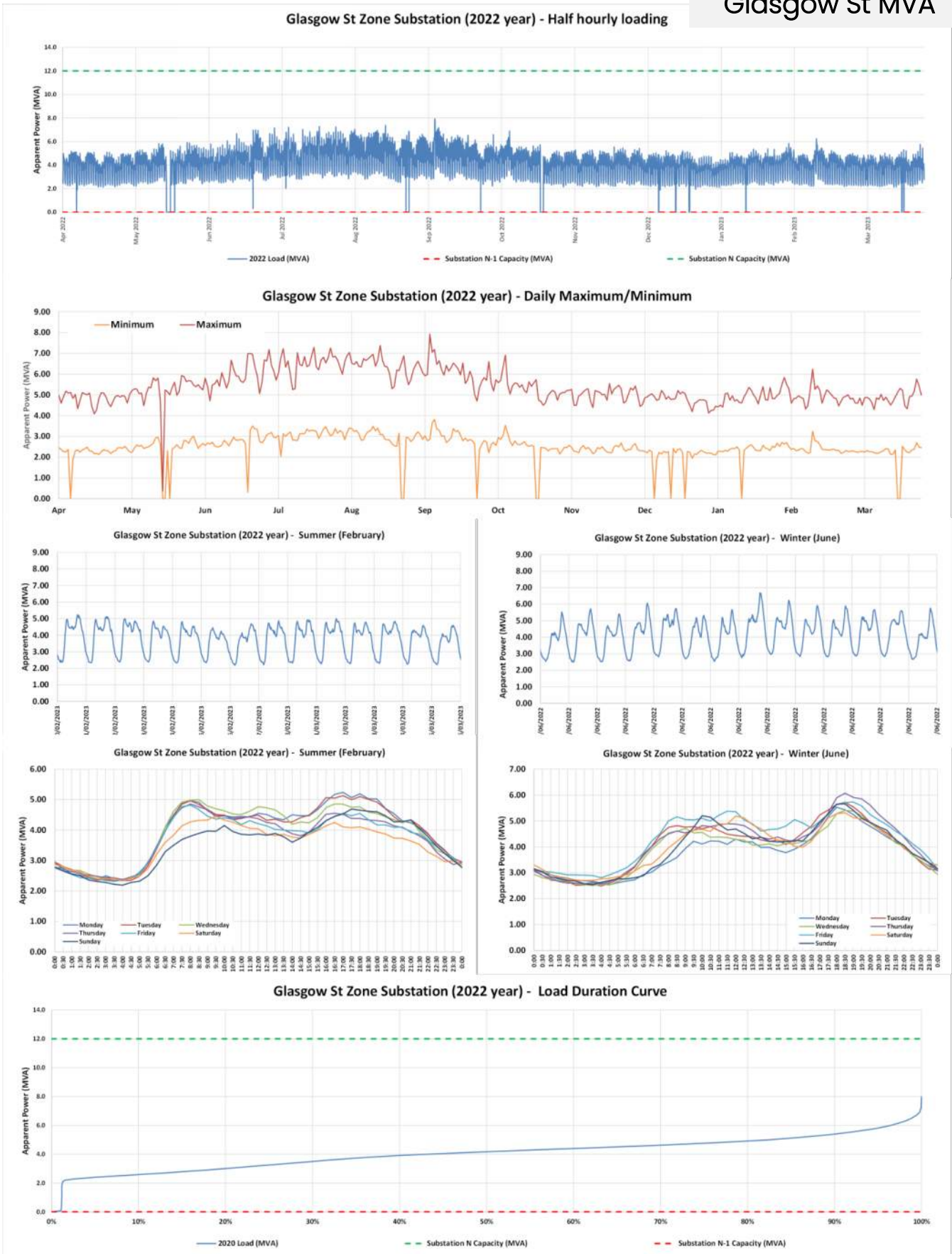


Figure 115. Glasgow St 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Hampton Downs MVA

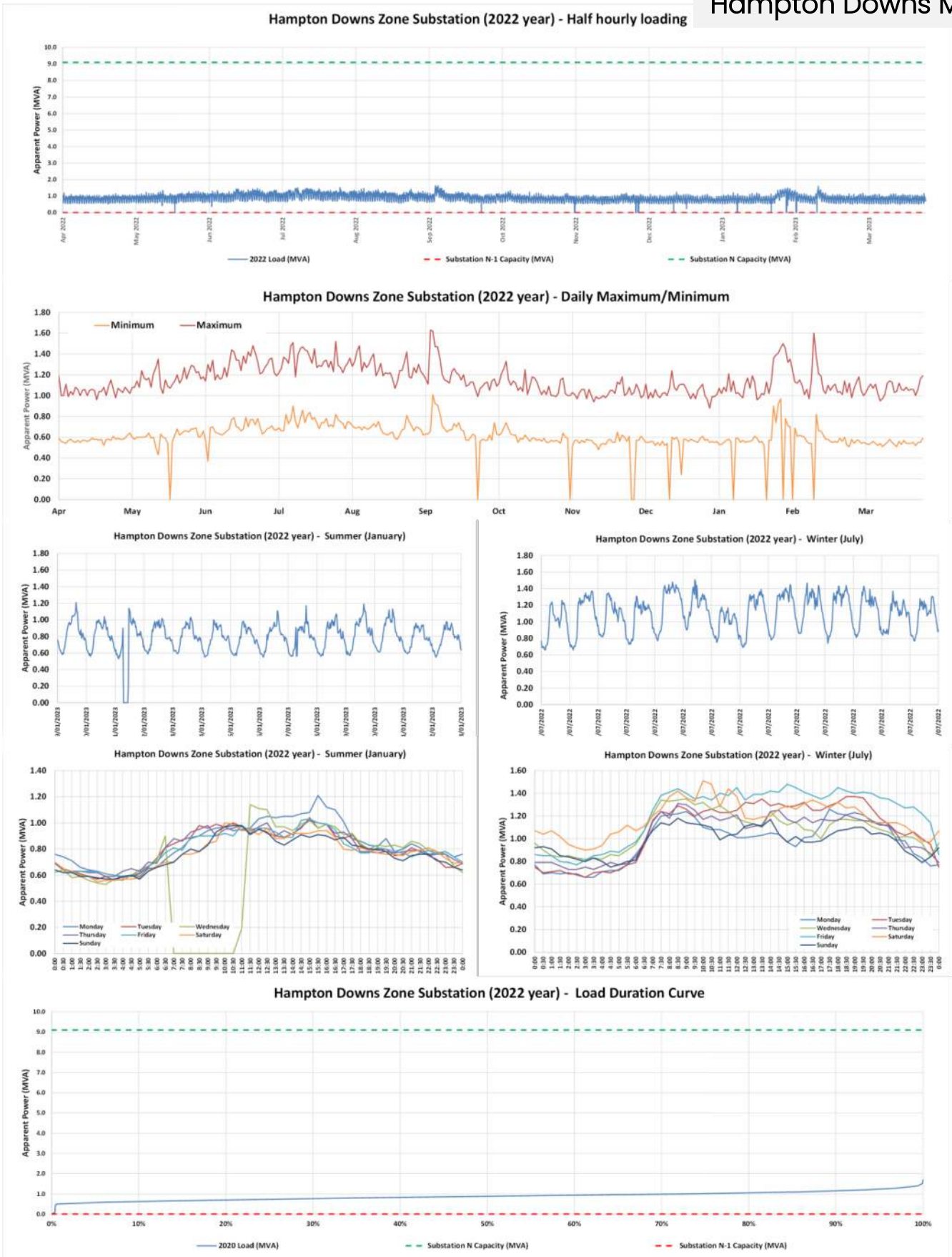


Figure 116. Hampton Downs 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Ngaruawahia MVA

