



South Canterbury Electrical Network

Supplementary Information - Substation Load Characteristics

EECA

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CONSULTING

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B	Issued in Final

Table of Contents

1.	Introduction	1
2.	Transmission/GXP Substations.....	2
3.	Zone Substations	25
3.1	EA Networks	25
3.2	Alpine Energy.....	46
3.3	Network Waitaki.....	67

List of Figures

Figure 1	Albury: Apparent power (MVA) load characteristics	3
Figure 2	Albury: Reactive power (MVAr) load characteristics.....	4
Figure 3	Ashburton: Apparent power (MVA) load characteristics	5
Figure 4	Ashburton: Reactive power (MVAr) load characteristics	6
Figure 5	Bells Pond: Apparent power (MVA) load characteristics	7
Figure 6	Bells Pond: Reactive power (MVAr) load characteristics	8
Figure 7	Black Point: Apparent power (MVA) load characteristics	9
Figure 8	Black Point: Reactive power (MVAr) load characteristics	10
Figure 9	Oamaru: Apparent power (MVA) load characteristics	11
Figure 10	Oamaru: Reactive power (MVAr) load characteristics	12
Figure 11	Studholme: Apparent power (MVA) load characteristics	13
Figure 12	Studholme: Reactive power (MVAr) load characteristics	14
Figure 13	Tekapo A: Apparent power (MVA) load characteristics	15
Figure 14	Tekapo A: Reactive power (MVAr) load characteristics	16
Figure 15	Temuka: Apparent power (MVA) load characteristics	17
Figure 16	Temuka: Reactive power (MVAr) load characteristics	18
Figure 17	Timaru: Apparent power (MVA) load characteristics.....	19
Figure 18	Timaru: Reactive power (MVAr) load characteristics.....	20
Figure 19	Twizel: Apparent power (MVA) load characteristics	21
Figure 20	Twizel: Reactive power (MVAr) load characteristics	22
Figure 21	Waitaki: Apparent power (MVA) load characteristics.....	23
Figure 22	Waitaki: Reactive power (MVAr) load characteristics.....	24
Figure 23	Ashburton 66/11kV zone substation: Apparent power (MVA) load characteristics.....	26
Figure 24	Carew 66/22kV zone substation: Apparent power (MVA) load characteristics.....	27
Figure 25	Coldstream 66/11kV zone substation: Apparent power (MVA) load characteristics	28
Figure 26	Dorie 66/22kV zone substation: Apparent power (MVA) load characteristics	29
Figure 27	Eiffelton 66/11kV zone substation: Apparent power (MVA) load characteristics	30
Figure 28	Fairton 66/22/11kV zone substation: Apparent power (MVA) load characteristics.....	31

Figure 29 Hackthorne 66/22kV zone substation: Apparent power (MVA) load characteristics	32
Figure 30 Lagmhor 33/11kV zone substation: Apparent power (MVA) load characteristics.....	33
Figure 31 Lauriston 66/22kV zone substation: Apparent power (MVA) load characteristics.....	34
Figure 32 Methven 33/11kV zone substation: Apparent power (MVA) load characteristics	35
Figure 33 Methven 66/11kV zone substation: Apparent power (MVA) load characteristics	36
Figure 34 Mt Hutt 33/11kV zone substation: Apparent power (MVA) load characteristics	37
Figure 35 Montalto 33/11kV zone substation: Apparent power (MVA) load characteristics.....	38
Figure 36 Mt Somers 33/22kV zone substation: Apparent power (MVA) load characteristics	39
Figure 37 Northtown 66/11kV zone substation: Apparent power (MVA) load characteristics	40
Figure 38 Overdale 66/22kV zone substation: Apparent power (MVA) load characteristics	41
Figure 39 Pendarves 66/22kV zone substation: Apparent power (MVA) load characteristics	42
Figure 40 Seafield 22/11kV zone substation: Apparent power (MVA) load characteristics	43
Figure 41 Seafield 66/11kV zone substation: Apparent power (MVA) load characteristics	44
Figure 42 Tinwald 66/22/11kV zone substation: Apparent power (MVA) load characteristics.....	45
Figure 43 Waikanui 66/11kV zone substation: Apparent power (MVA) load characteristics.....	46
Figure 44 Albury 110/11kV zone substation: Real power (MW) load characteristics.....	47
Figure 45 Albury 110/11kV zone substation not including OPU connection: Real power (MW) load characteristics.....	48
Figure 46 Bells Pond 110/33/11kV zone substation: Real power (MW) load characteristics.....	49
Figure 47 Old Man Rage 11/22kV zone substation: Real power (MW) load characteristics	50
Figure 48 Clandeboye 1 33/11kV zone substation: Real power (MW) load characteristics	51
Figure 49 Clandeboye 2 33/11kV zone substation: Real power (MW) load characteristics	52
Figure 50 Cooneys Rd 33/11kV zone substation: Real power (MW) load characteristics	53
Figure 51 Fairlie 33/11kV zone substation: Real power (MW) load characteristics	54
Figure 52 Geraldine 33/11kV zone substation: Real power (MW) load characteristics	55
Figure 53 Haldon Lilybank 11/22kV zone substation: Real power (MW) load characteristics	56
Figure 54 Pareora 33/11kV zone substation: Real power (MW) load characteristics	57
Figure 55 Pleasant Point 33/11kV zone substation: Real power (MW) load characteristics	58
Figure 56 Rangitata 33/11kV zone substation: Real power (MW) load characteristics.....	59
Figure 57 Studholme 110/11kV zone substation: Real power (MW) load characteristics.....	60
Figure 58 Tekapo Village 33/11kV zone substation: Real power (MW) load characteristics.....	61
Figure 59 Temuka 33/11kV zone substation: Real power (MW) load characteristics at 11kV	62
Figure 60 Temuka 33/11kV zone substation: Real power (MW) load characteristics at 33kV	63
Figure 61 Timaru 110/11kV zone substation: Real power (MW) load characteristics.....	64
Figure 62 Twizel Village 33/11kV zone substation: Real power (MW) load characteristics	65
Figure 63 Unwin Hut 33/11kV zone substation: Real power (MW) load characteristics	66
Figure 64 Chelmer Street 33/11kV zone substation: Real power (MW) load characteristics.....	68
Figure 65 Duntroon 33/22kV zone substation: Real power (MW) load characteristics.....	69
Figure 66 Eastern Road 33/11kV zone substation: Real power (MW) load characteristics.....	70

Figure 67 Enfield 33/11kV zone substation: Real power (MW) load characteristics	71
Figure 68 Five Forks 33/11kV zone substation: Real power (MW) load characteristics	72
Figure 69 Hampden 33/11kV zone substation: Real power (MW) load characteristics	73
Figure 70 Kurow 33/11kV zone substation: Real power (MW) load characteristics.....	74
Figure 71 Maheno 33/11kV zone substation: Real power (MW) load characteristics.....	75
Figure 72 Ngapara 33/11kV zone substation: Real power (MW) load characteristics.....	76
Figure 73 Ohau 33/11kV zone substation: Real power (MW) load characteristics	77
Figure 74 Omarama 33/11kV zone substation: Real power (MW) load characteristics	78
Figure 75 Otematata 33/11kV zone substation: Real power (MW) load characteristics.....	79
Figure 76 Papakaio 33/11kV zone substation: Real power (MW) load characteristics	80
Figure 77 Parsons Road 33/11kV zone substation: Real power (MW) load characteristics	81
Figure 78 Pukeuri 33/11kV zone substation: Real power (MW) load characteristics.....	82
Figure 79 Redcastle 33/11kV zone substation: Real power (MW) load characteristics.....	83
Figure 80 Ruataniwha 33/11kV zone substation: Real power (MW) load characteristics.....	84

1. Introduction

The following figures illustrate the characteristics of the major electrical substations (both GXPs and Zone Substations) in the South Canterbury Region. This document supplements the main report titled "South Canterbury Electrical Network – Spare Capacity and Load Conversion Opportunity Report".

For each GXP, the July 2021 through June 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:

- **Albury GXP**
 - Figure 1 Albury: Apparent power (MVA) load characteristics
 - Figure 2 Albury: Reactive power (MVAr) load characteristics
- **Ashburton GXP**
 - Figure 3 Ashburton: Apparent power (MVA) load characteristics
 - Figure 4 Ashburton: Reactive power (MVAr) load characteristics
- **Bells Pond GXP**
 - Figure 5 Bells Pond: Apparent power (MVA) load characteristics
 - Figure 6 Bells Pond: Reactive power (MVAr) load characteristics
- **Black Point GXP**
 - Figure 7 Black Point: Apparent power (MVA) load characteristics
 - Figure 8 Black Point: Reactive power (MVAr) load characteristics
- **Oamaru GXP**
 - Figure 9 Oamaru: Apparent power (MVA) load characteristics
 - Figure 10 Oamaru: Reactive power (MVAr) load characteristics
- **Studholme GXP**
 - Figure 11 Studholme: Apparent power (MVA) load characteristics
 - Figure 12 Studholme: Reactive power (MVAr) load characteristics
- **Tekapo A GXP**
 - Figure 13 Tekapo A: Apparent power (MVA) load characteristics
 - Figure 14 Tekapo A: Reactive power (MVAr) load characteristics
- **Temuka GXP**
 - Figure 15 Temuka: Apparent power (MVA) load characteristics
 - Figure 16 Temuka: Reactive power (MVAr) load characteristics
- **Timaru GXP**
 - Figure 17 Timaru: Apparent power (MVA) load characteristics
 - Figure 18 Timaru: Reactive power (MVAr) load characteristics
- **Twizel GXP**
 - Figure 19 Twizel: Apparent power (MVA) load characteristics
 - Figure 20 Twizel: Reactive power (MVAr) load characteristics
- **Waitaki GXP**
 - Figure 21 Waitaki: Apparent power (MVA) load characteristics
 - Figure 22 Waitaki: Reactive power (MVAr) load characteristics

