



Nelson, Marlborough and Tasman

Supplementary Information - Substation Load Characteristics

EECA

22132 / 22132-RPT-0004 Revision A / 01-Jun-2023
INSPIRED. AGILE. GENUINE.

ERGO
CONSULTING

Document history and status

Revision	Date	Author	Reviewed by	Approved by	Status
A	01-06-2023	Caitlin Bergervoet	Richard Fairbairn	Kane Morison	Draft

Revision details

Revision	Details
A	Supplementary document created to reduce size of overall “spare capacity and load conversion opportunity report”

Table of Contents

1.	Introduction	1
2.	Transmission/GXP Substations.....	2
3.	Zone Substations	13
3.1	Nelson Electricity.....	13
3.2	Network Tasman.....	15
3.3	Marlborough Lines.....	29

List of Figures

Figure 1 Blenheim: Apparent power (MVA) load characteristics.....	3
Figure 2 Blenheim: Reactive power (MVAr) load characteristics.....	4
Figure 3 Kikiwa: Apparent power (MVA) load characteristics.....	5
Figure 4 Kikiwa: Reactive power (MVAr) load characteristics.....	6
Figure 5 Murchison: Apparent power (MVA) load characteristics.....	7
Figure 6 Murchison: Reactive power (MVAr) load characteristics.....	8
Figure 7 Stoke_33kV: Apparent power (MVA) load characteristics	9
Figure 8 Stoke_33kV: Reactive power (MVAr) load characteristics.....	10
Figure 9 Stoke_66kV: Apparent power (MVA) load characteristics	11
Figure 10 Stoke_66kV: Reactive power (MVAr) load characteristics	12
Figure 11 Haven Road 33/11kV zone substation: Apparent power (MVA) load characteristics.....	14
Figure 12 Annesbrook 33/11kV zone substation: Apparent power (MVA) load characteristics	16
Figure 13 Brightwater 33/11kV zone substation: Apparent power (MVA) load characteristics.....	17
Figure 14 Eves Valley 33/11kV zone substation: Apparent power (MVA) load characteristics	18
Figure 15 Founders 33/11kV zone substation: Apparent power (MVA) load characteristics	19
Figure 16 Mapua 33/11kV zone substation: Apparent power (MVA) load characteristics	20
Figure 17 Motueka 33/11kV zone substation: Apparent power (MVA) load characteristics	21
Figure 18 Richmond 33/11kV zone substation: Apparent power (MVA) load characteristics.....	22
Figure 19 Songer 33/11kV zone substation: Apparent power (MVA) load characteristics.....	23
Figure 20 St Hope 33/11kV zone substation: Apparent power (MVA) load characteristics	24
Figure 21 Swamp Road 33/11kV zone substation: Apparent power (MVA) load characteristics.....	25
Figure 22 Takaka 33/11kV zone substation: Apparent power (MVA) load characteristics.....	26
Figure 23 Upper Takaka 33/11kV zone substation: Apparent power (MVA) load characteristics.....	27
Figure 24 Wakapuaka 33/11kV zone substation: Apparent power (MVA) load characteristics	28
Figure 25 Cloudy bay 33/11kV zone substation: Apparent power (MVA) load characteristics	30
Figure 26 Havelock 33/11kV zone substation: Apparent power (MVA) load characteristics	31
Figure 27 Leefield 33/11kV zone substation: Apparent power (MVA) load characteristics	32
Figure 28 Linkwater 33/11kV zone substation: Apparent power (MVA) load characteristics	33

Figure 29	Nelson Street 33/11kV zone substation: Apparent power (MVA) load characteristics	34
Figure 30	Picton 33/11kV zone substation: Apparent power (MVA) load characteristics.....	35
Figure 31	Rai Valley 33/11kV zone substation: Apparent power (MVA) load characteristics	36
Figure 32	Redwoodtown 33/11kV zone substation: Apparent power (MVA) load characteristics	37
Figure 33	Riverlands 33/11kV zone substation: Apparent power (MVA) load characteristics	38
Figure 34	Seddon 33/11kV zone substation: Apparent power (MVA) load characteristics.....	39
Figure 35	Spring Creek 33/11kV zone substation: Apparent power (MVA) load characteristics.....	40
Figure 36	Springlands 33/11kV zone substation: Apparent power (MVA) load characteristics	41
Figure 37	Tapp 33/11kV zone substation: Apparent power (MVA) load characteristics.....	42
Figure 38	Ward 33/11kV zone substation: Apparent power (MVA) load characteristics	43
Figure 39	Waters 33/11kV zone substation: Apparent power (MVA) load characteristics	44
Figure 40	Woodbourne 33/11kV zone substation: Apparent power (MVA) load characteristics	45

1. Introduction

The following figures illustrate the characteristics of the major electrical substations (both GXPs and Zone Substations) in the Nelson, Marlborough and Tasman region. This document supplements the main report titled “Nelson, Marlborough and Tasman Network – Spare Capacity and Load Conversion Opportunity Report”.

For each GXP, the January 2022 through December 2022 apparent (MVA) and reactive loadings (MVAr) are presented. For each Zone Substation, the apparent (MVA) 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:

- **Blenheim GXP**
 - Figure 1 Blenheim: Apparent power (MVA) load characteristics
 - Figure 2 Blenheim: Reactive power (MVAr) load characteristics
- **Kikiwa GXP**
 - Figure 3 Kikiwa: Apparent power (MVA) load characteristics
 - Figure 4 Kikiwa: Reactive power (MVAr) load characteristics
- **Murchison GXP**
 - Figure 5 Murchison: Apparent power (MVA) load characteristics
 - Figure 6 Murchison: Reactive power (MVAr) load characteristics
- **Stoke_33kV GXP**
 - Figure 7 Stoke_33kV: Apparent power (MVA) load characteristics
 - Figure 8 Stoke_33kV: Reactive power (MVAr) load characteristics
- **Stoke_66kV GXP**
 - Figure 9 Stoke_66kV: Apparent power (MVA) load characteristics
 - Figure 10 Stoke_66kV: Reactive power (MVAr) load characteristics