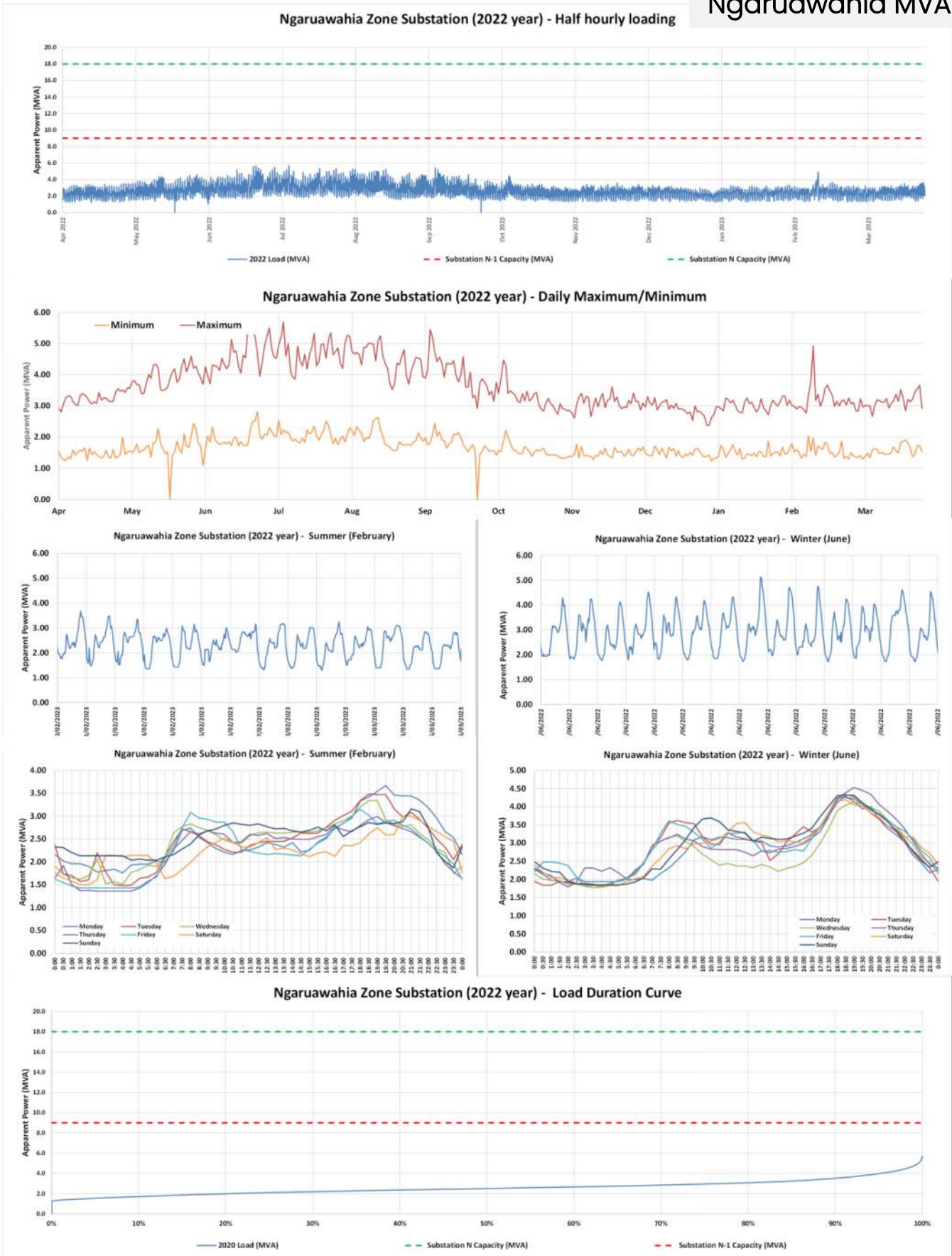


Figure 117. Ngaruawahia 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Te Kauwhata MVA