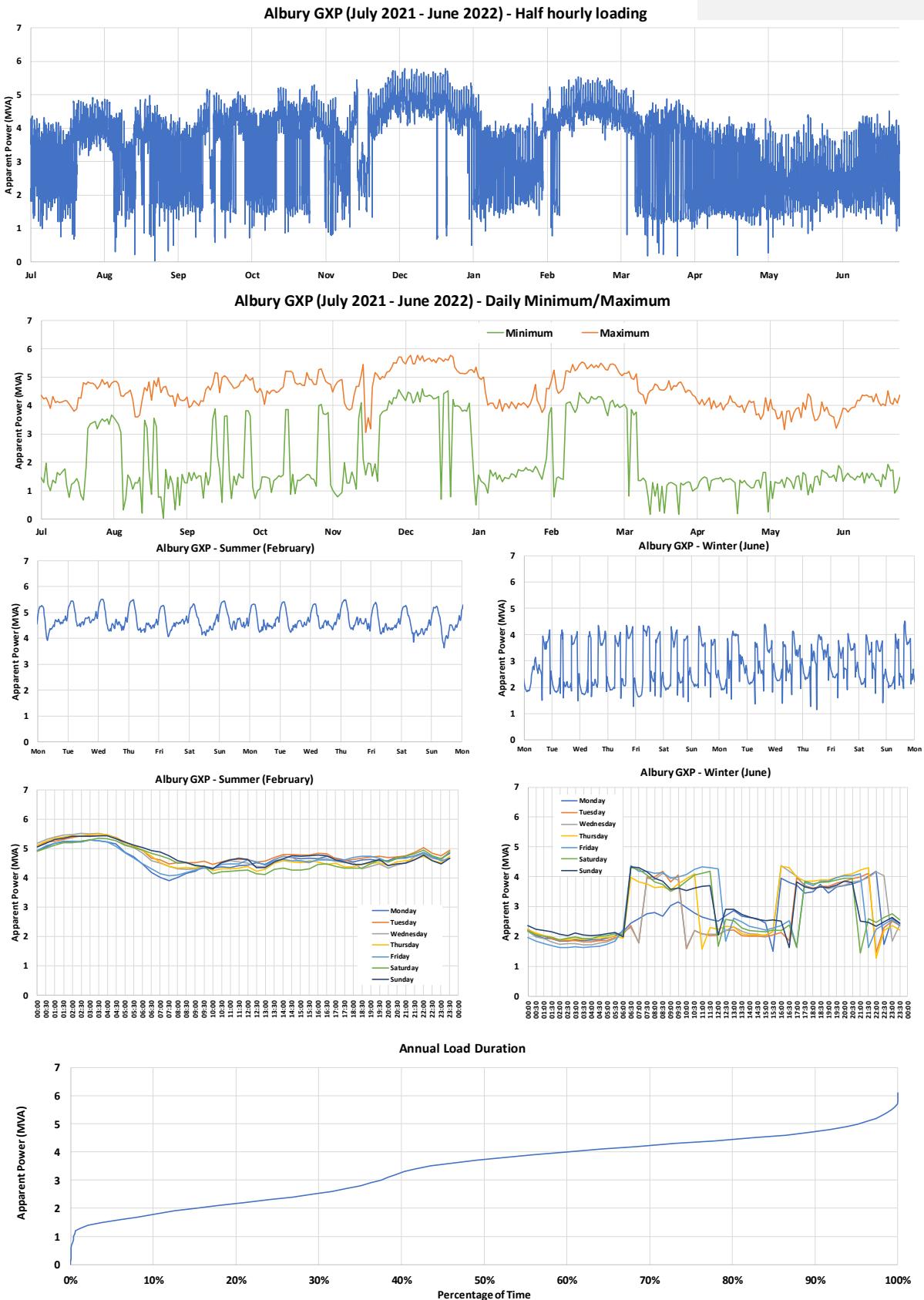
ALBURY MVA


Figure 1 Albury: Apparent power (MVA) load characteristics

ALBURY MVAr

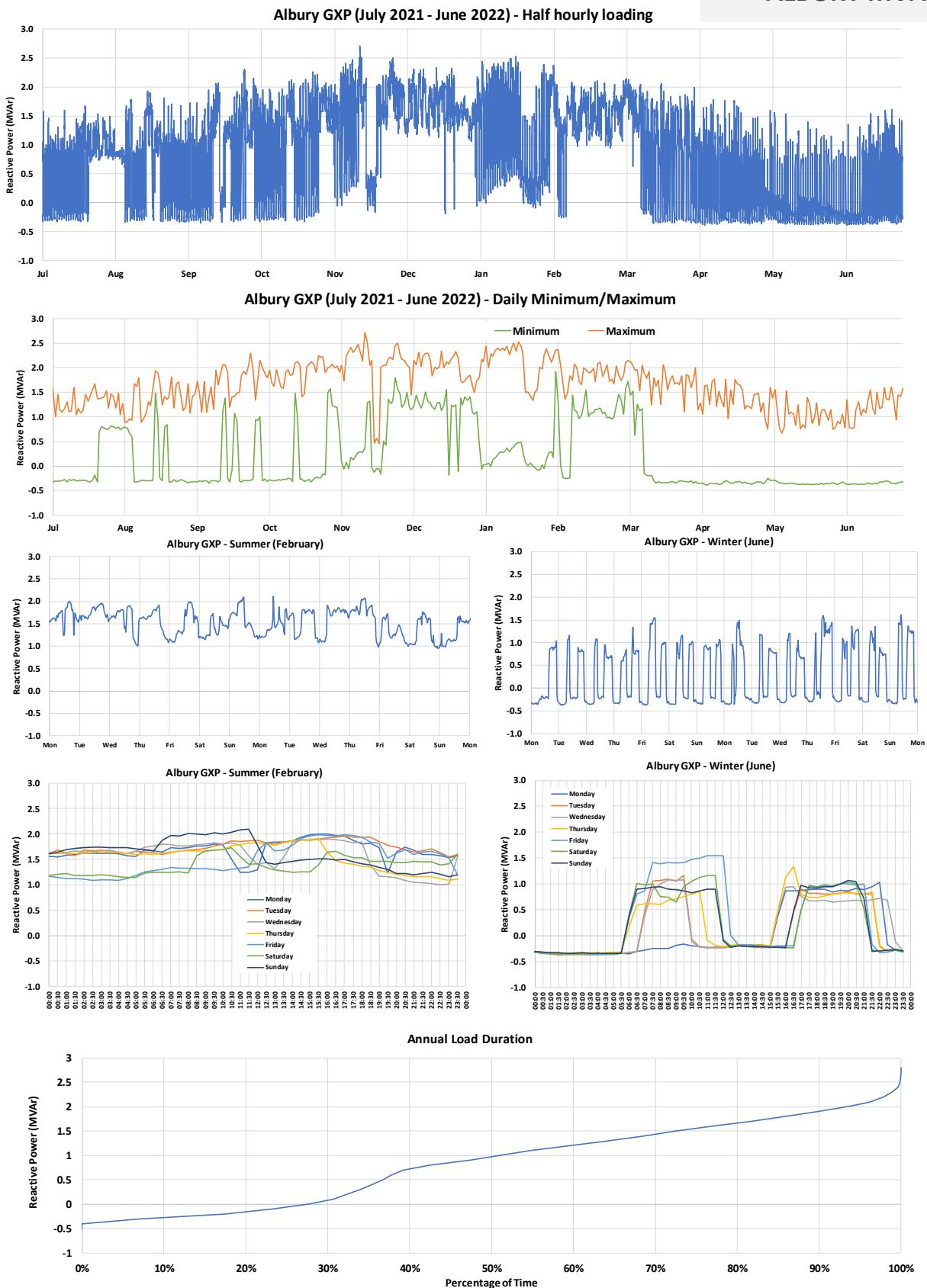


Figure 2 Albury: Reactive power (MVAr) load characteristics

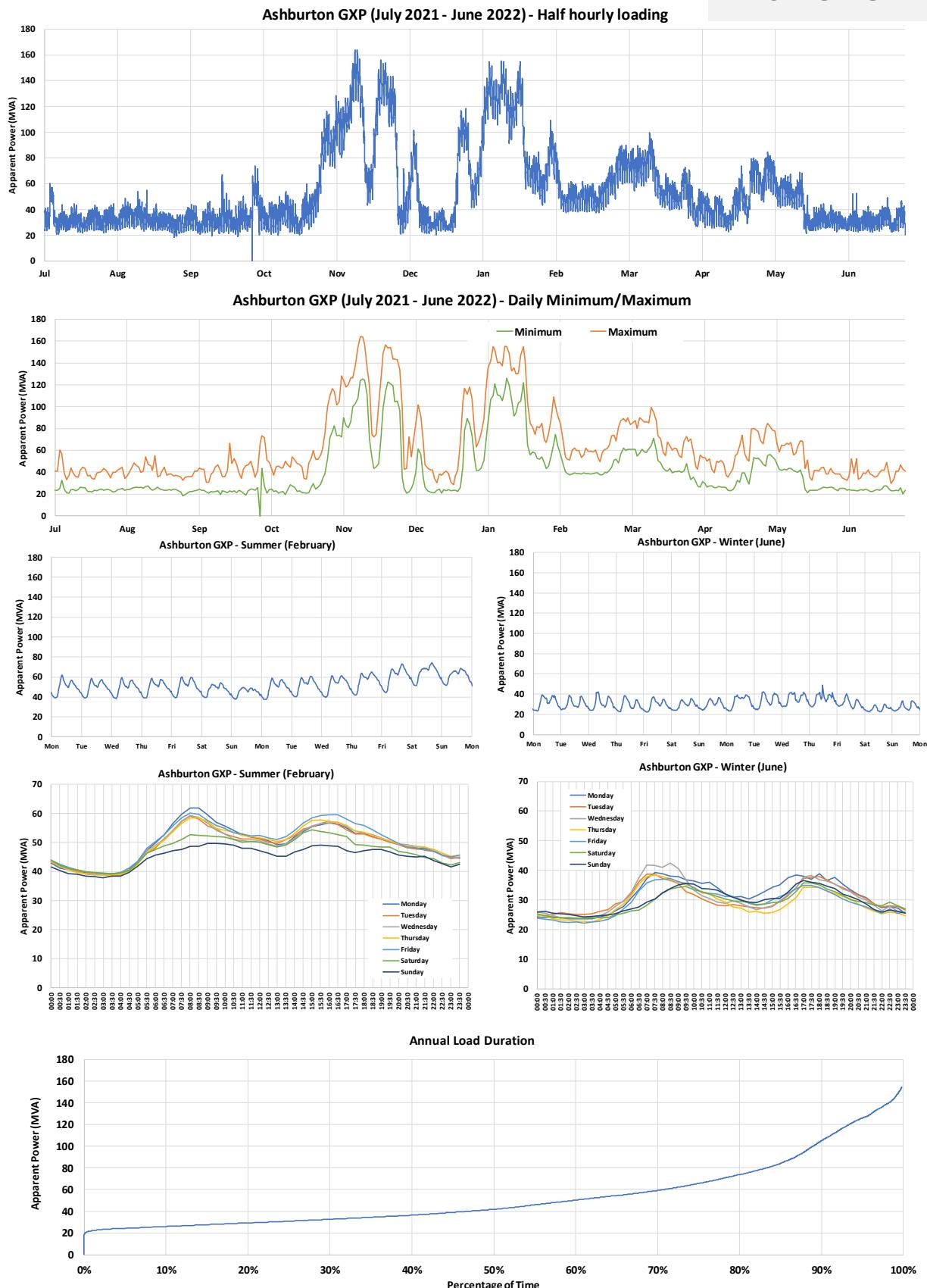
ASHBURTON MVA


Figure 3 Ashburton: Apparent power (MVA) load characteristics

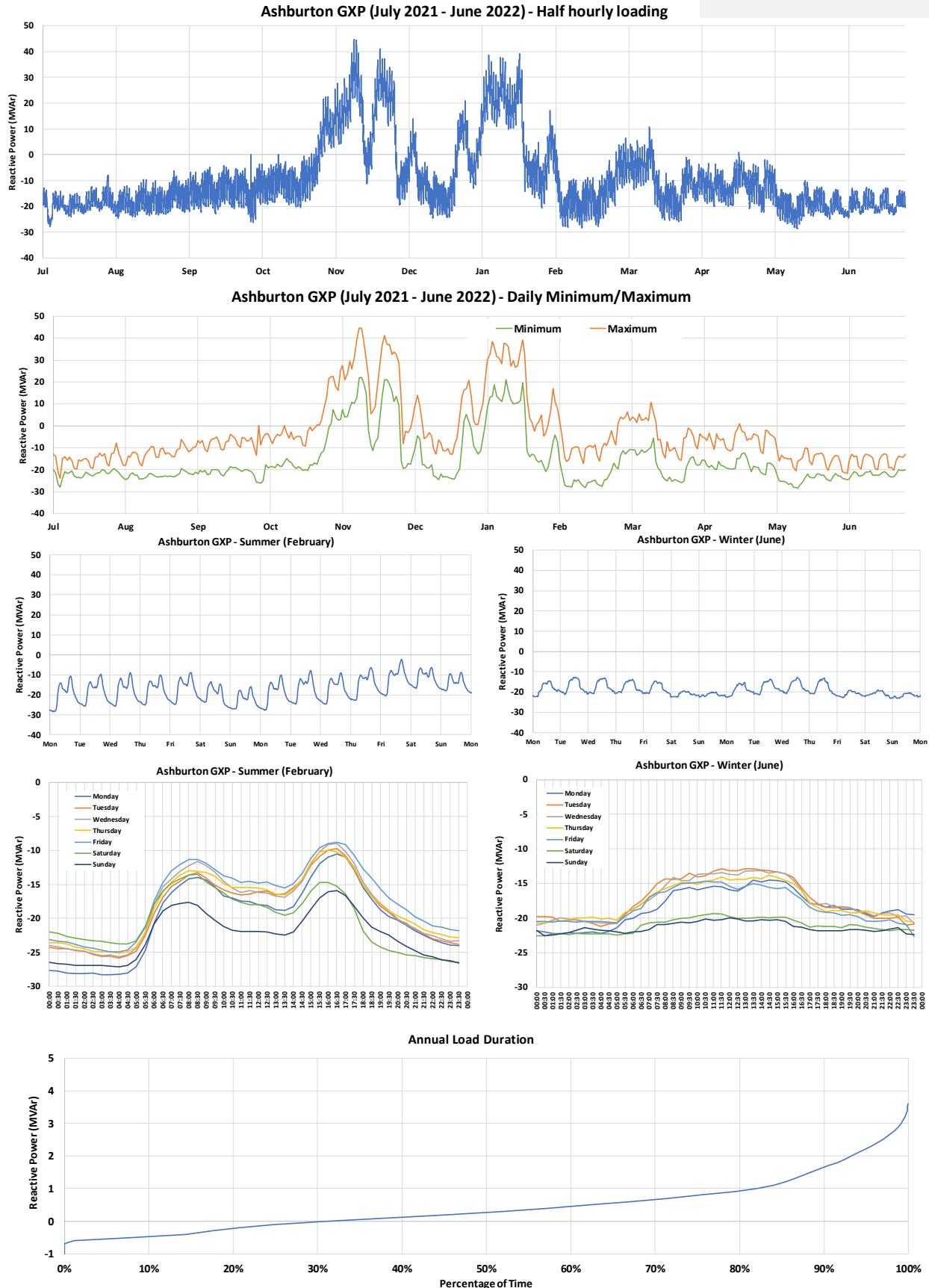
ASHBURTON MVar


Figure 4 Ashburton: Reactive power (MVA) load characteristics

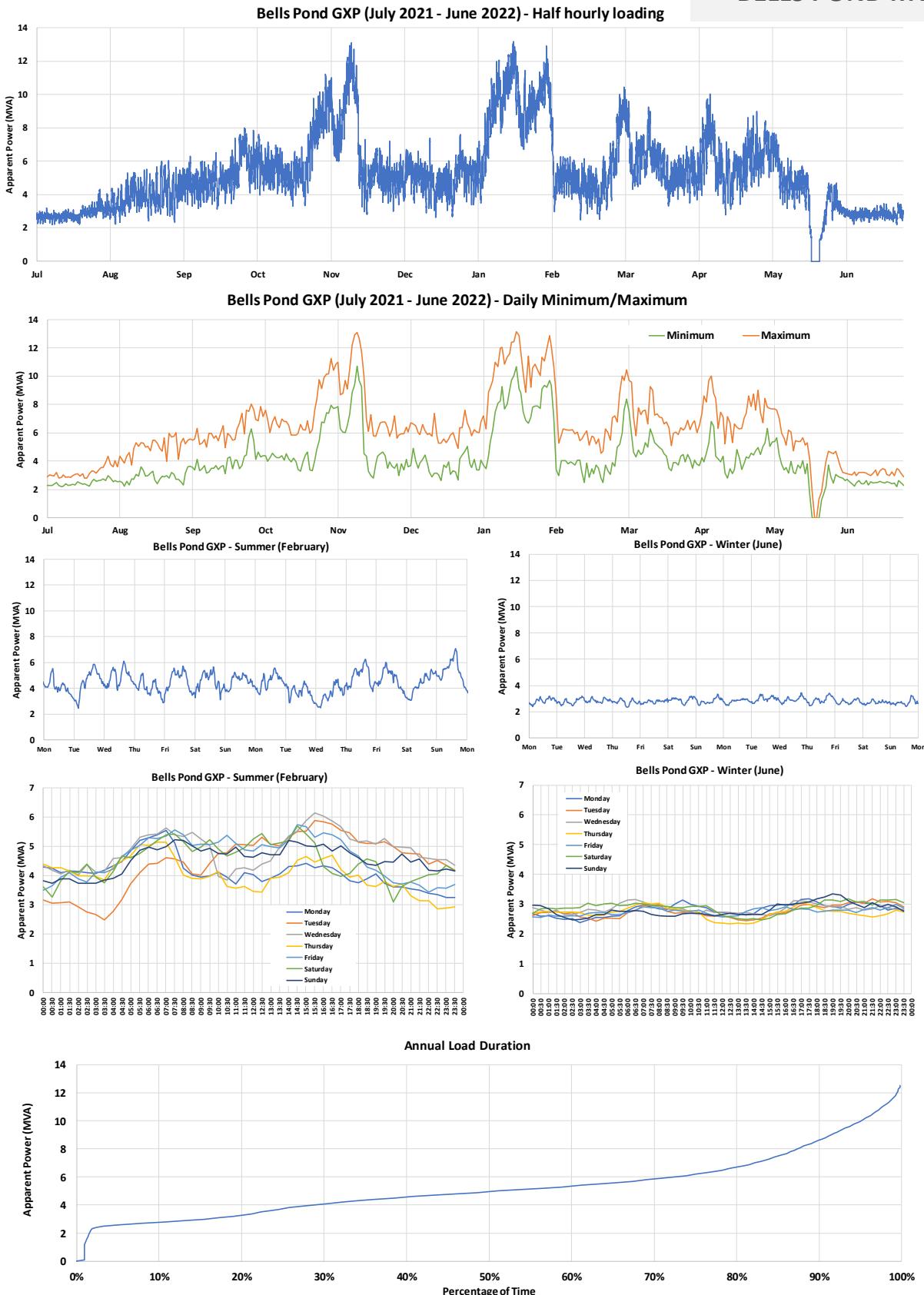
BELLS POND MVA


Figure 5 Bells Pond: Apparent power (MVA) load characteristics

BELLS POND MVar