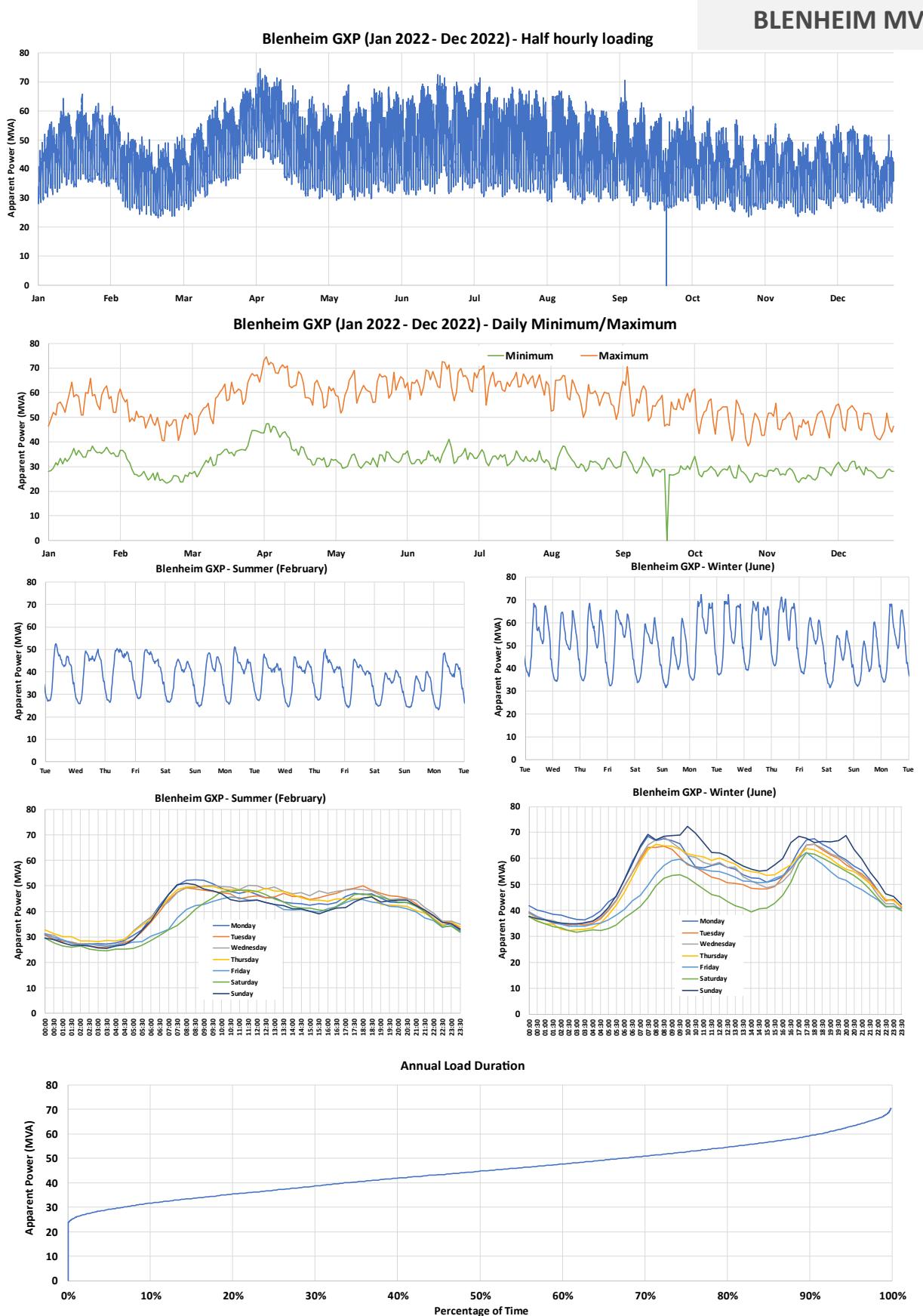


Figure 1 Blenheim: Apparent power (MVA) load characteristics

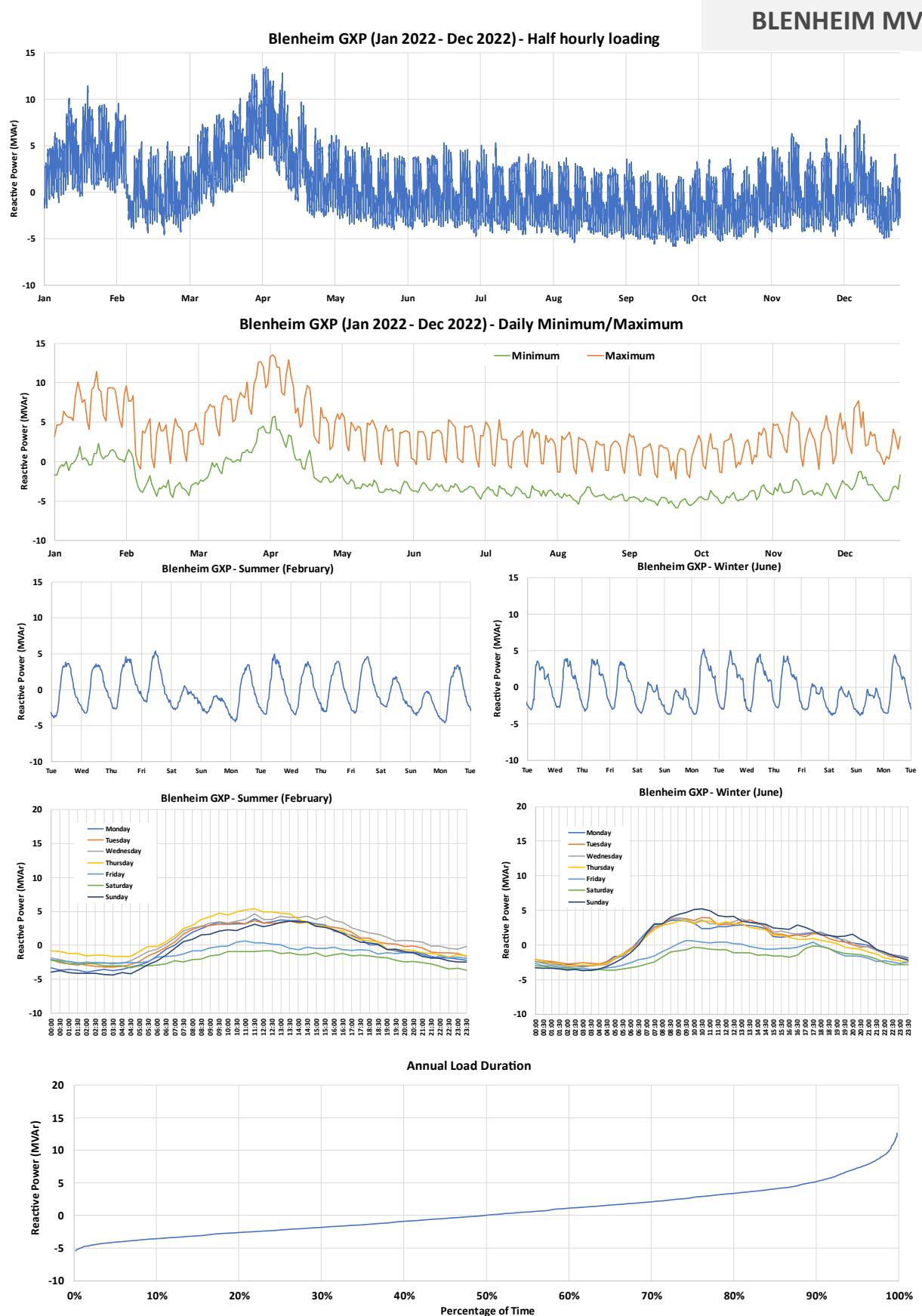


Figure 2 Blenheim: Reactive power (MVAr) load characteristics

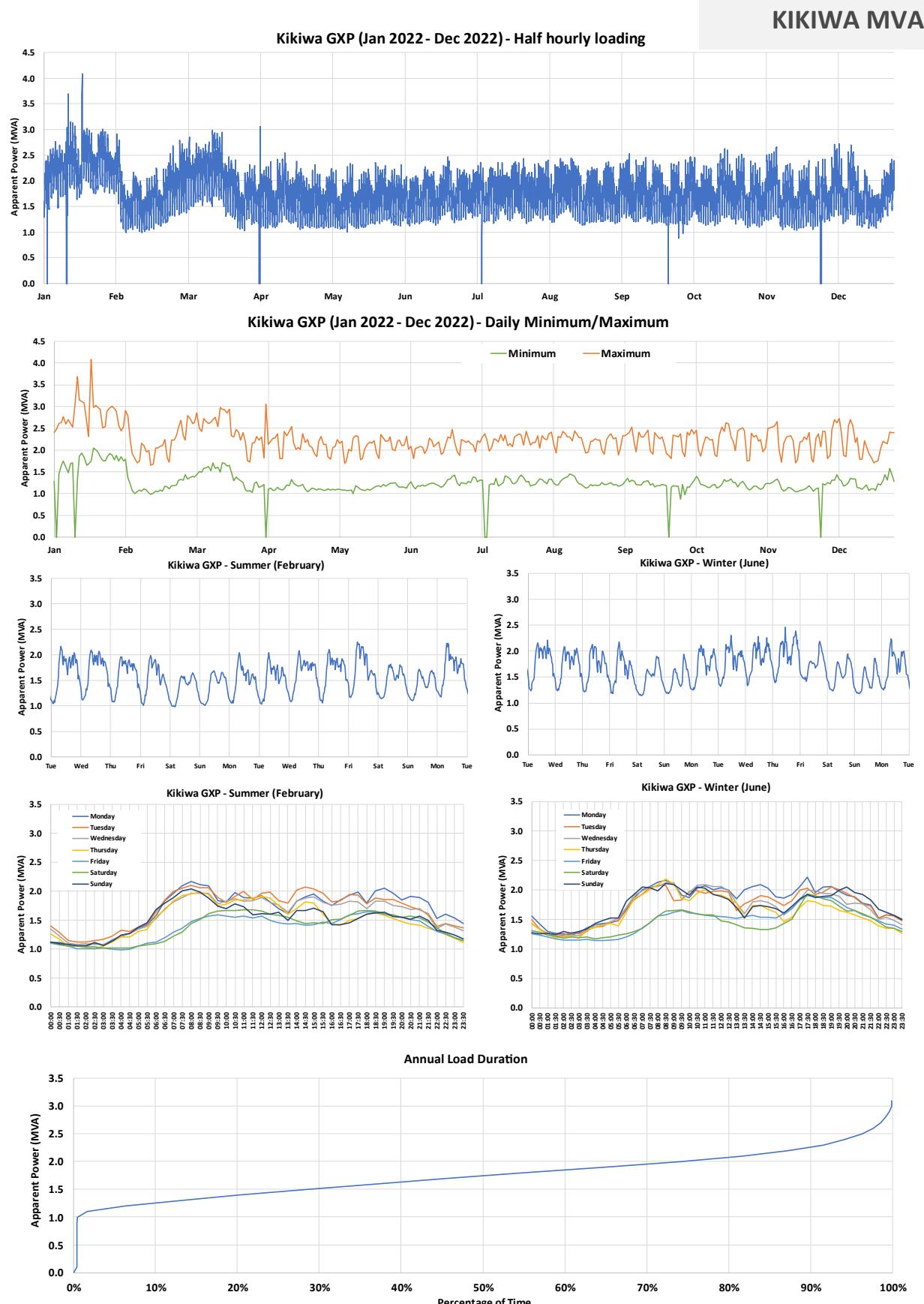


Figure 3 Kikiwa: Apparent power (MVA) load characteristics

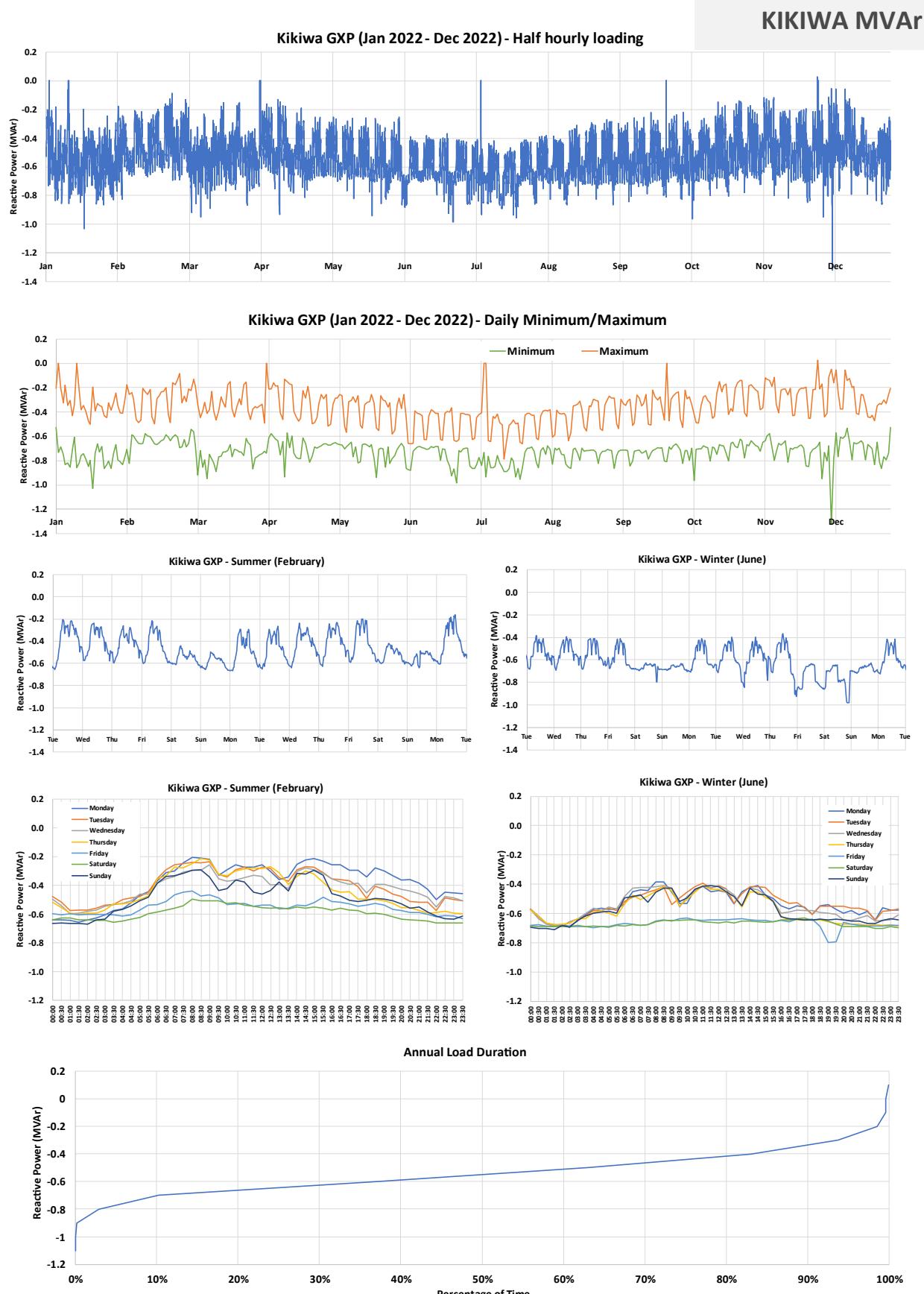


Figure 4 Kikiwa: Reactive power (MVAr) load characteristics

MURCHISON MVA

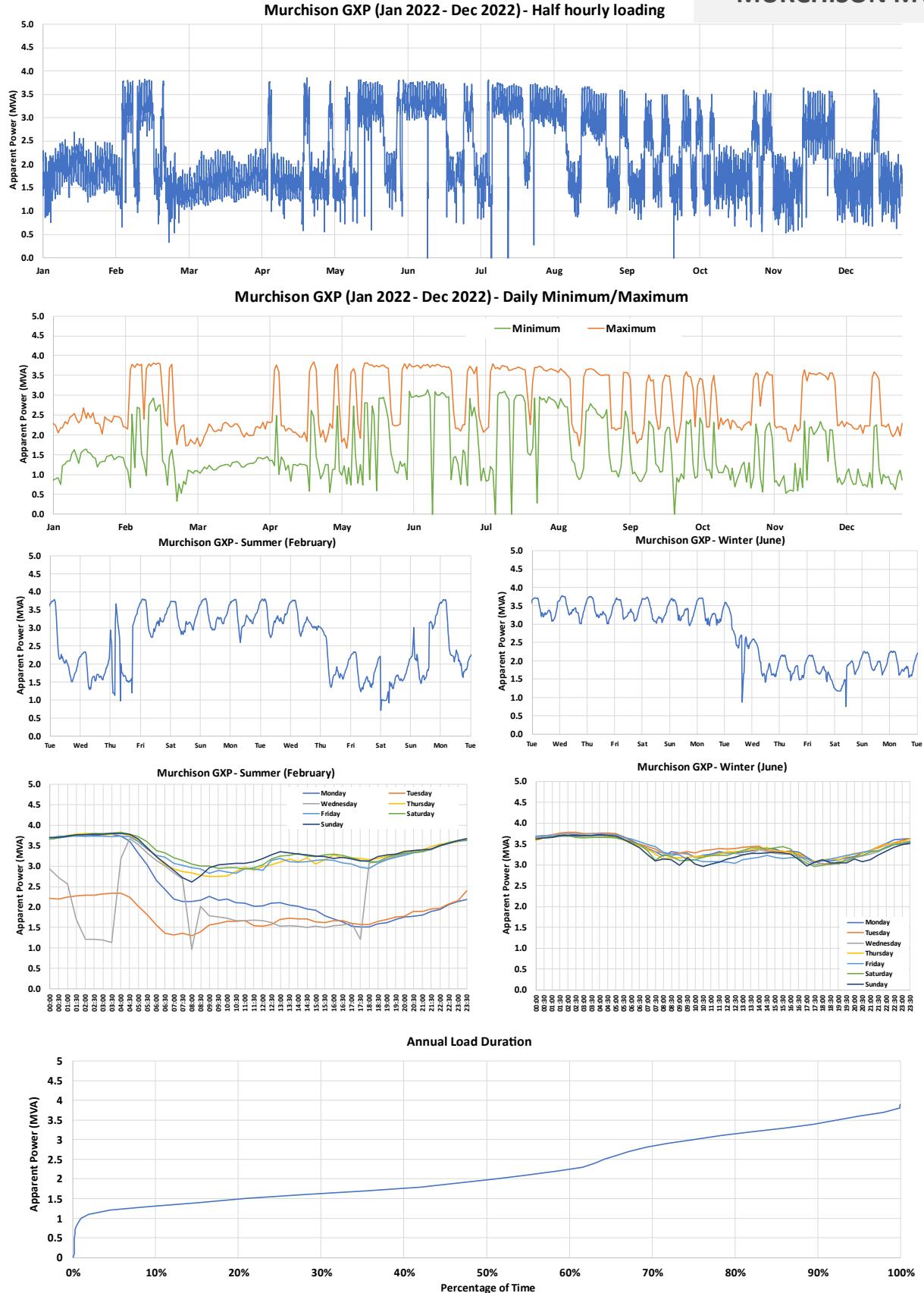


Figure 5 Murchison: Apparent power (MVA) load characteristics

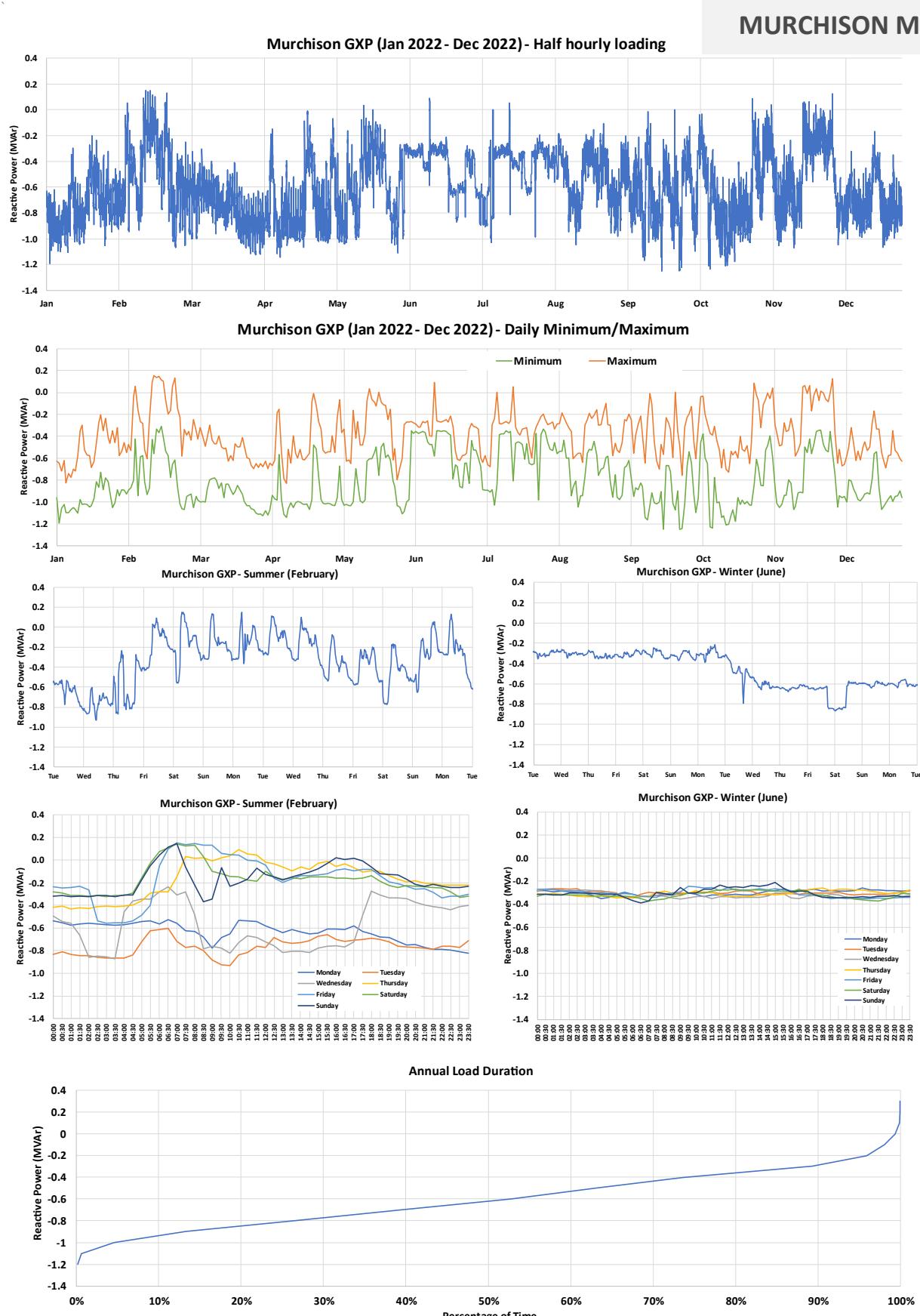


Figure 6 Murchison: Reactive power (MVar) load characteristics

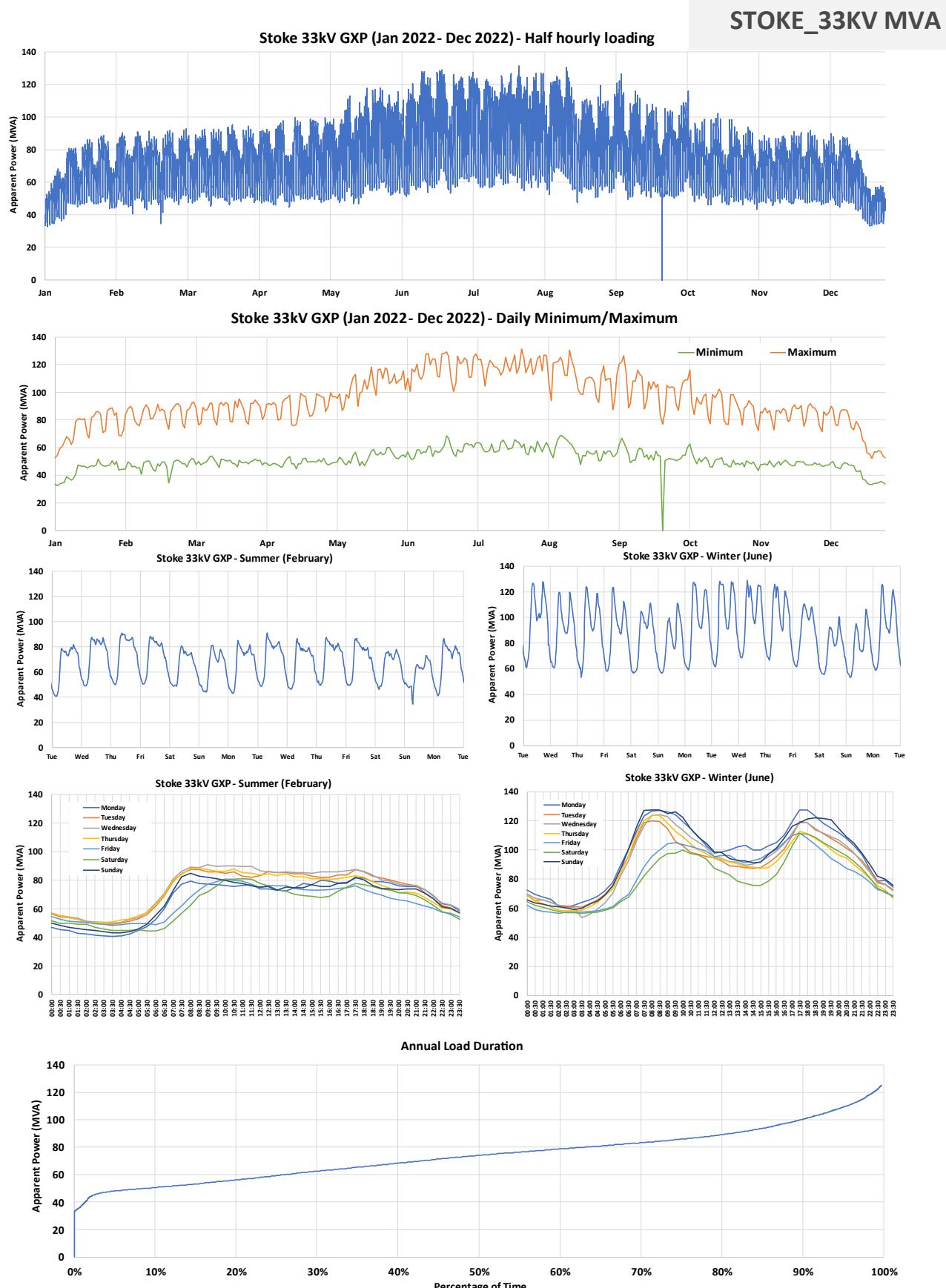


Figure 7 Stoke_33kV: Apparent power (MVA) load characteristics

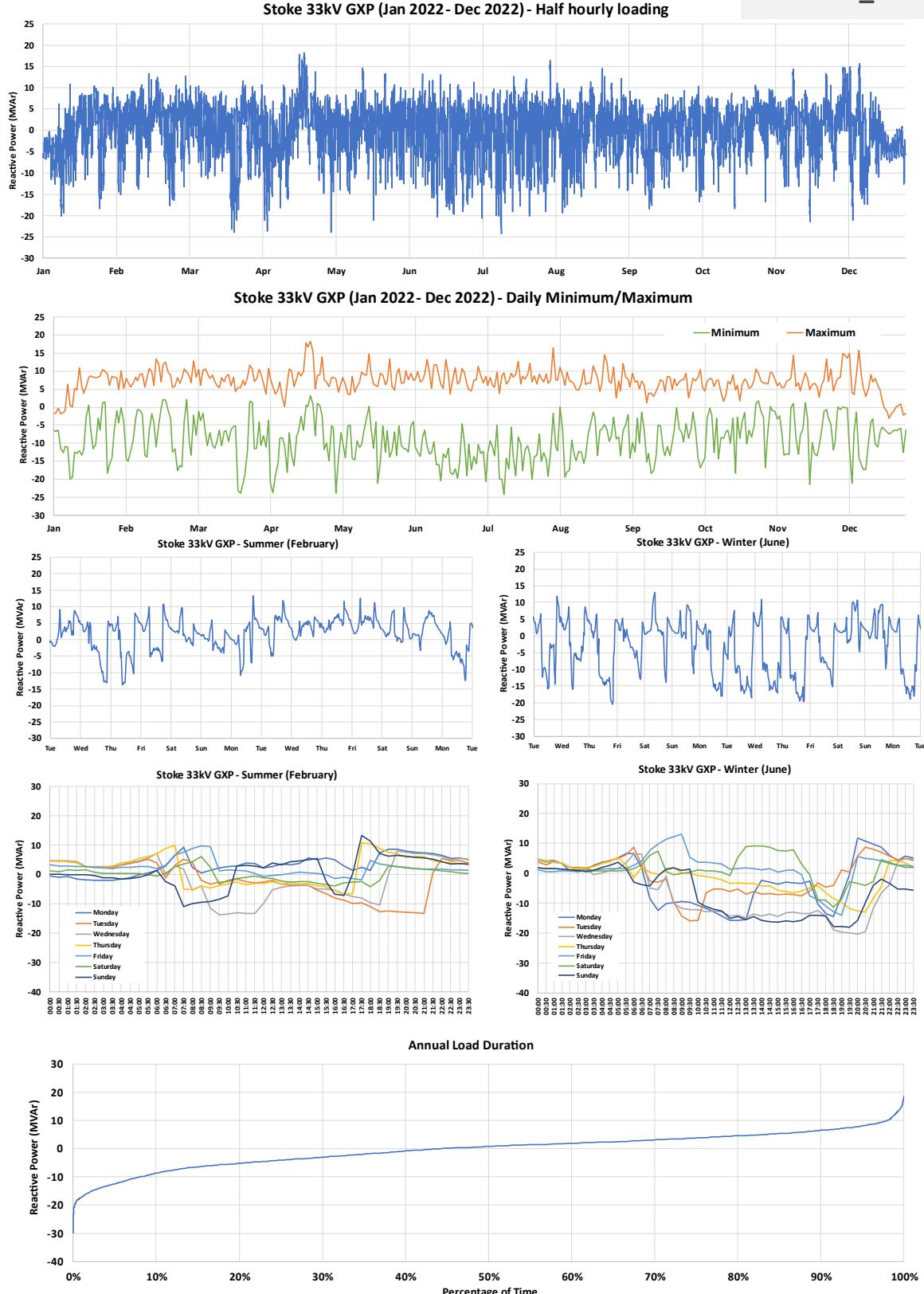
STOKE_33KV MVar

Figure 8 Stoke_33kV: Reactive power (MVA) load characteristics

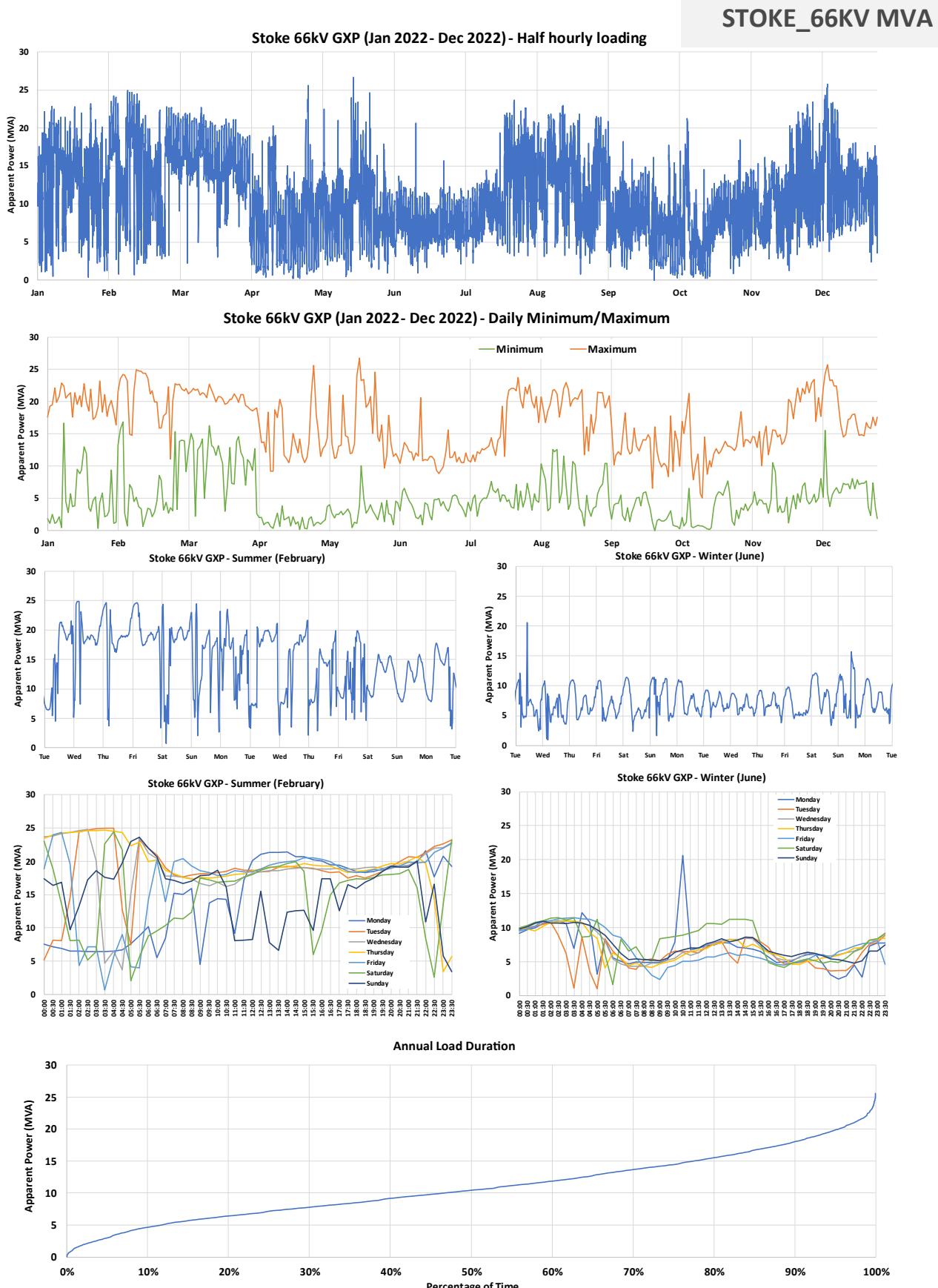


Figure 9 Stoke_66kV: Apparent power (MVA) load characteristics

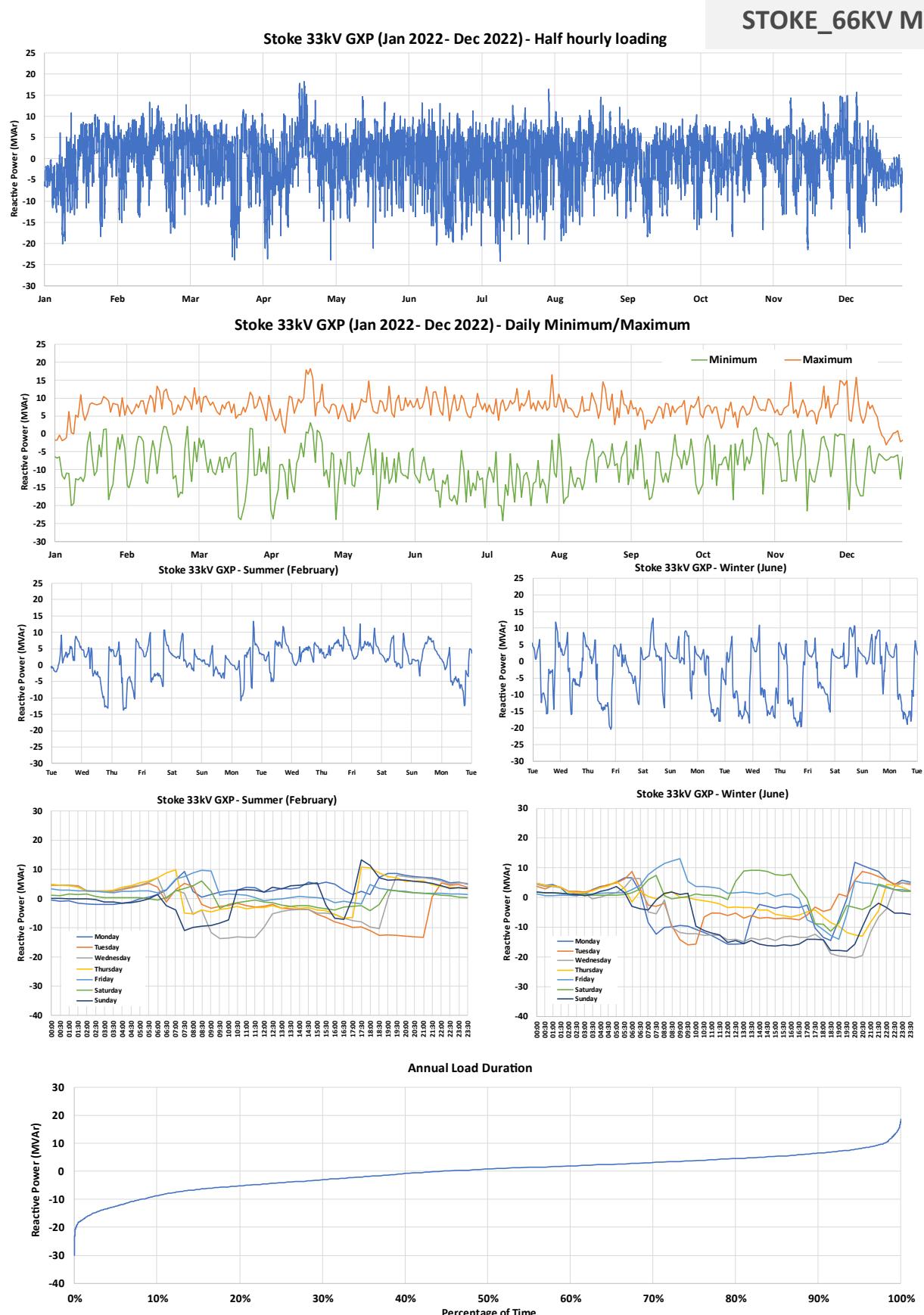


Figure 10 Stoke_66kV: Reactive power (MVAr) load characteristics

3. Zone Substations

3.1 Nelson Electricity

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