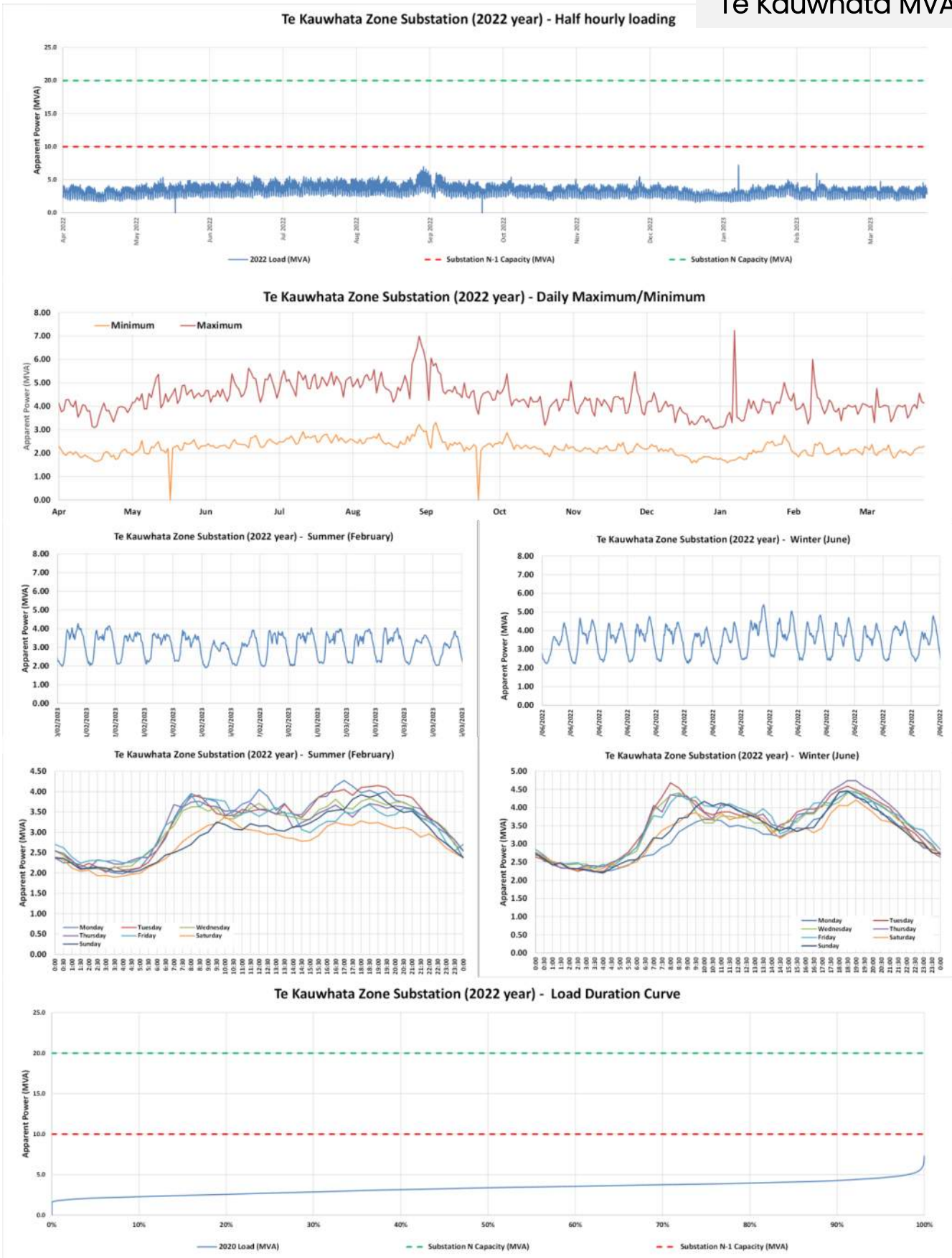


Figure 118. Te Kauwhata 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Weavers MVA

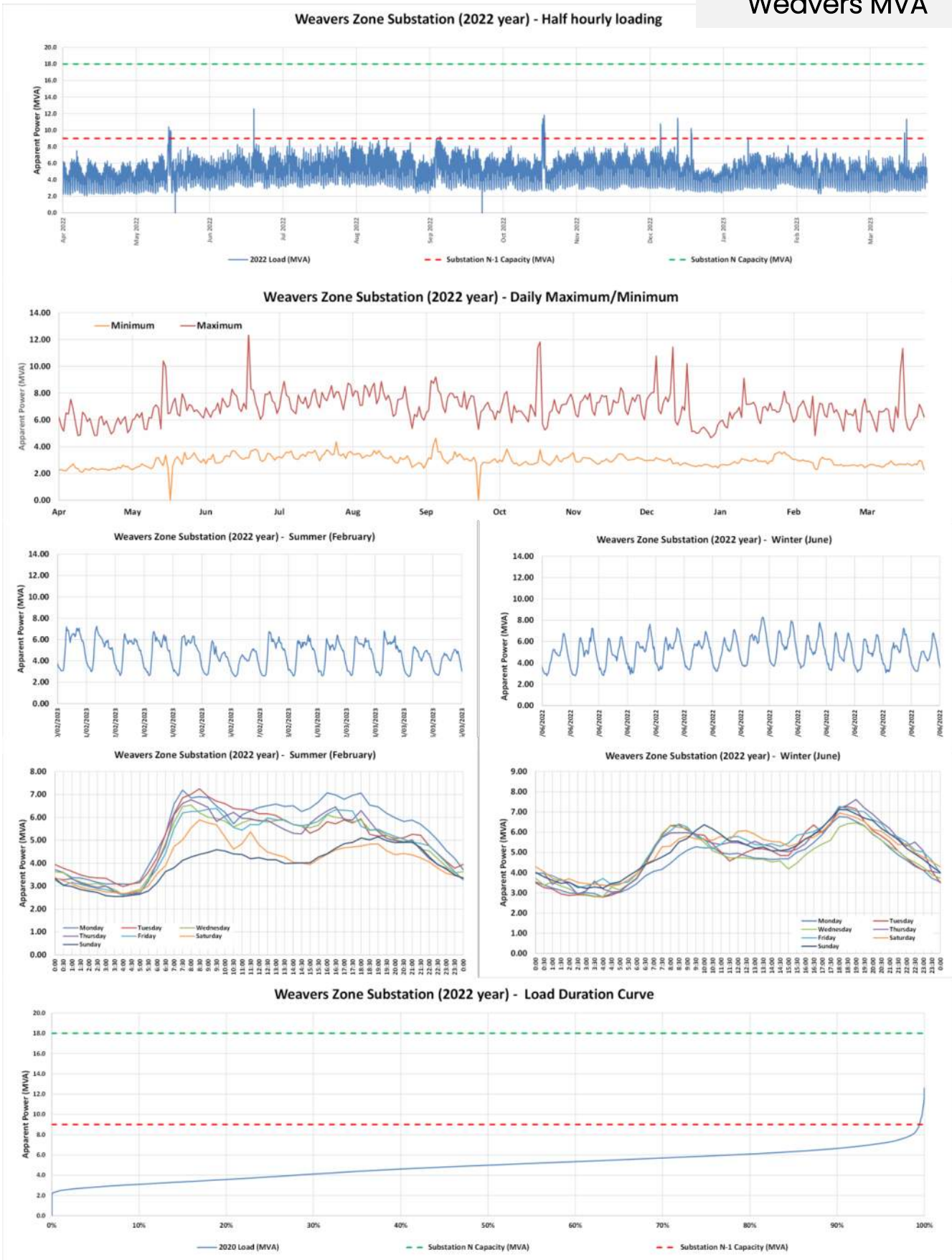


Figure 119. Weavers 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Gordonton MVA