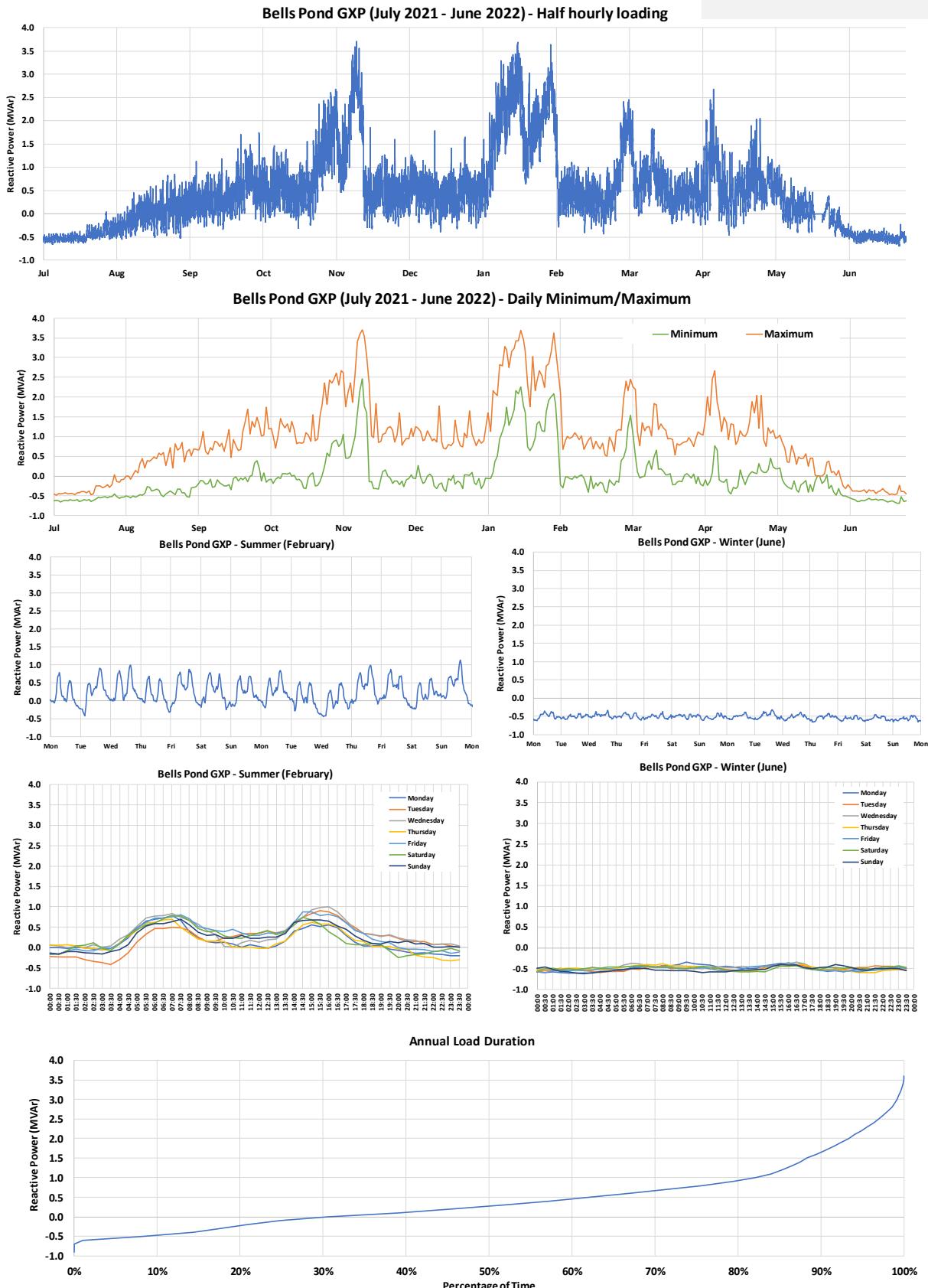


Figure 6 Bells Pond: Reactive power (MVar) load characteristics

BLACK POINT MVA

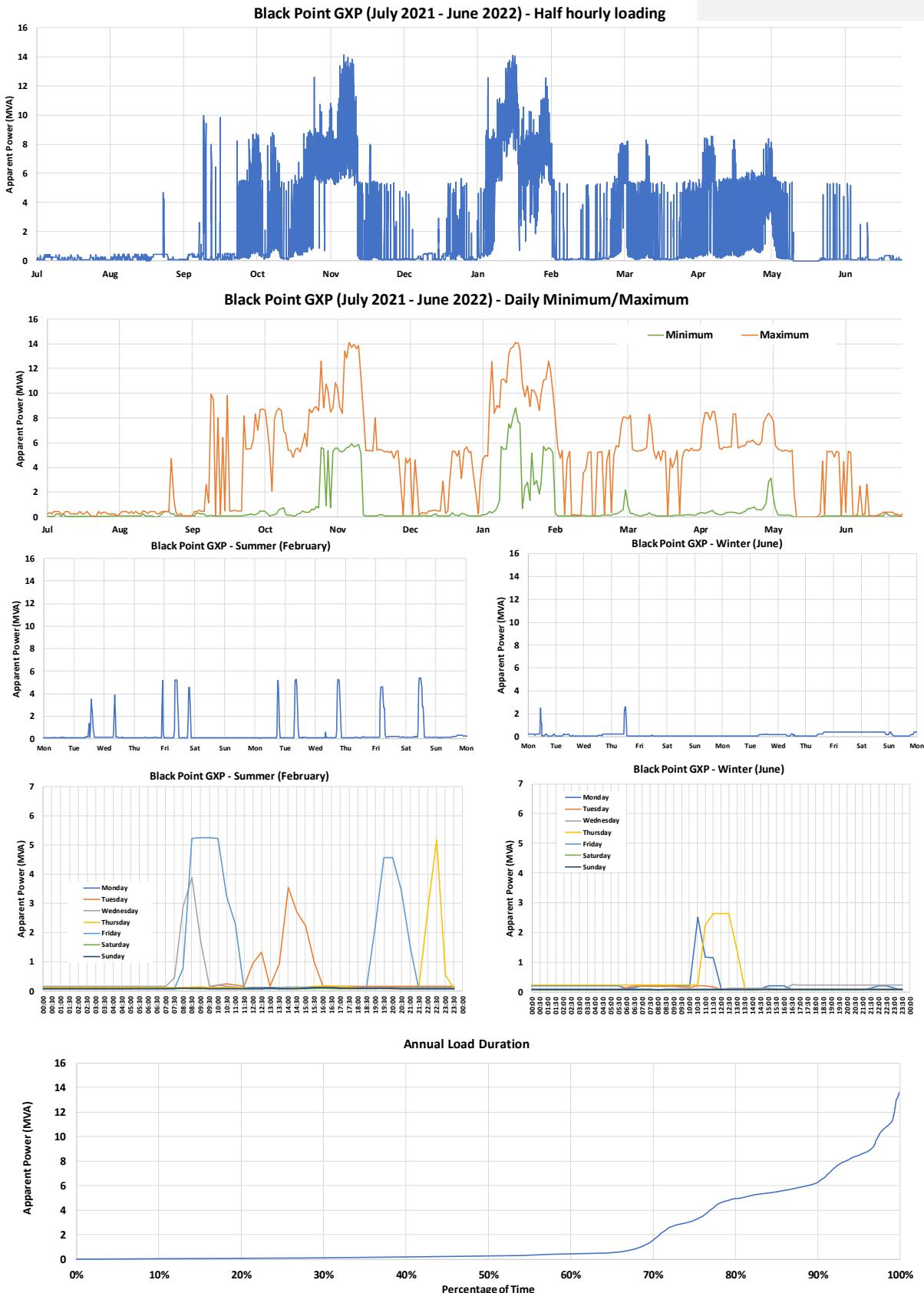


Figure 7 Black Point: Apparent power (MVA) load characteristics

BLACK POINT MVAr

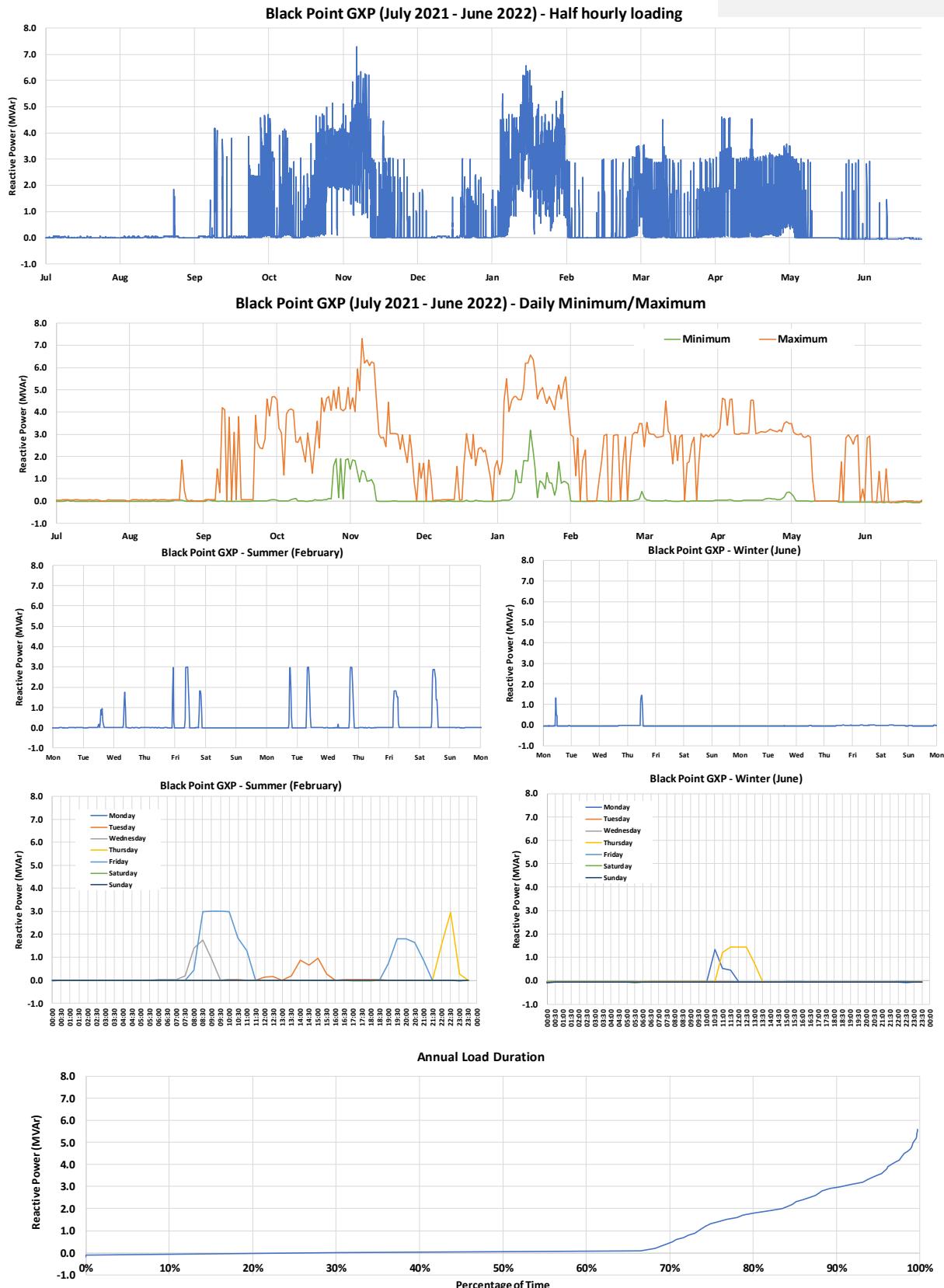


Figure 8 Black Point: Reactive power (MVAr) load characteristics

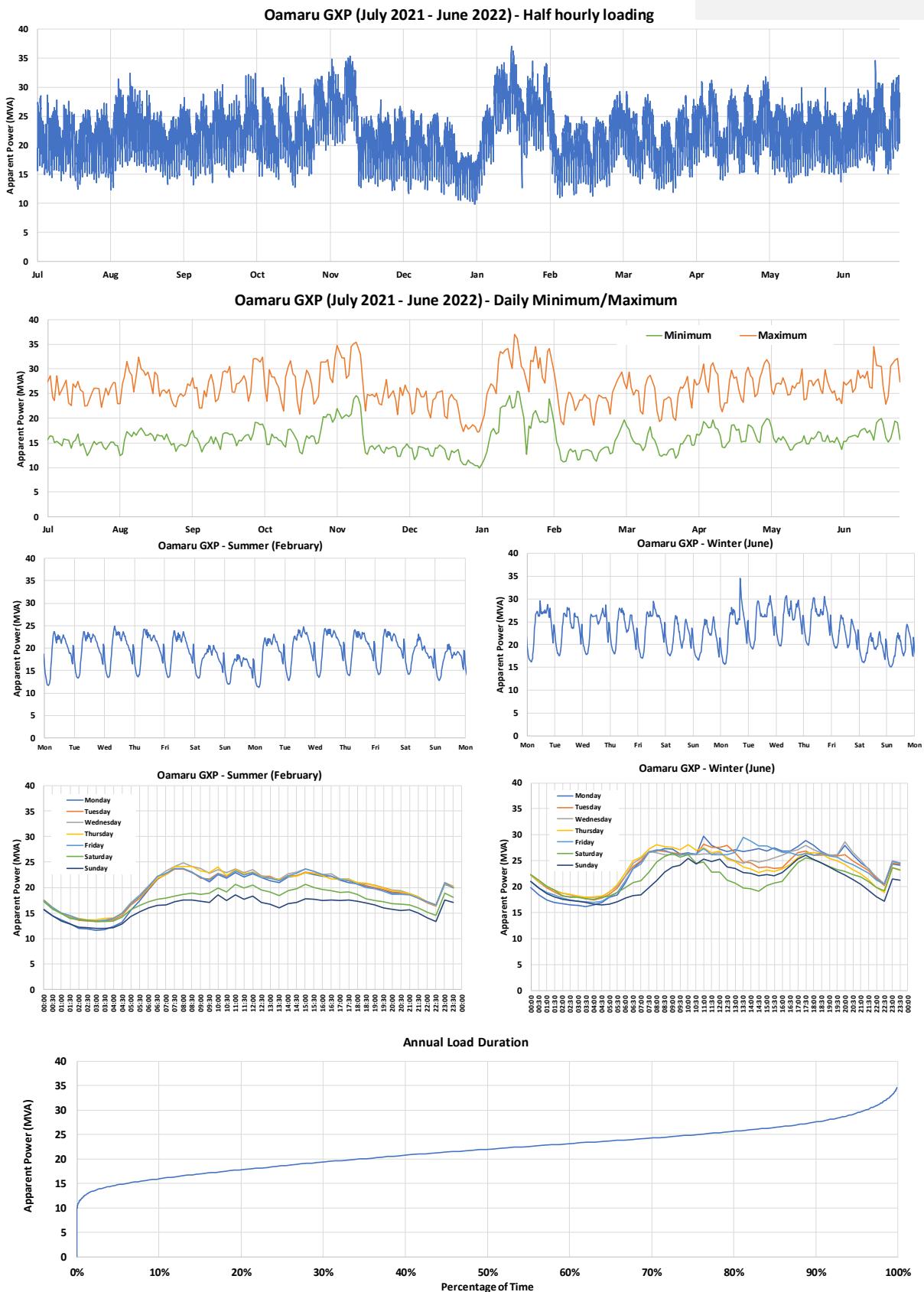
OAMARU MVA


Figure 9 Oamaru: Apparent power (MVA) load characteristics

OAMARU MVAr

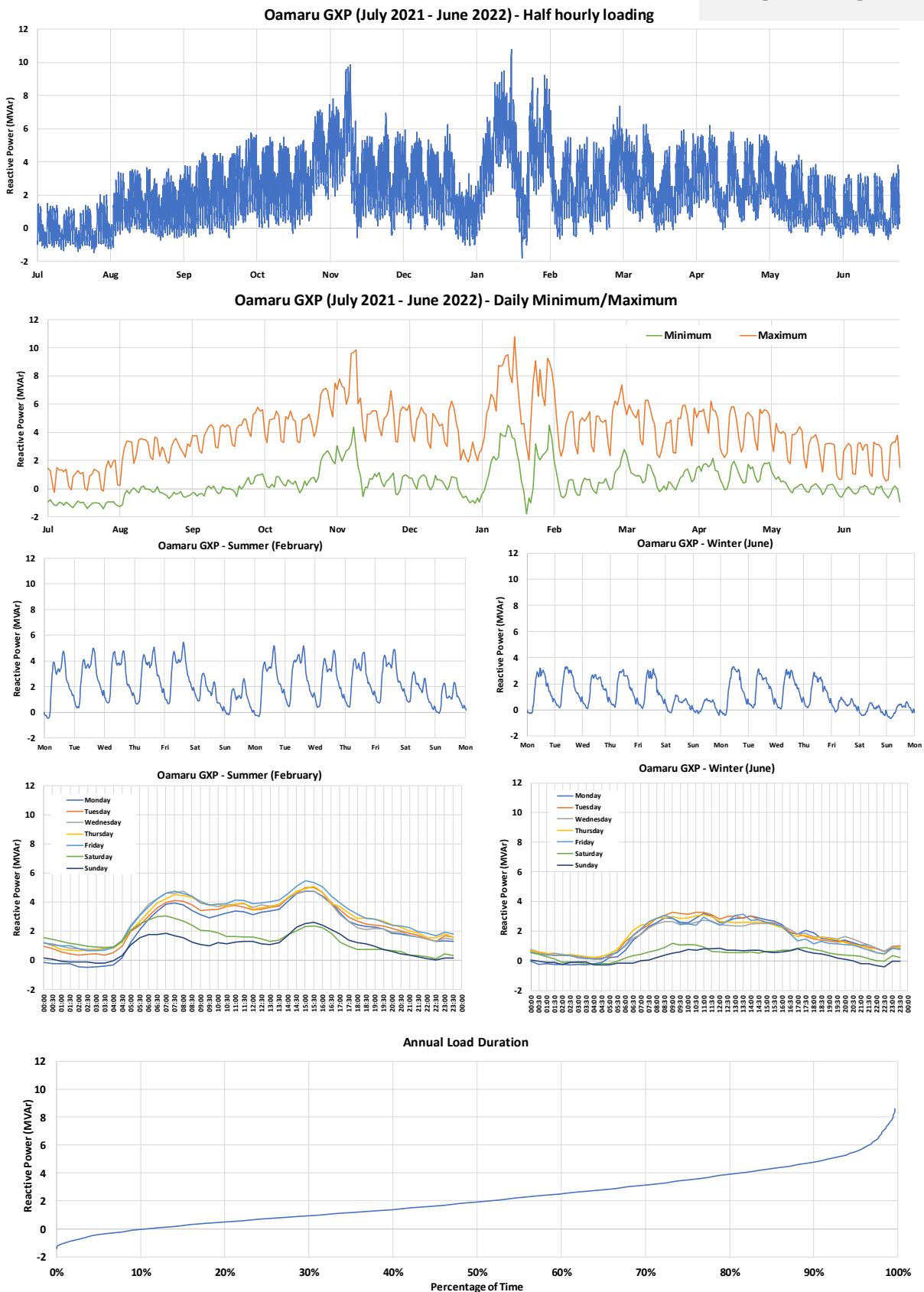


Figure 10 Oamaru: Reactive power (MVAr) load characteristics

STUDHOLME MVA

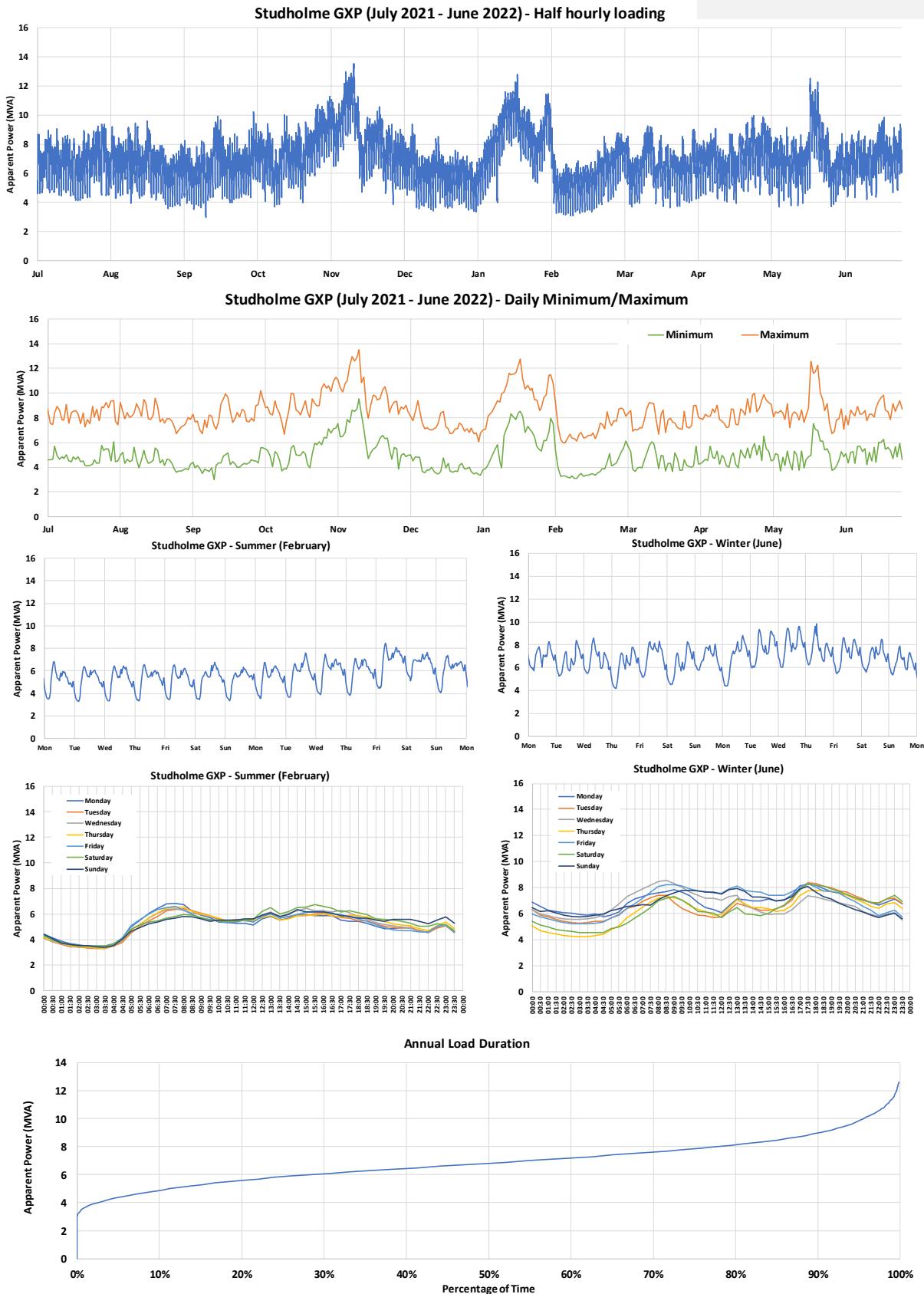