- **Figure 11** Haven Road 33/11kV zone substation: Apparent power (MVA) load characteristics

HAVEN RD MVA

YET TO BE SUPPLIED

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

3.2 Network Tasman

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

- **Figure 12** Annesbrook 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 13** Brightwater 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 14** Eves Valley 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 15** Founders 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 16** Mapua 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 17** Motueka 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 18** Richmond 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 19** Songer 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 20** St Hope 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 21** Swamp Road 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 22** Takaka 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 23** Upper Takaka 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 24** Wakapuaka 33/11kV zone substation: Apparent power (MVA) load characteristics

ANNESBROOK MVA

YET TO BE SUPPLIED

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

BRIGHTWATER MVA

YET TO BE SUPPLIED

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

EVES VALLEY MVA

YET TO BE SUPPLIED

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

FOUNDERS MVA

YET TO BE SUPPLIED

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

MAPUA MVA

YET TO BE SUPPLIED

Figure 16 Mapua 33/11kV zone substation: Apparent power (MVA) load characteristics

MOTUEKA MVA

YET TO BE SUPPLIED

Figure 17 Motueka 33/11kV zone substation: Apparent power (MVA) load characteristics

RICHMOND MVA

YET TO BE SUPPLIED

Figure 18 Richmond 33/11kV zone substation: Apparent power (MVA) load characteristics

SONGER MVA

YET TO BE SUPPLIED

Figure 19 Songer 33/11kV zone substation: Apparent power (MVA) load characteristics

ST HOPE MVA

YET TO BE SUPPLIED

Figure 20 St Hope 33/11kV zone substation: Apparent power (MVA) load characteristics

SWAMP RD MVA

YET TO BE SUPPLIED

Figure 21 Swamp Road 33/11kV zone substation: Apparent power (MVA) load characteristics

TAKAKA MVA

YET TO BE SUPPLIED

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

UPPER TAKAKA MVA

YET TO BE SUPPLIED

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

WAKAPUAKA MVA

YET TO BE SUPPLIED

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

3.3 Marlborough Lines

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

- **Figure 25** Cloudy bay 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 26** Havelock 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 27** Leefield 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 28** Linkwater 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 29** Nelson Street 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 30** Picton 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 31** Rai Valley 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 32** Redwoodtown 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 33** Riverlands 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 34** Seddon 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 35** Spring Creek 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 36** Springlands 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 37** Tapp 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 38** Ward 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 39** Waters 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 40** Woodbourne 33/11kV zone substation: Apparent power (MVA) load characteristics