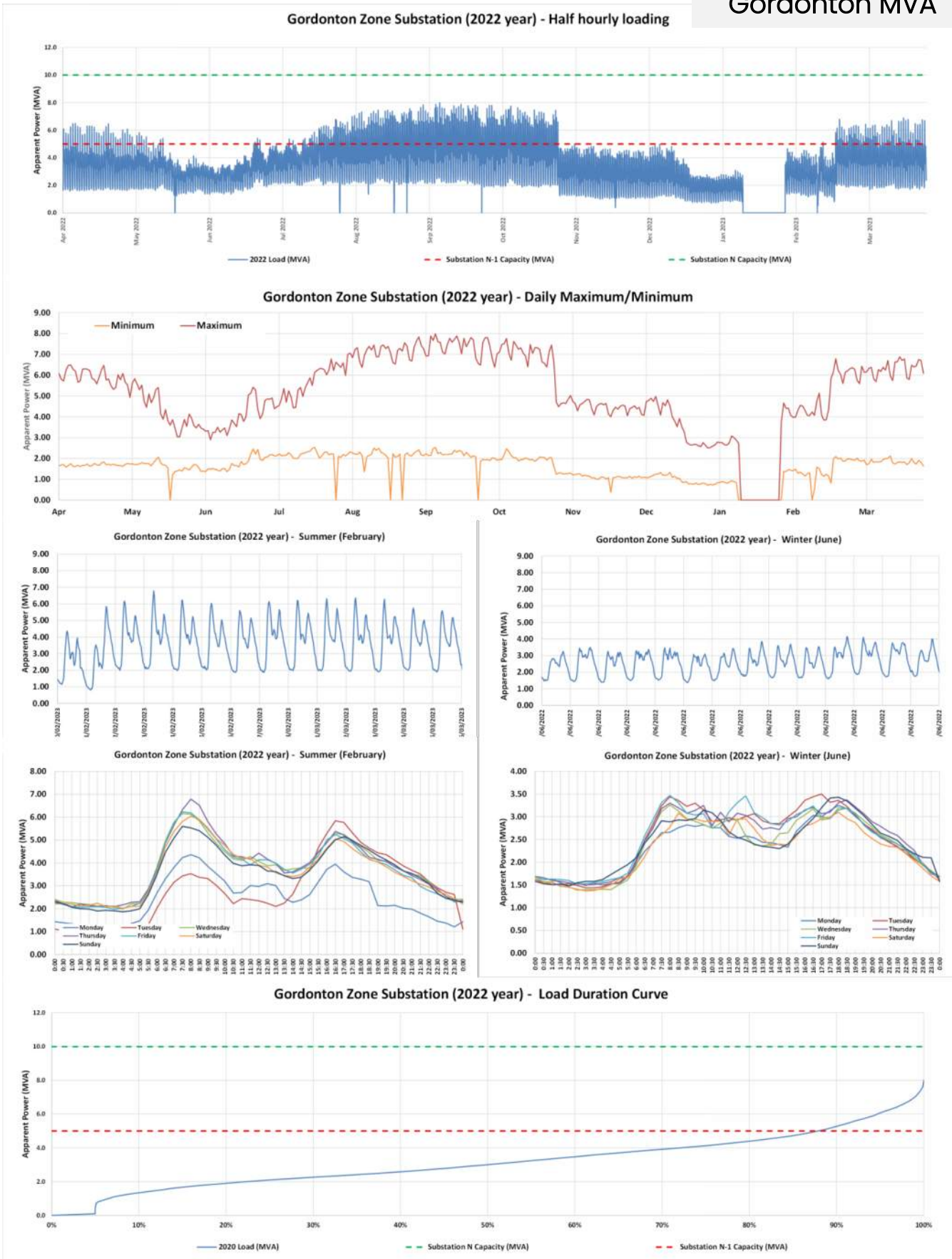


Figure 120. Gordonton 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Horotiu MVA

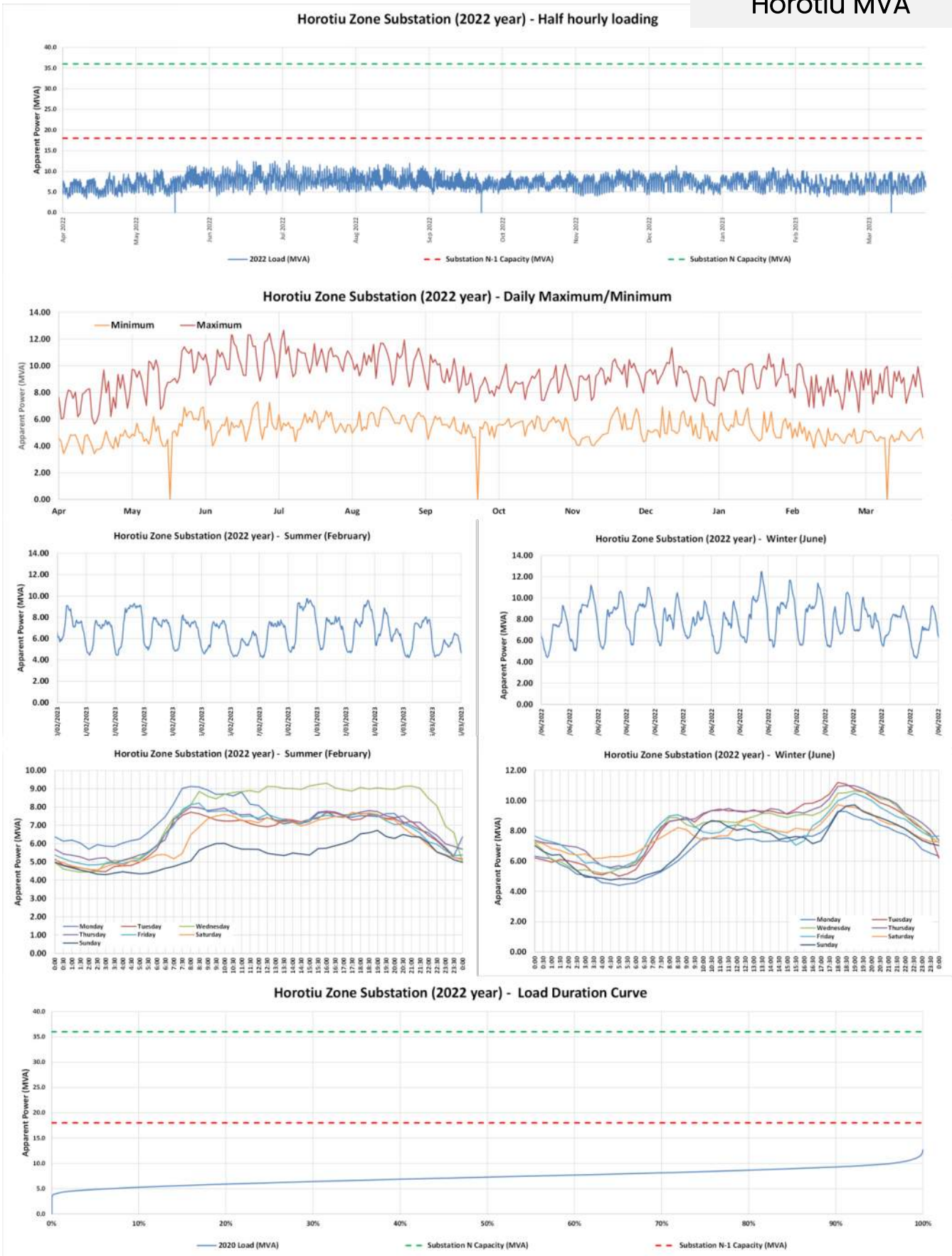


Figure 121. Horotiu 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Kent St MVA