Figure 11 Studholme: Apparent power (MVA) load characteristics

STUDHOLME MVAR

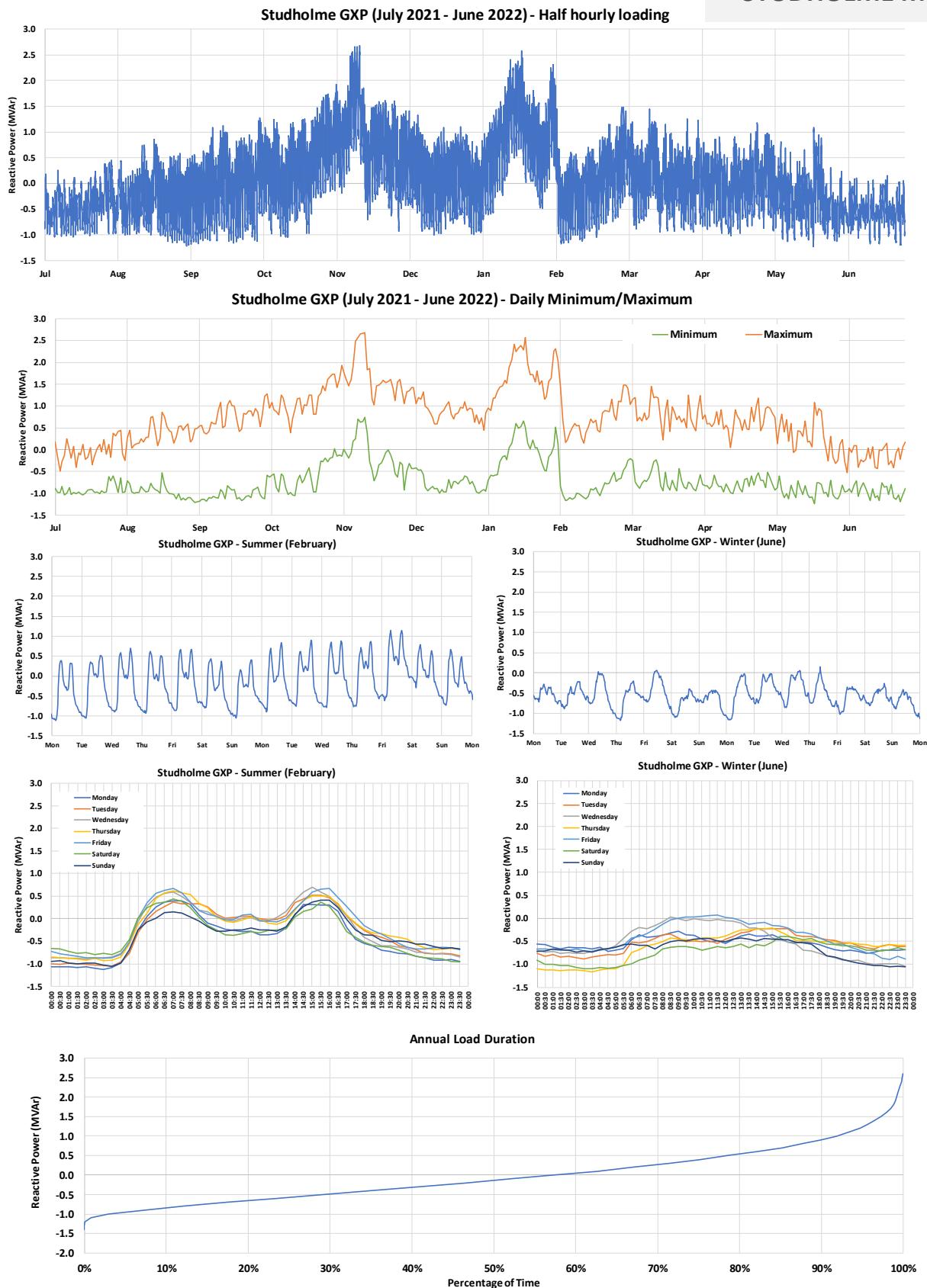


Figure 12 Studholme: Reactive power (MVA) load characteristics

TEKAPO A MVA

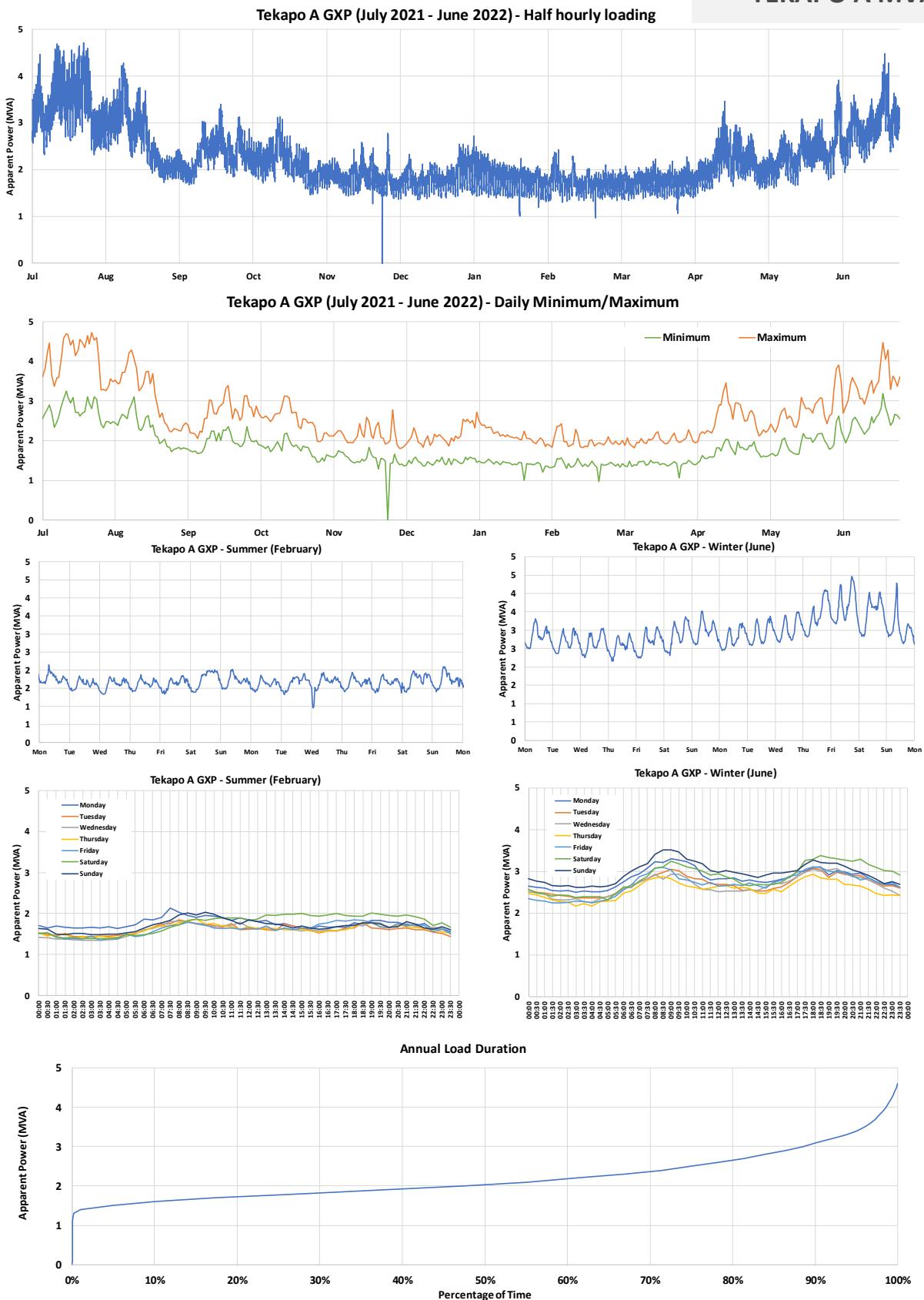


Figure 13 Tekapo A: Apparent power (MVA) load characteristics

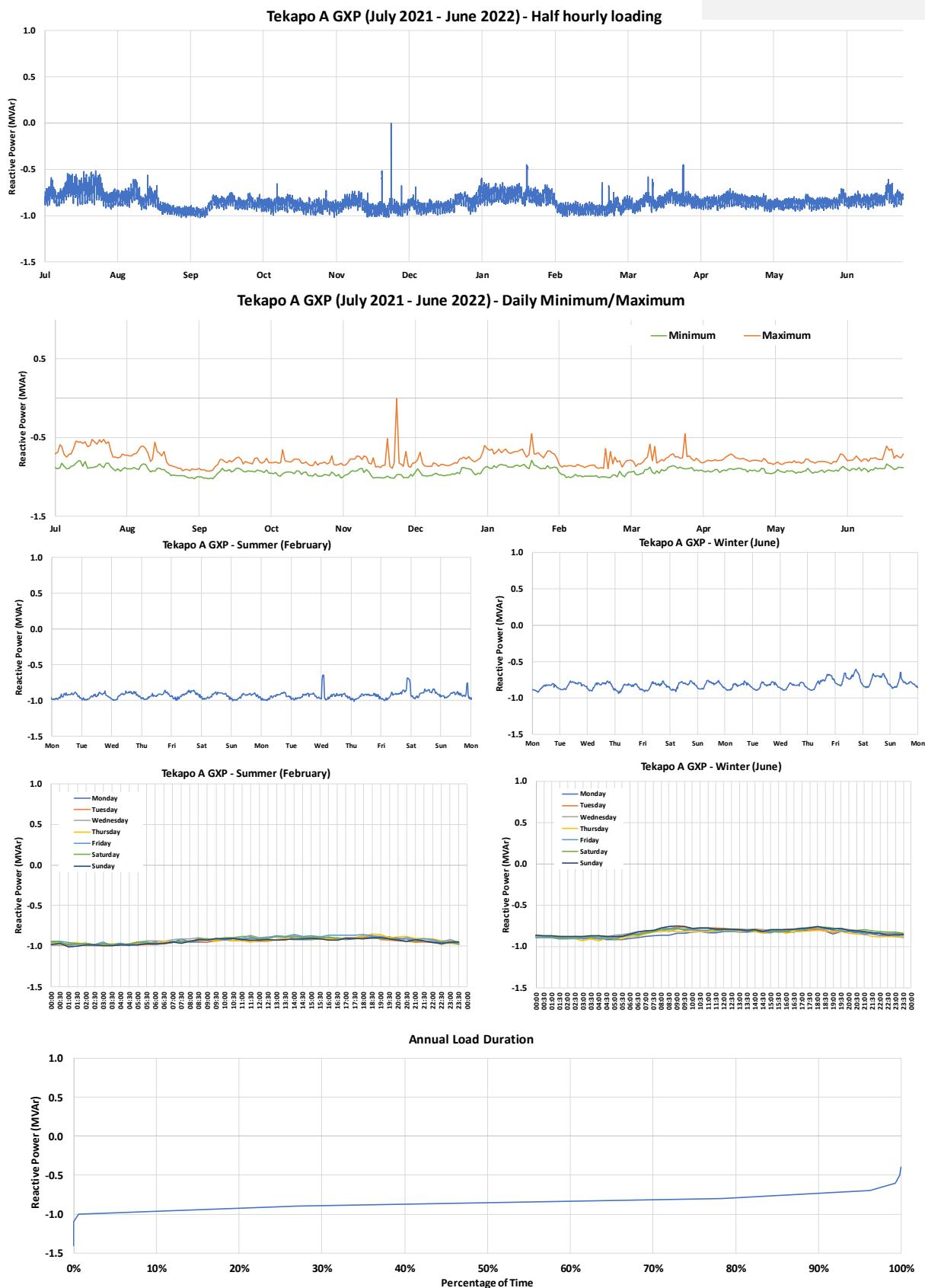
TEKAPO A MVAr


Figure 14 Tekapo A: Reactive power (MVAr) load characteristics

TEMUKA MVA

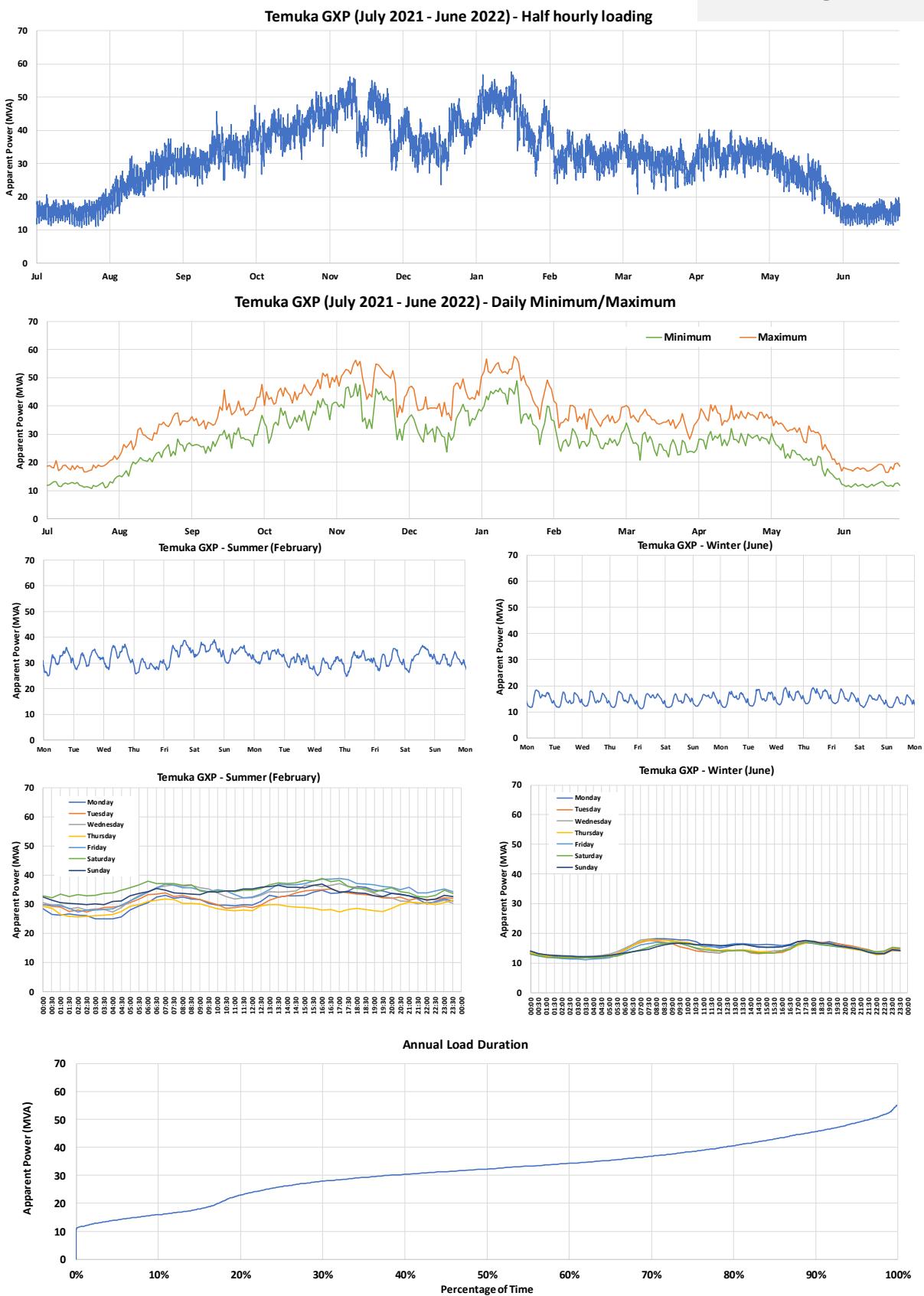


Figure 15 Temuka: Apparent power (MVA) load characteristics

TEMUKA MVAr

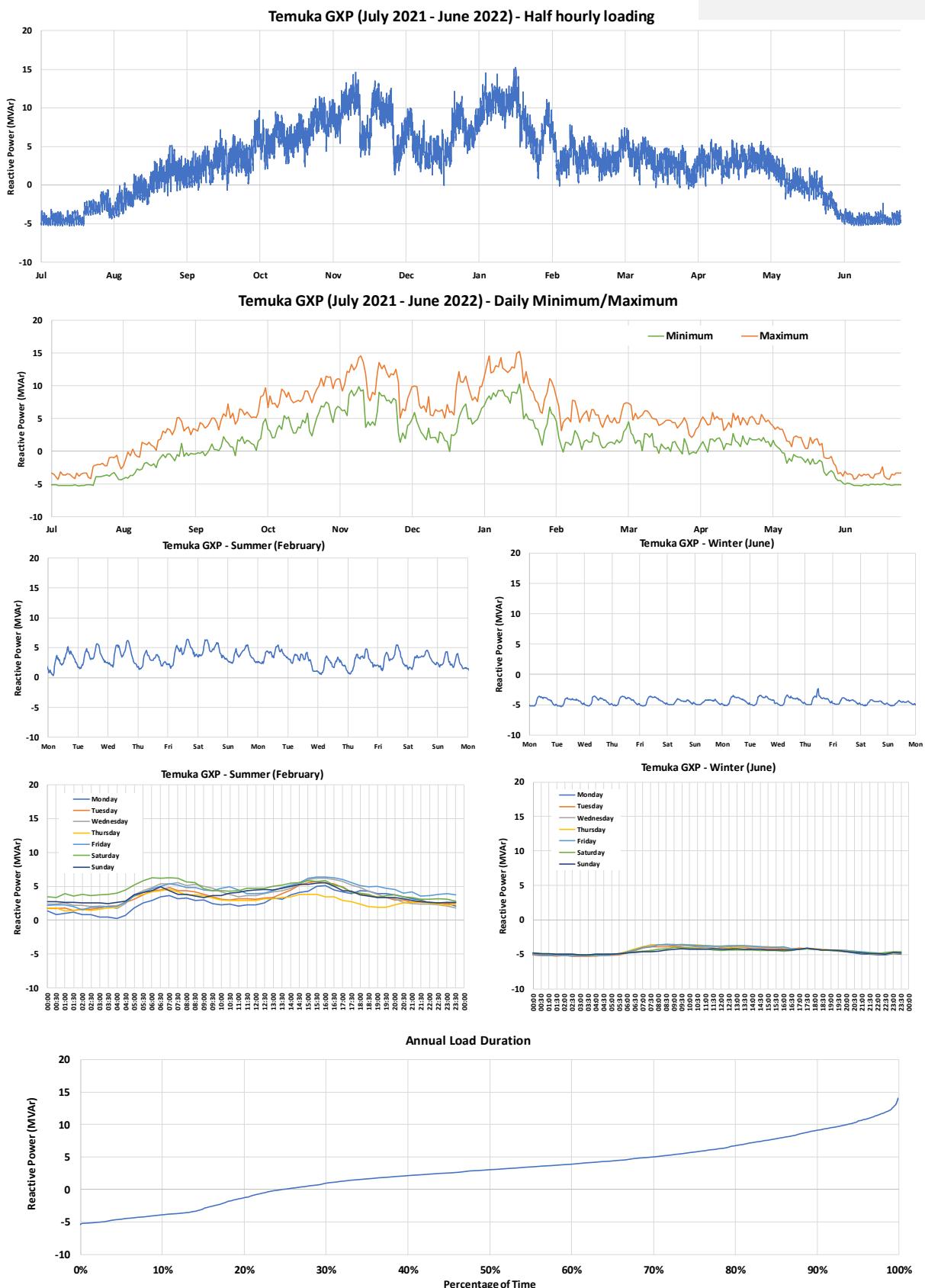