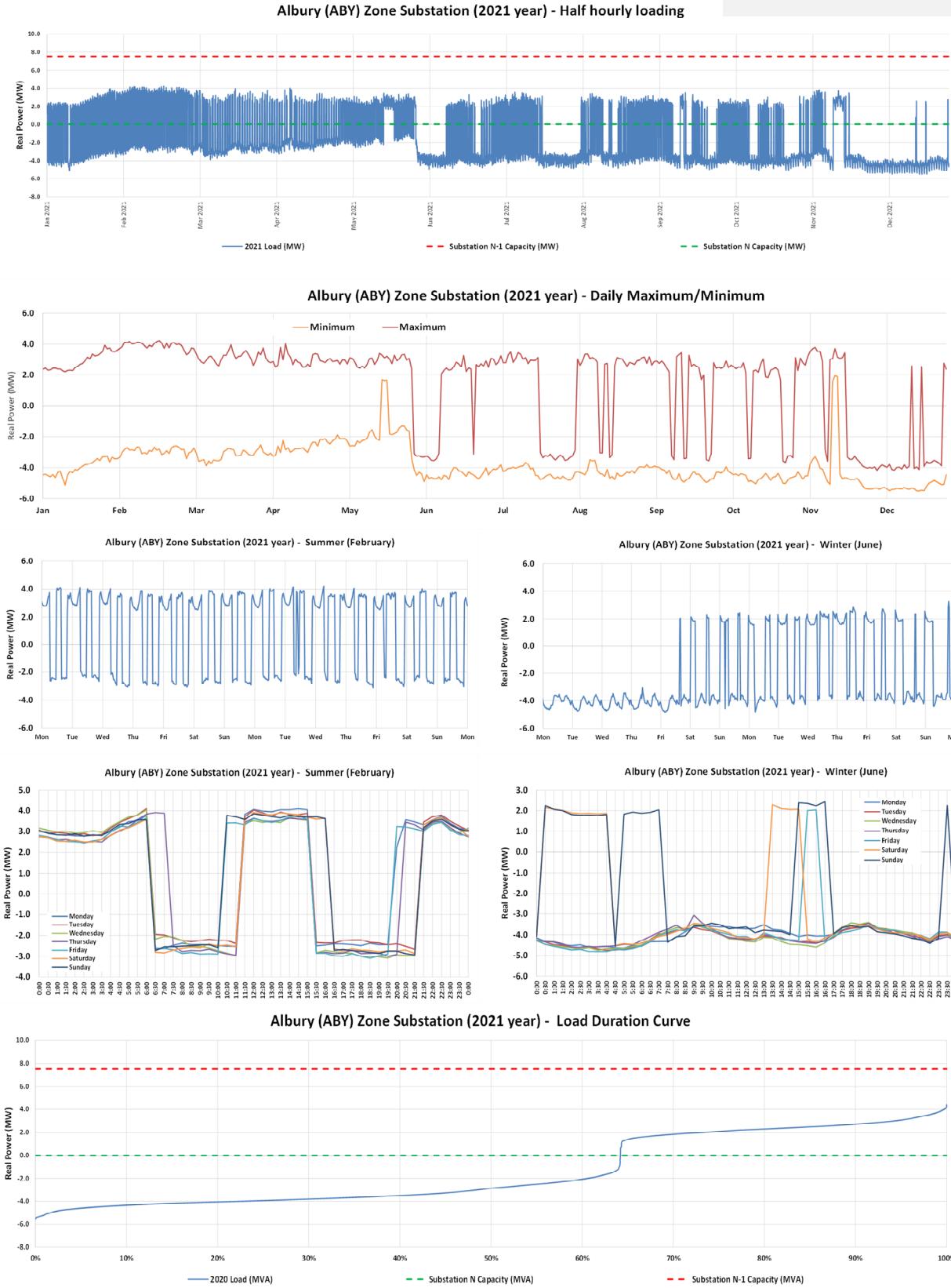
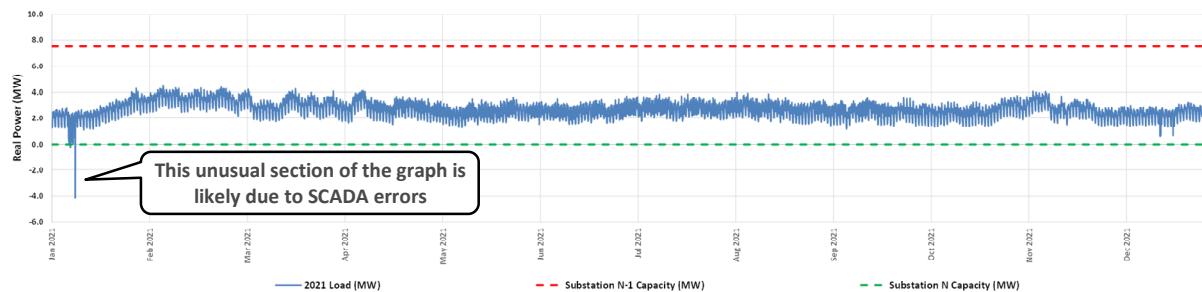
CLOUDY BAY MVA

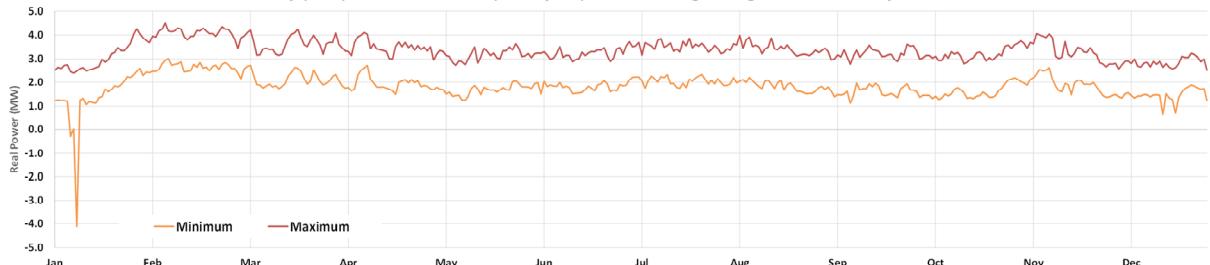
Figure 25 Cloudy bay 33/11kV zone substation: Apparent power (MVA) load characteristics

HAVELOCK MVA

Albury (ABY) Zone Substation (2021 year) not including OPU generation - Half hourly I



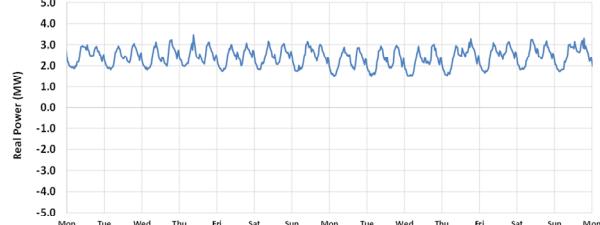
Albury (ABY) Zone Substation (2021 year) not including OPU generation - Daily Maximum/Minimum



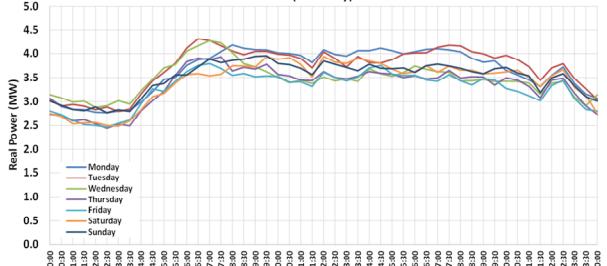
Albury (ABY) Zone Substation (2021 year) not including OPU generation - Summer (February)



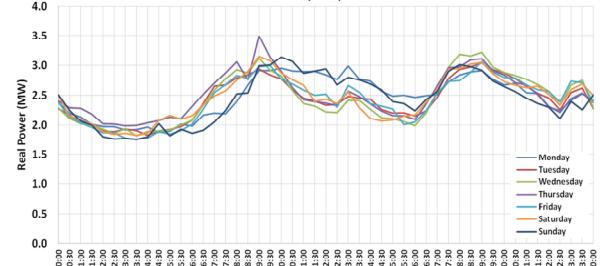
Albury (ABY) Zone Substation (2021 year) not including OPU generation - Winter (June)



Albury (ABY) Zone Substation (2021 year) not including OPU generation - Summer (February)



Albury (ABY) Zone Substation (2021 year) not including OPU generation - Winter (June)



Albury (ABY) Zone Substation (2021 year) not including OPU generation - Load Duration Curve

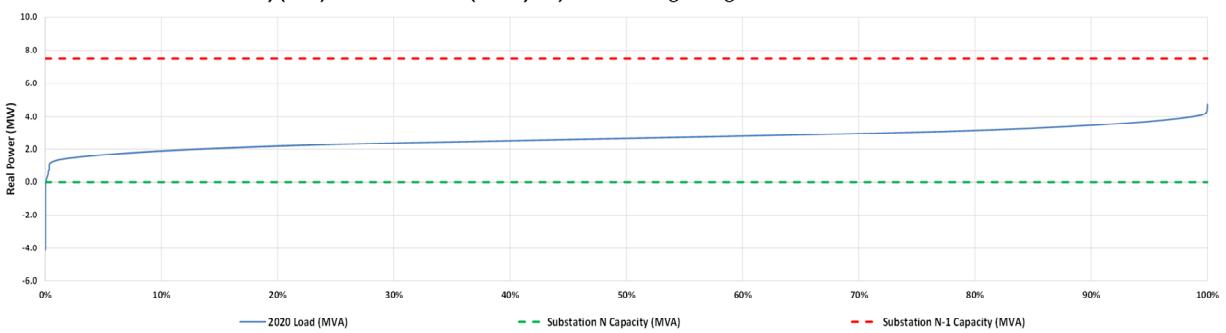


Figure 26 Havelock 33/11kV zone substation: Apparent power (MVA) load characteristics