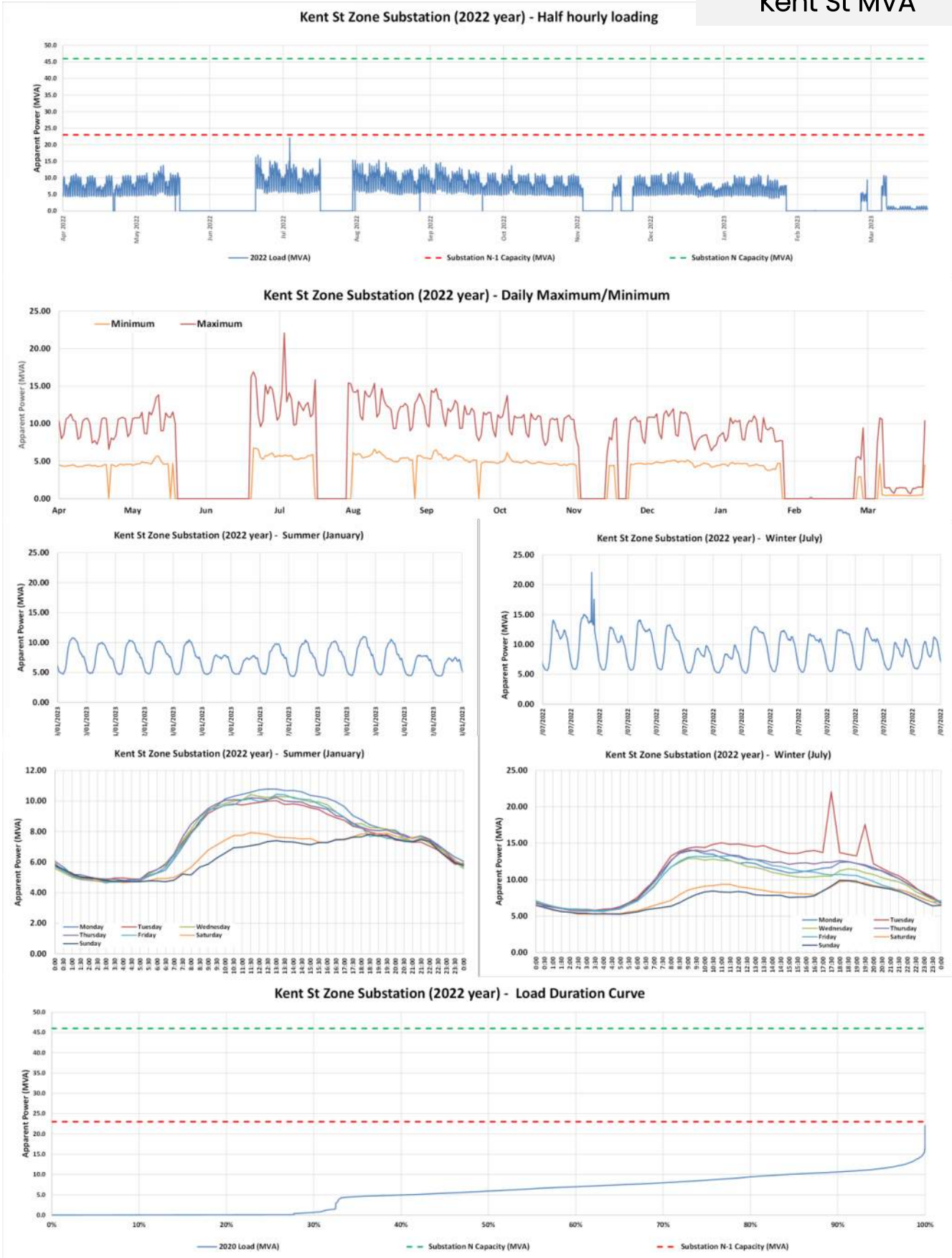


Figure 122. Kent St 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Pukete MVA

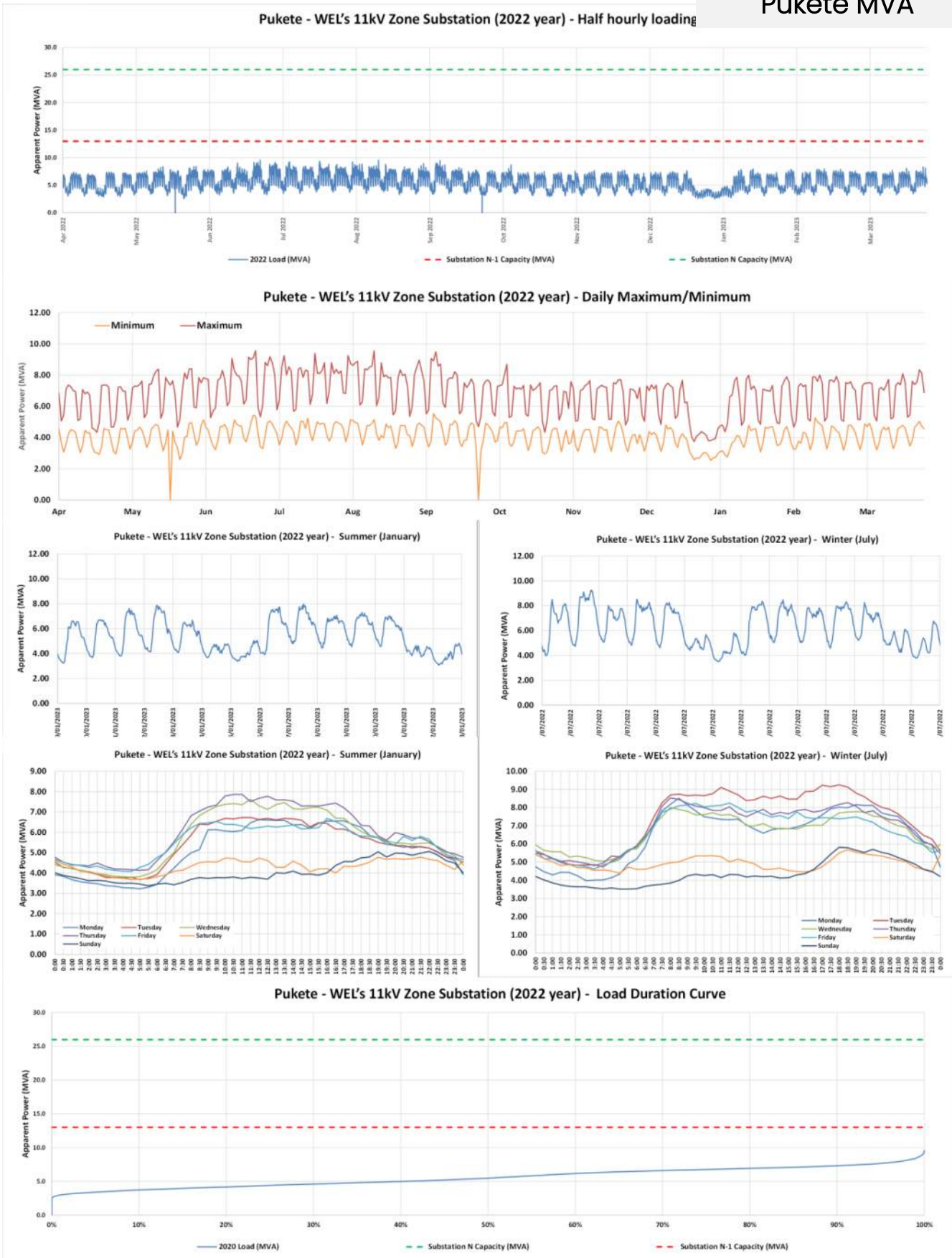


Figure 123. Pukete 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Raglan MVA