Figure 16 Temuka: Reactive power (MVAr) load characteristics

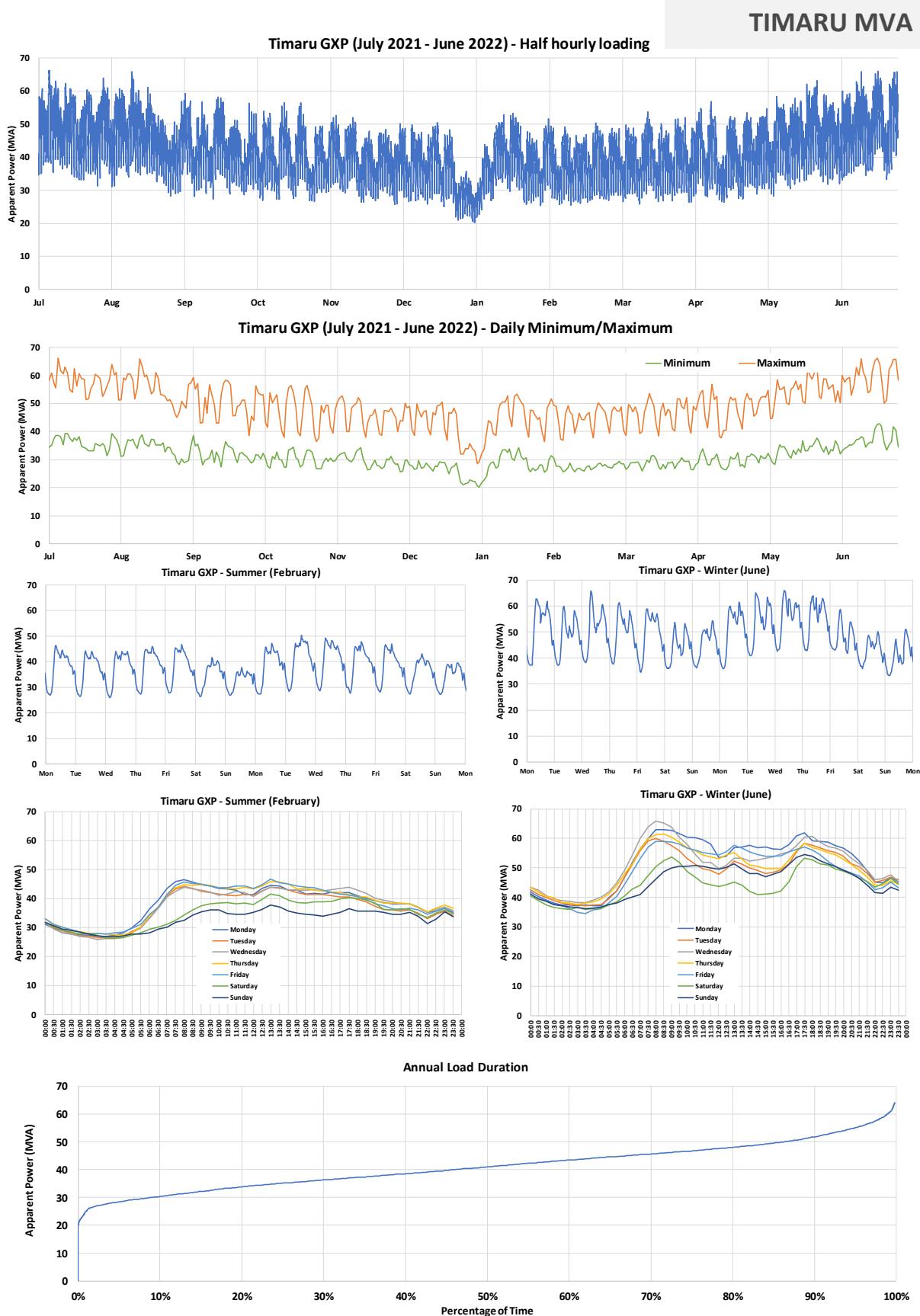


Figure 17 Timaru: Apparent power (MVA) load characteristics

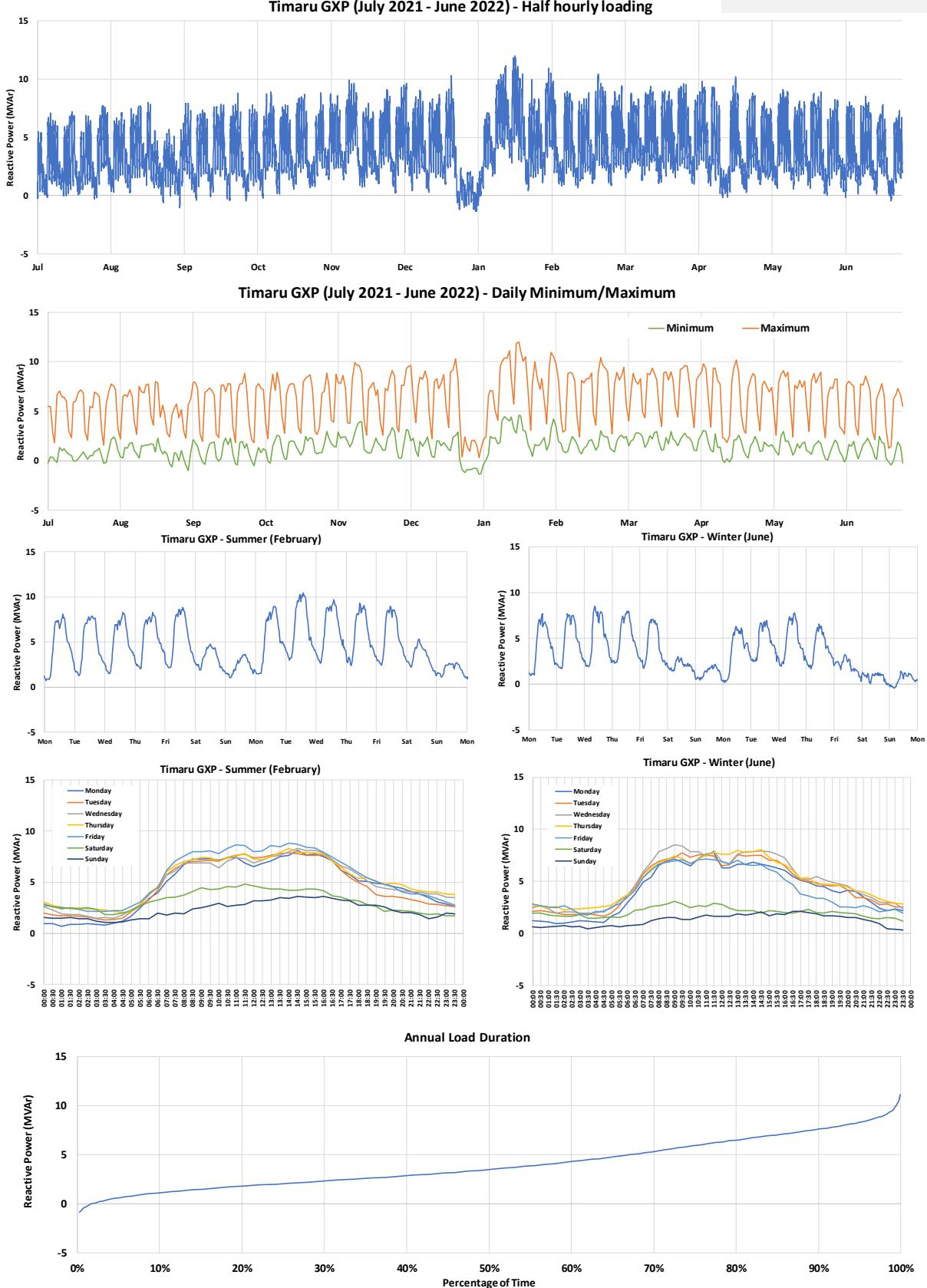
TIMARU MVAr


Figure 18 Timaru: Reactive power (MVAr) load characteristics

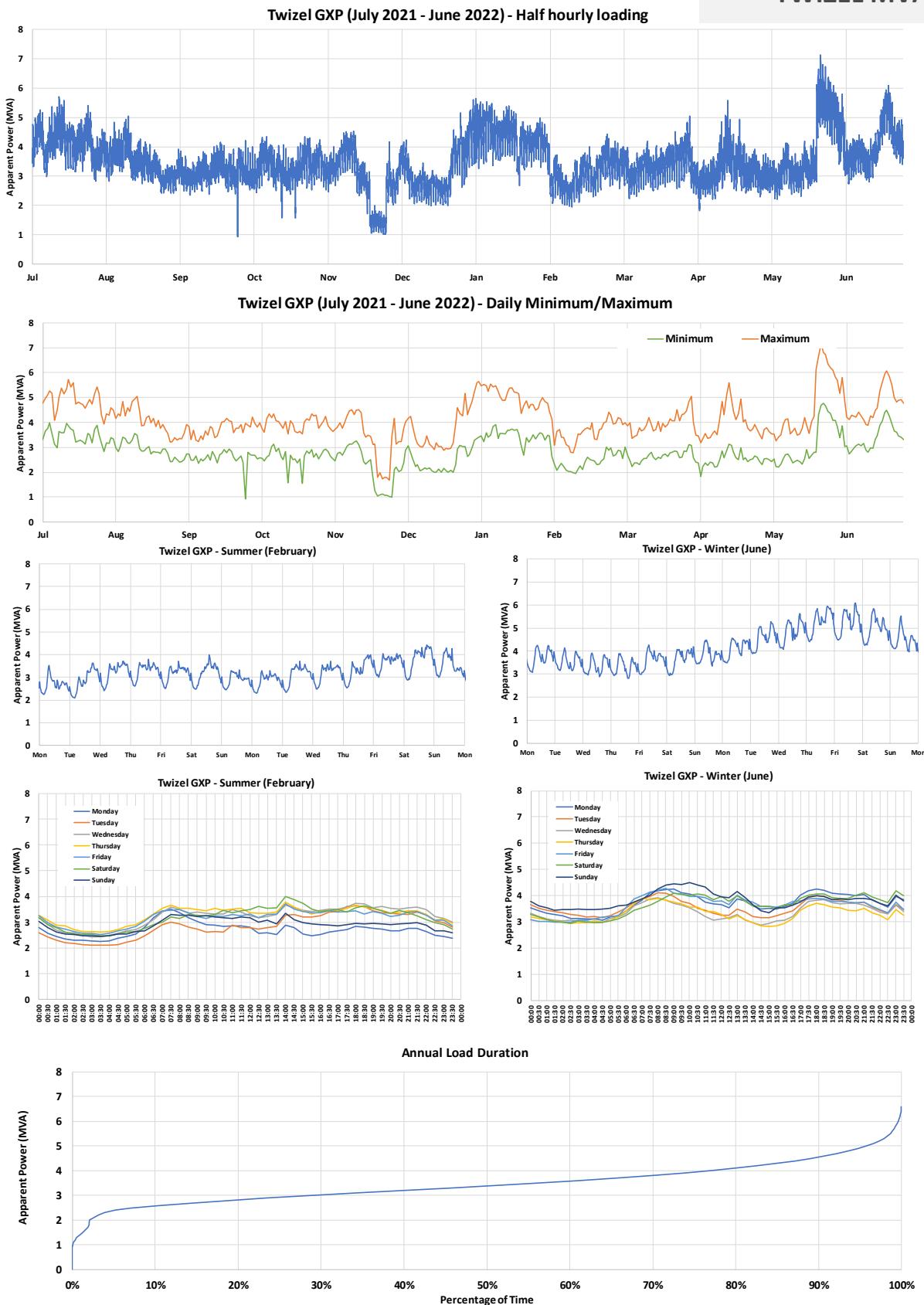
TWIZEL MVA


Figure 19 Twizel: Apparent power (MVA) load characteristics

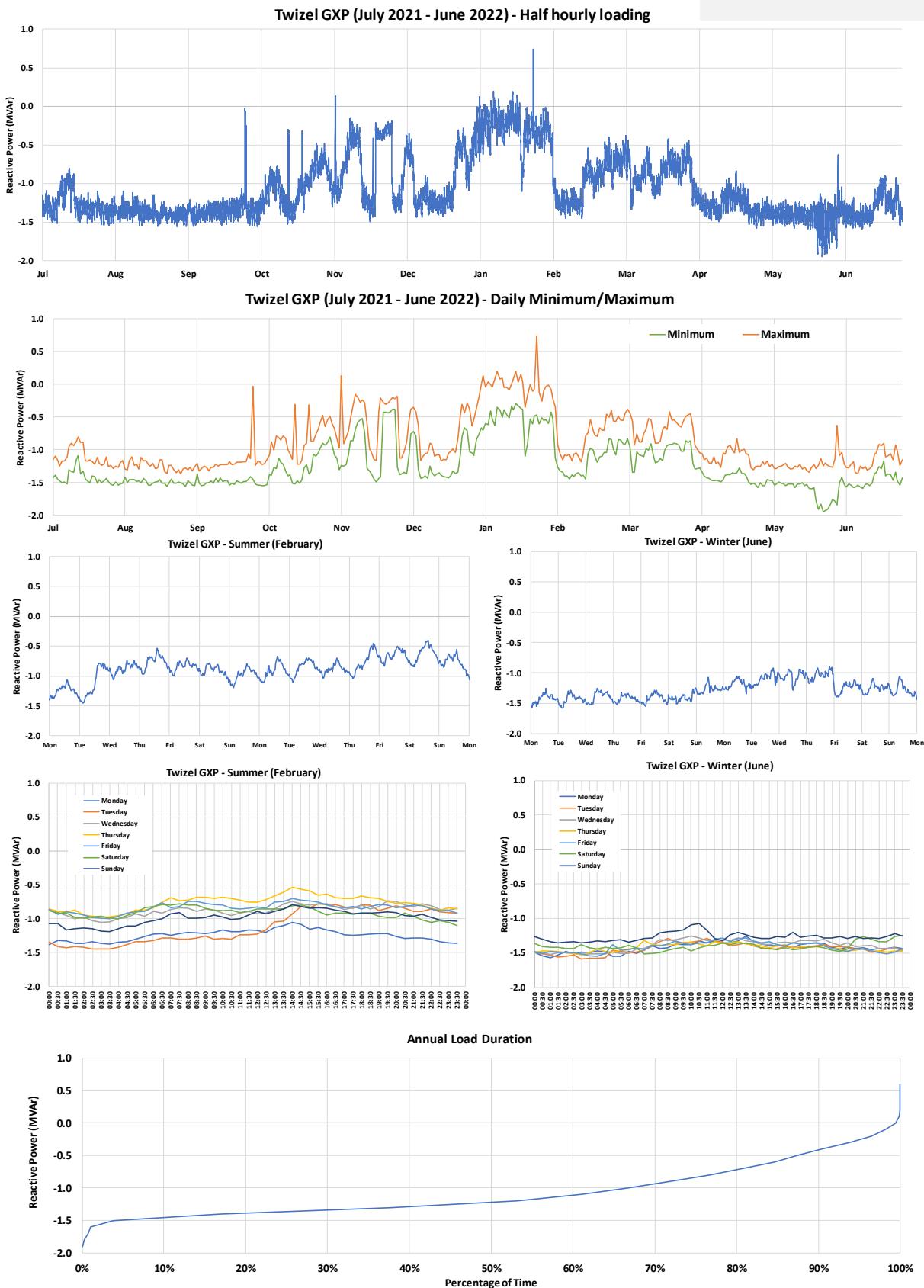
TWIZEL MVAr


Figure 20 Twizel: Reactive power (MVAr) load characteristics

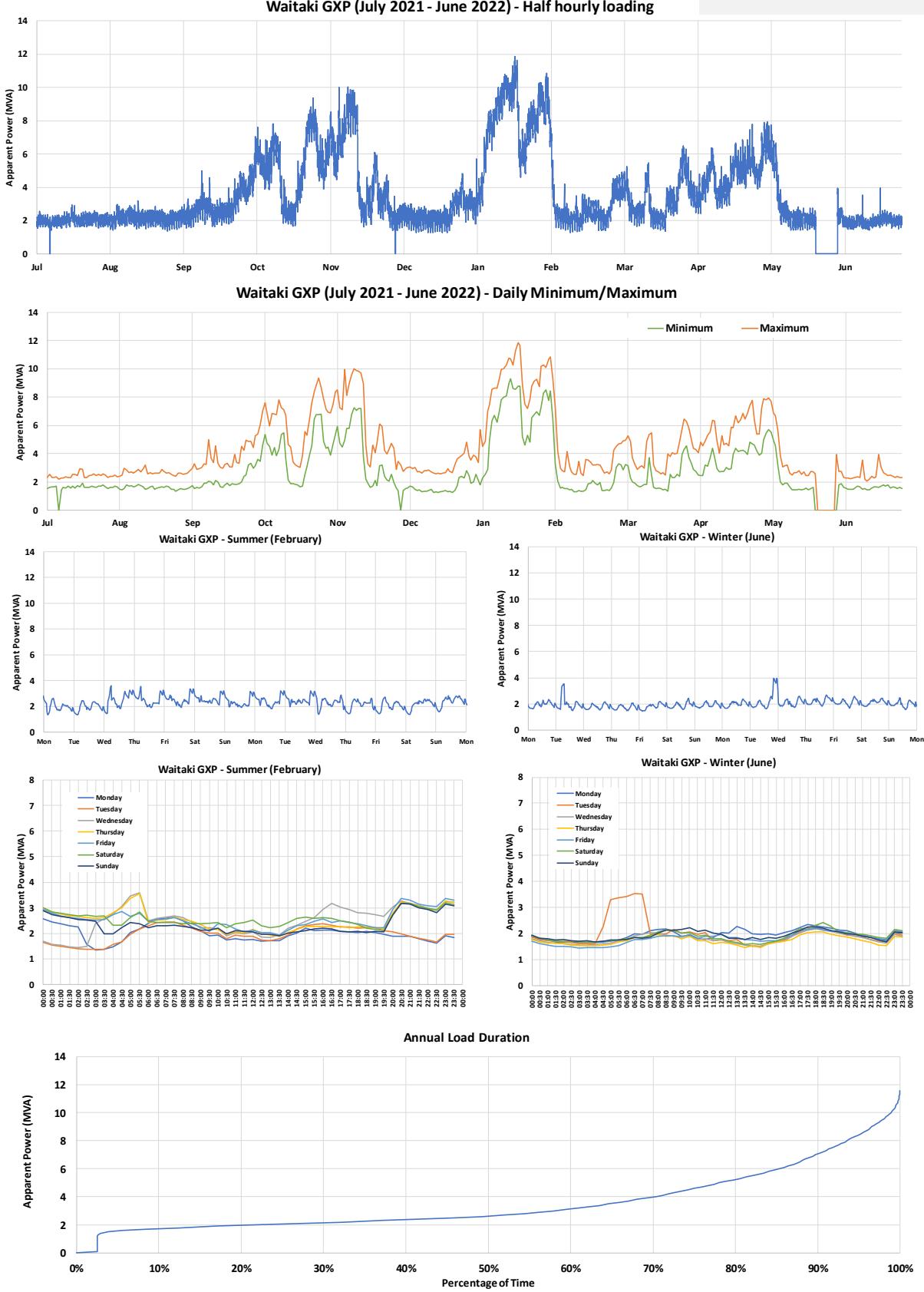
WAITAKI MVA


Figure 21 Waitaki: Apparent power (MVA) load characteristics