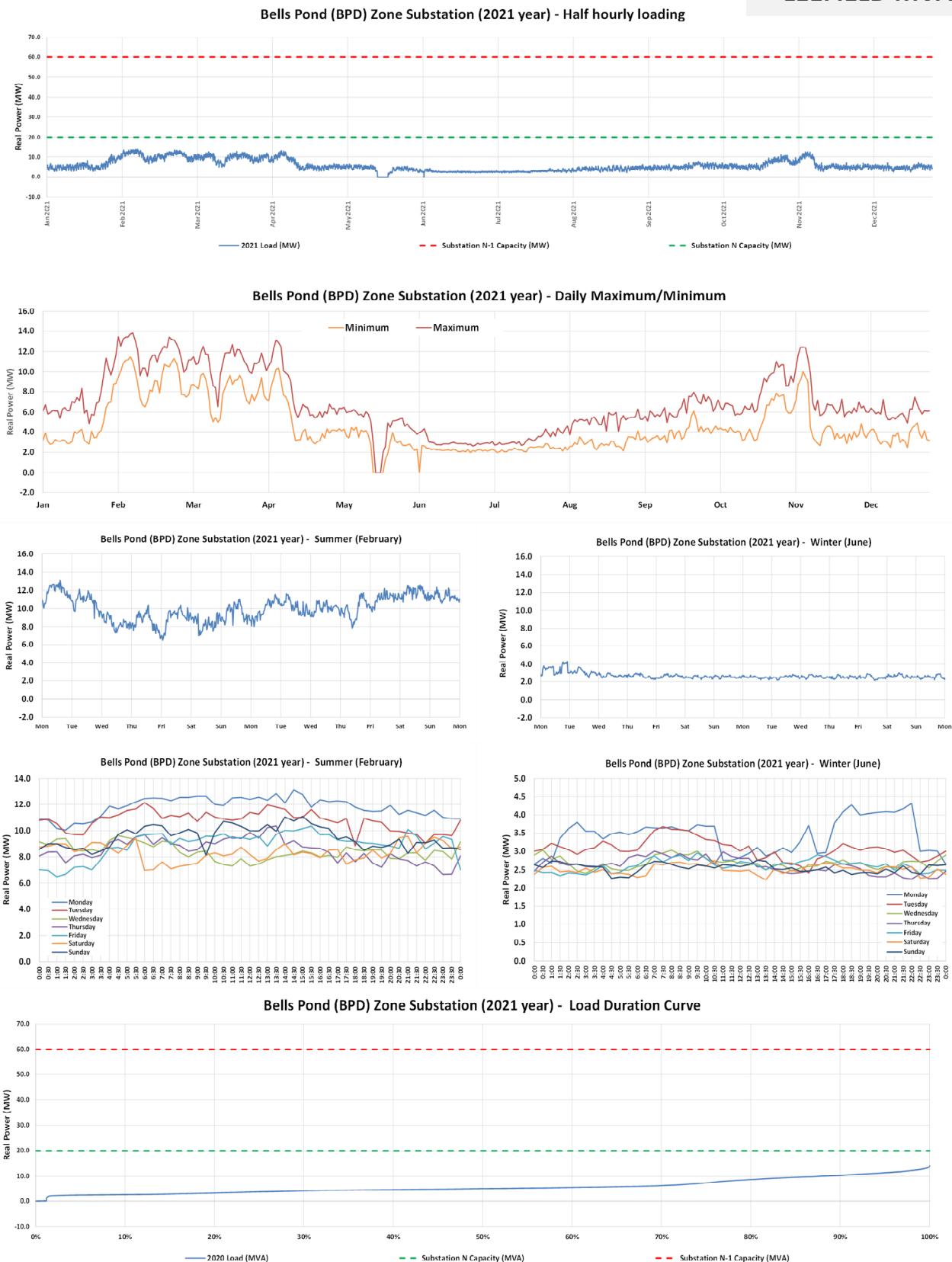
LEEFIELD MVA


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

LINKWATER MVA

YET TO BE SUPPLIED

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

NELSON STREET MVA

YET TO BE SUPPLIED

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

PICTON MVA

YET TO BE SUPPLIED

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

RAI VALLEY MVA

YET TO BE SUPPLIED

Figure 31 Rai Valley 33/11kV zone substation: Apparent power (MVA) load characteristics

REDWOODTOWN MVA

YET TO BE SUPPLIED

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

RIVERLANDS MVA

YET TO BE SUPPLIED

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

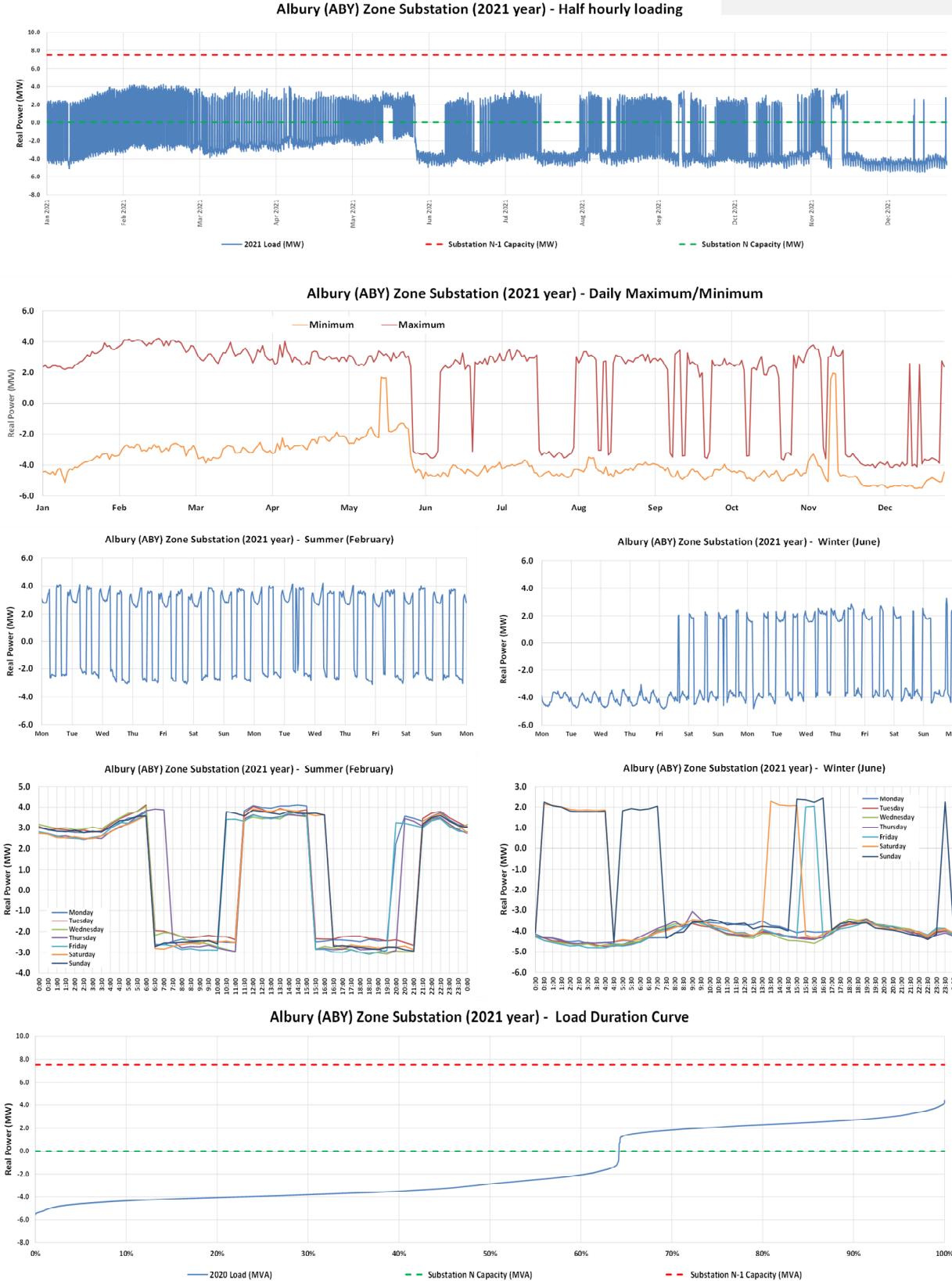
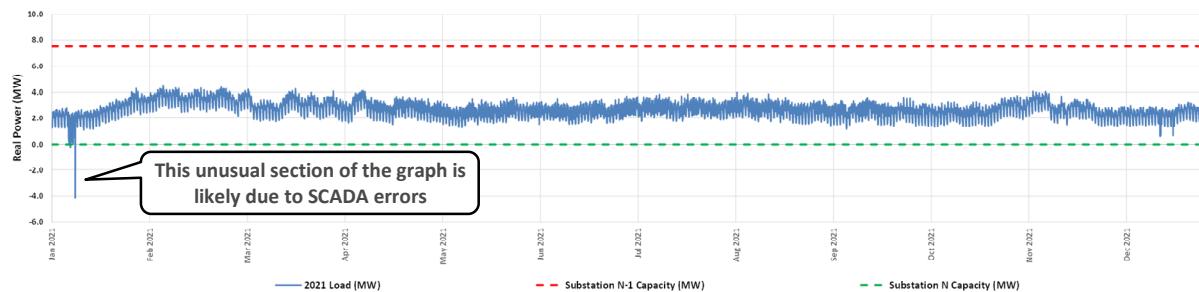
SEDDON MVA