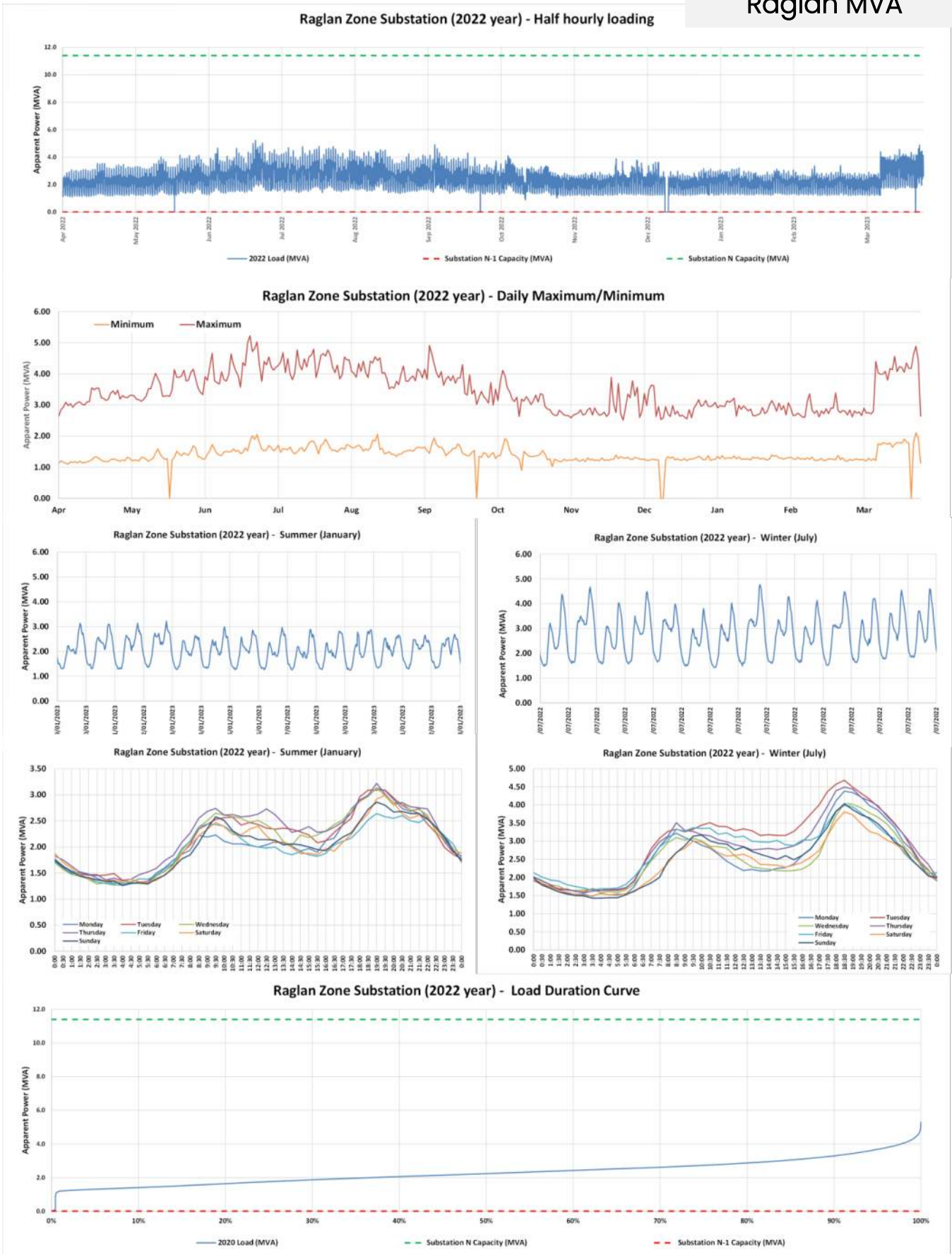


Figure 124. Raglan 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Sandwich Rd MVA

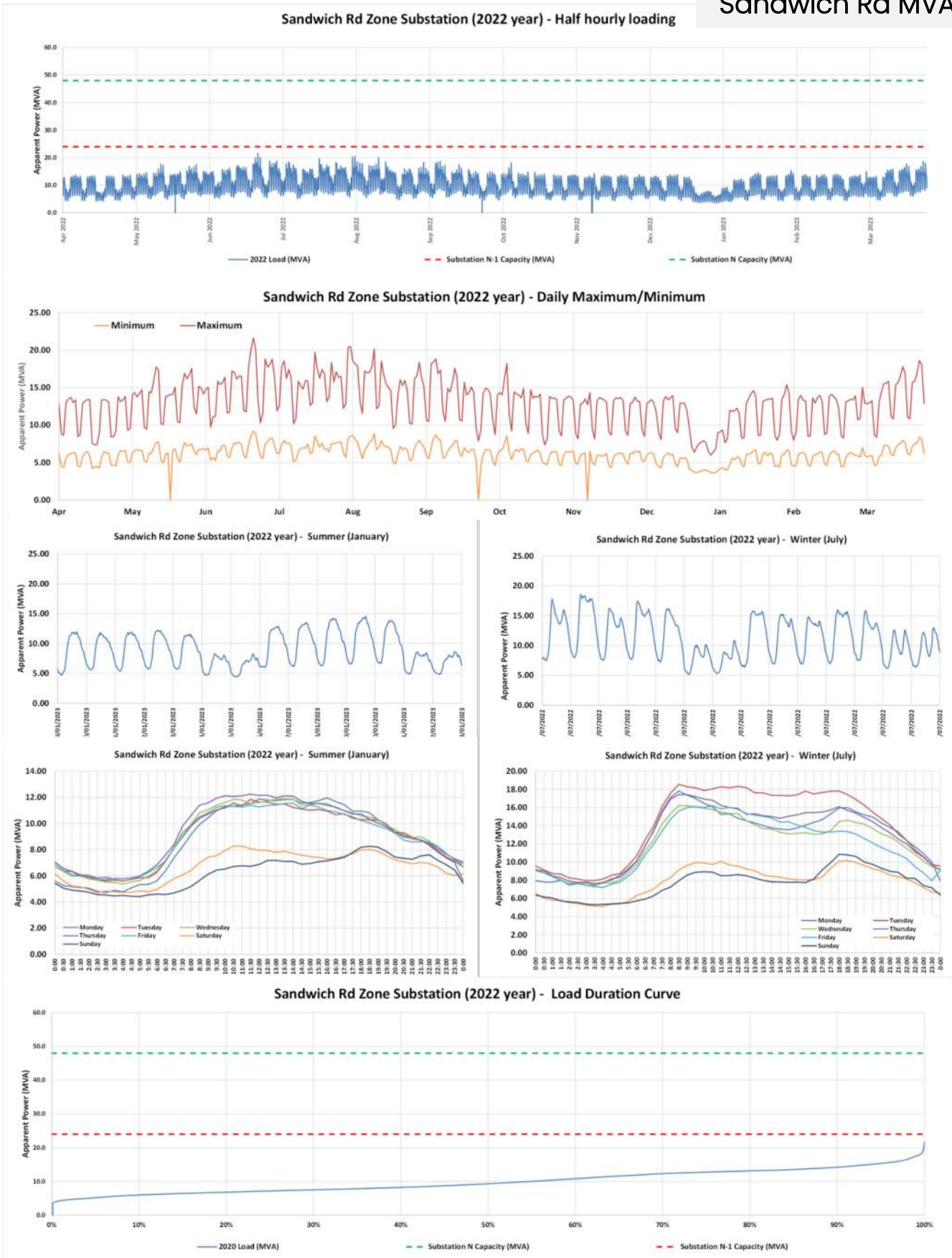


Figure 125. Sandwich Rd 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Tasman MVA

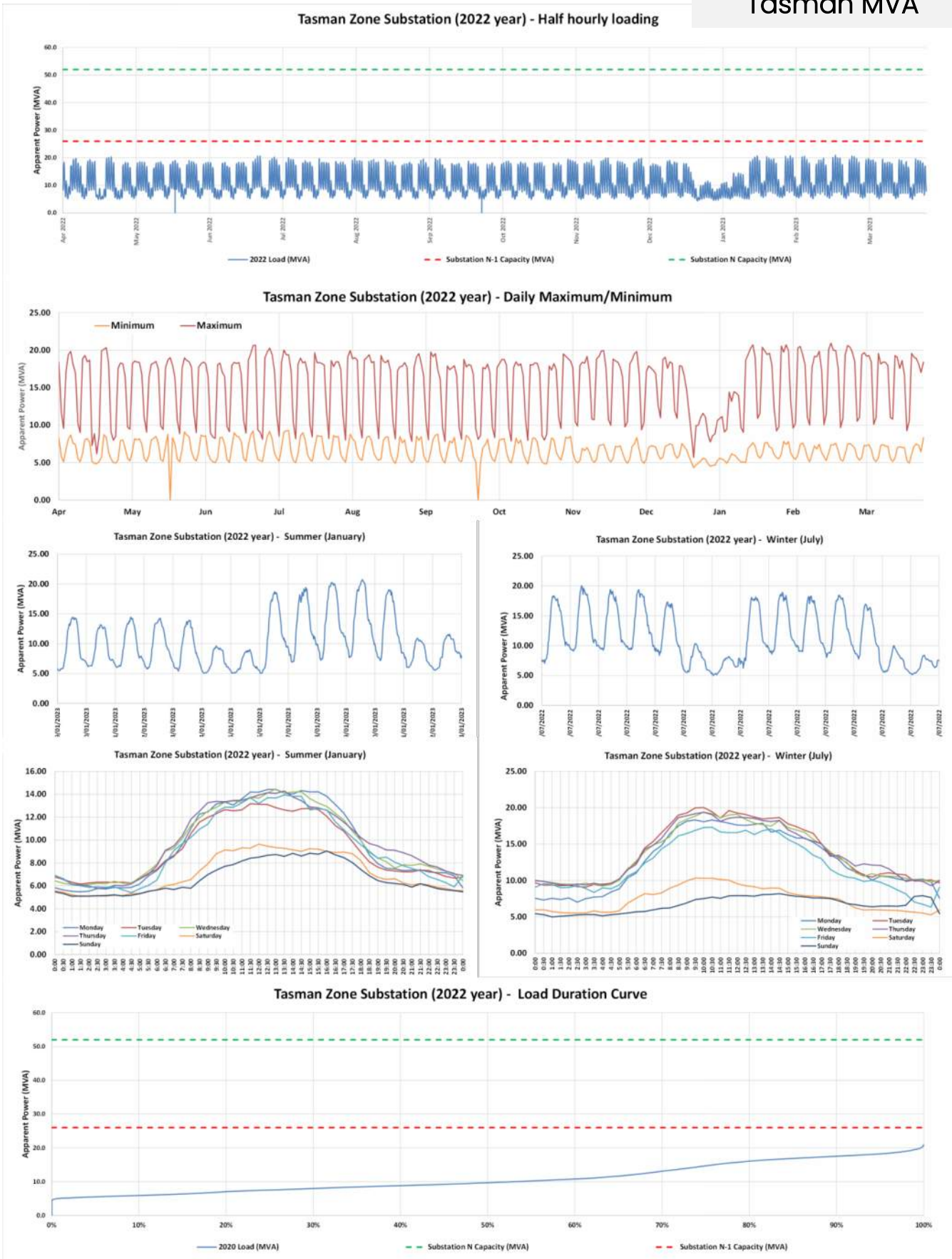


Figure 126. Tasman 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Te Uku MVA