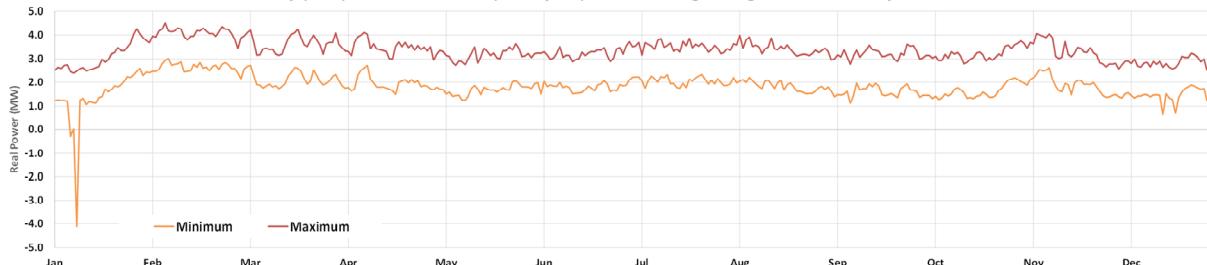
Figure 34 Seddon 33/11kV zone substation: Apparent power (MVA) load characteristics

SPRING CREEK MVA

Albury (ABY) Zone Substation (2021 year) not including OPU generation - Half hourly I



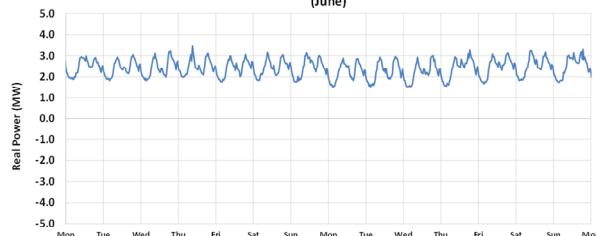
Albury (ABY) Zone Substation (2021 year) not including OPU generation - Daily Maximum/Minimum



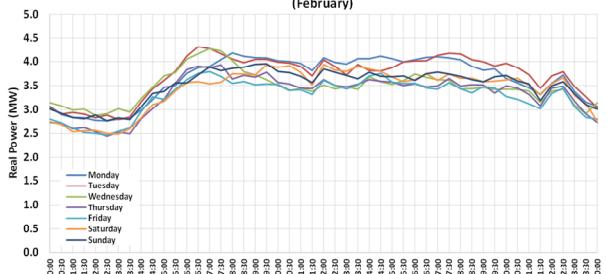
Albury (ABY) Zone Substation (2021 year) not including OPU generation - Summer (February)



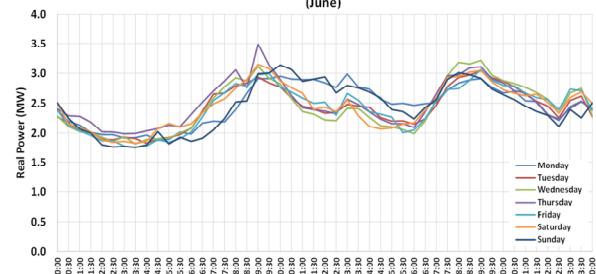
Albury (ABY) Zone Substation (2021 year) not including OPU generation - Winter (June)



Albury (ABY) Zone Substation (2021 year) not including OPU generation - Summer (February)



Albury (ABY) Zone Substation (2021 year) not including OPU generation - Winter (June)



Albury (ABY) Zone Substation (2021 year) not including OPU generation - Load Duration Curve

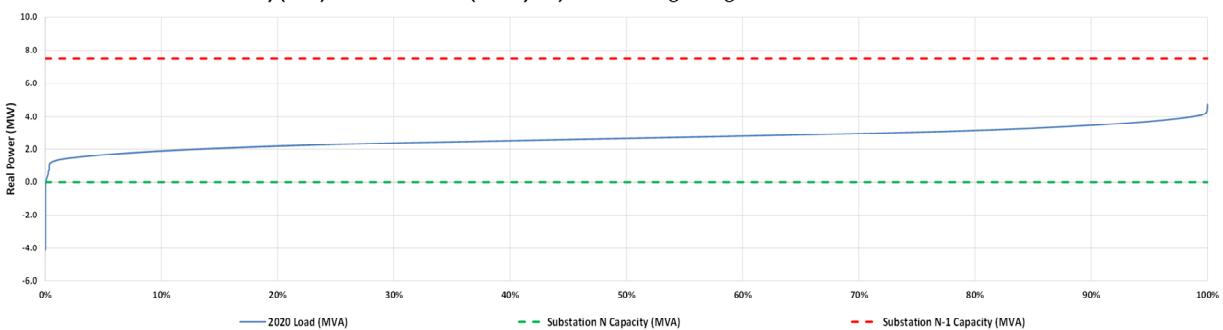


Figure 35 Spring Creek 33/11kV zone substation: Apparent power (MVA) load characteristics

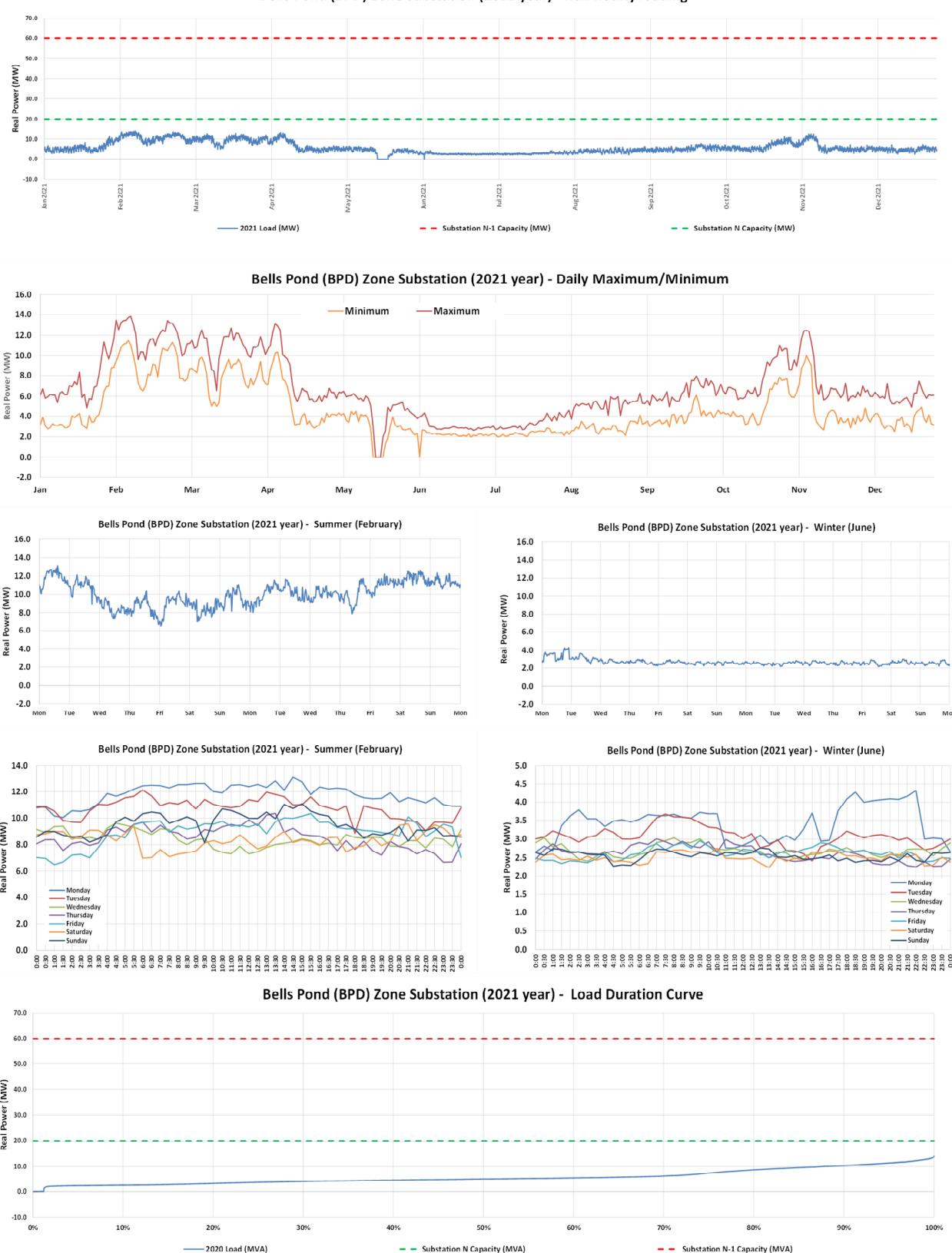
SPRINGLANDS MVA


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

TAPP MVA

YET TO BE SUPPLIED

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

WARD MVA

YET TO BE SUPPLIED

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

WATERS MVA

YET TO BE SUPPLIED

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

WOODBOURNE MVA

YET TO BE SUPPLIED

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