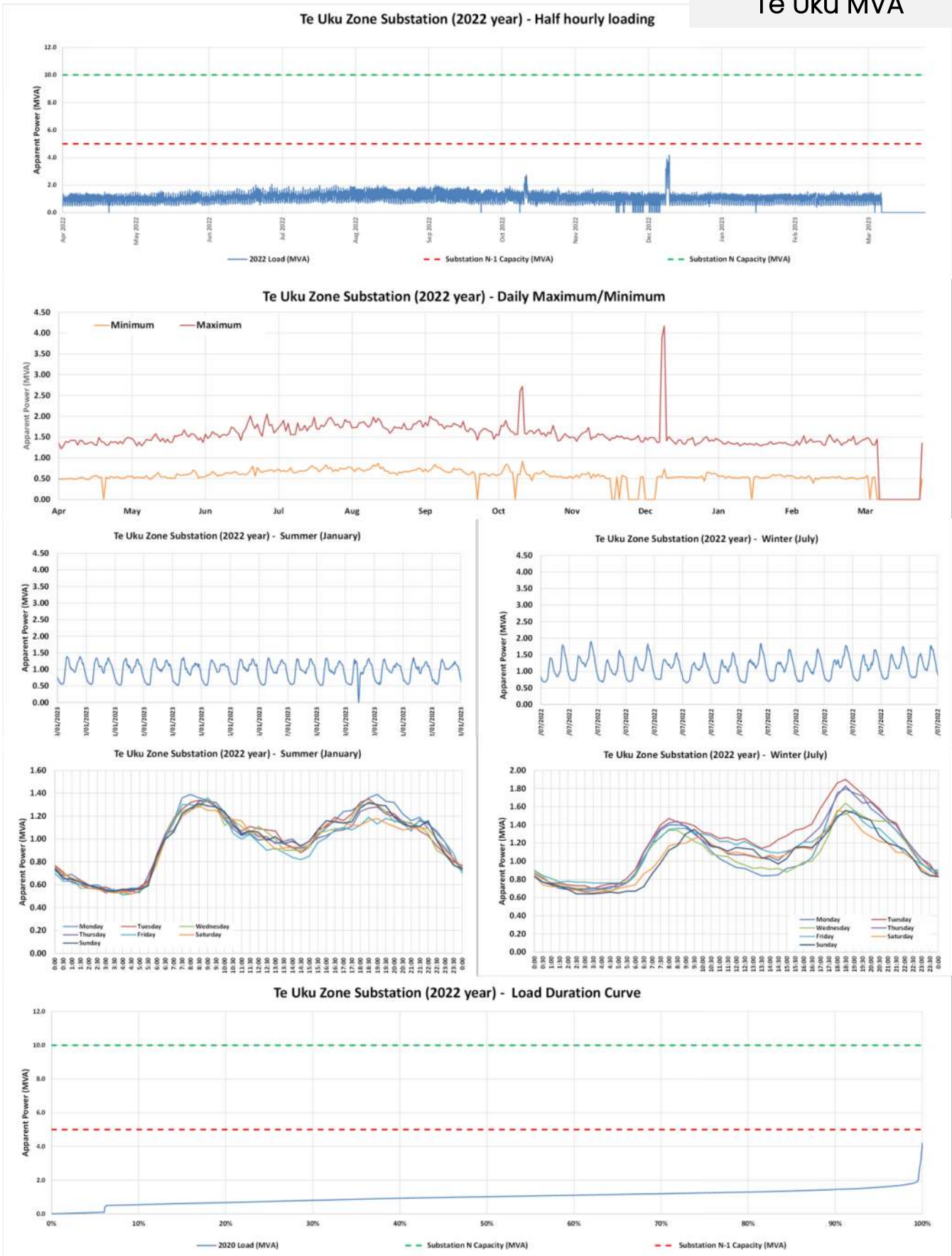


Figure 127. Te Uku 33/11 kV zone substation: Apparent power (MVA) load characteristics.

Whatawhata MVA

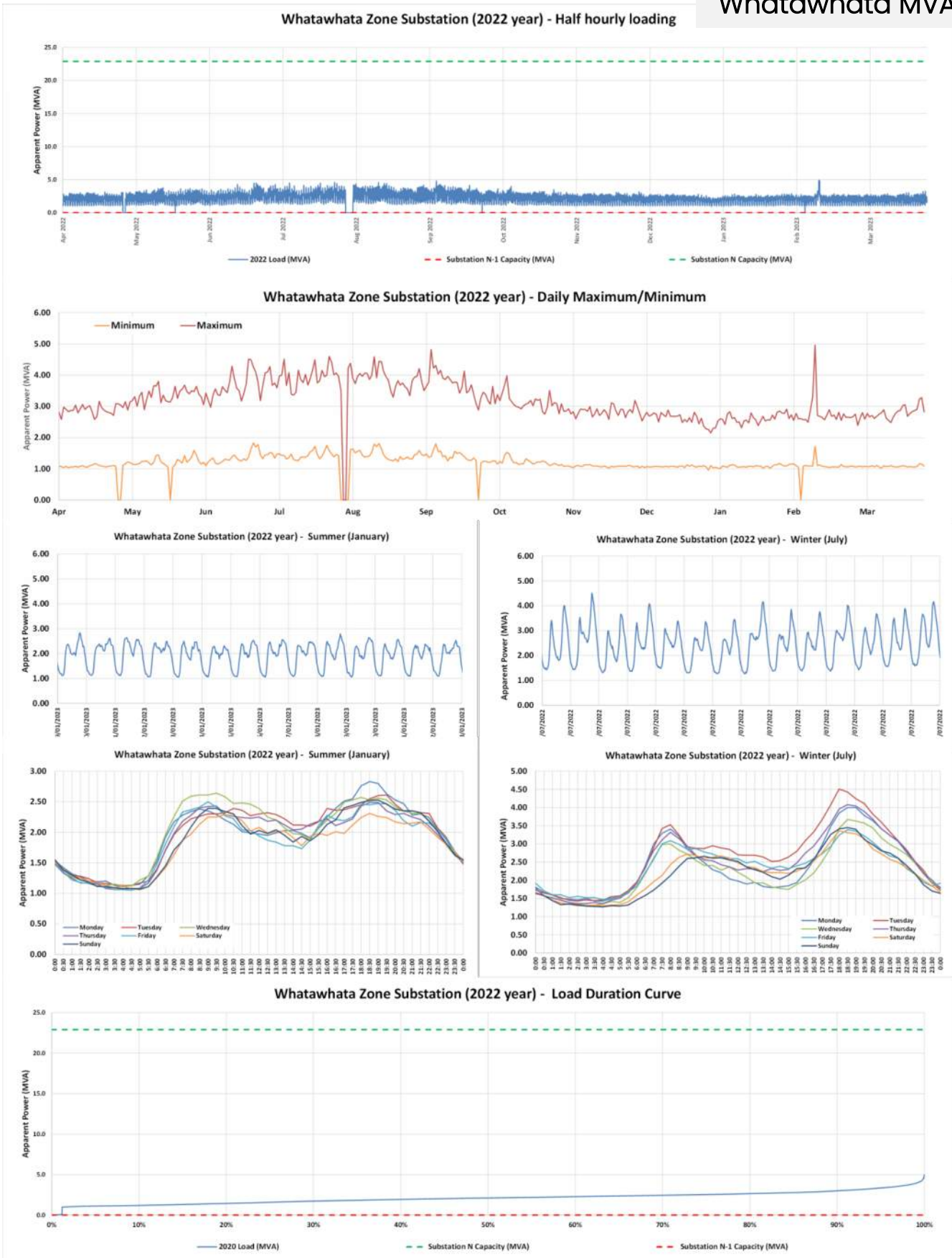


Figure 128. Whatawhata 33/11 kV zone substation: Apparent power (MVA) load characteristics.