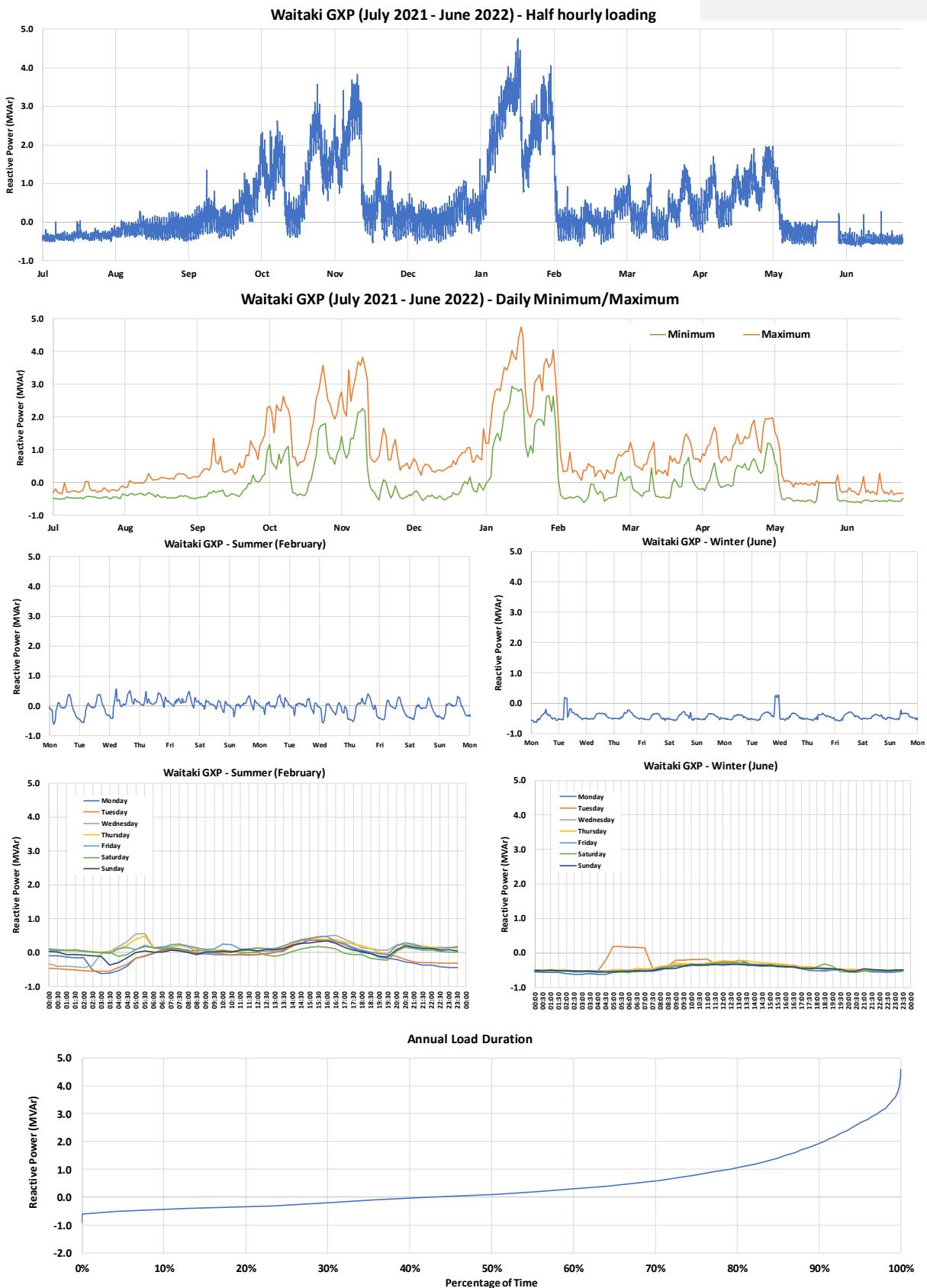
WAITAKI MVAr


Figure 22 Waitaki: Reactive power (MVAr) load characteristics

3. Zone Substations

3.1 EA Networks

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

- **Figure 23** Ashburton 66/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 24** Carew 66/22kV zone substation: Apparent power (MVA) load characteristics
- **Figure 25** Coldstream 66/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 26** Dorie 66/22kV zone substation: Apparent power (MVA) load characteristics
- **Figure 27** Eiffelton 66/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 28** Fairton 66/22/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 29** Hackthorne 66/22kV zone substation: Apparent power (MVA) load characteristics
- **Figure 30** Lagmhor 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 31** Lauriston 66/22kV zone substation: Apparent power (MVA) load characteristics
- **Figure 32** Methven 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 34** Mt Hutt 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 35** Montalto 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 36** Mt Somers 33/22kV zone substation: Apparent power (MVA) load characteristics
- **Figure 33** Methven 66/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 37** Northtown 66/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 38** Overdale 66/22kV zone substation: Apparent power (MVA) load characteristics
- **Figure 39** Pendarves 66/22kV zone substation: Apparent power (MVA) load characteristics
- **Figure 40** Seafield 22/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 41** Seafield 66/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 42** Tinwald 66/22/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 43** Waikanui 66/11kV zone substation: Apparent power (MVA) load characteristics

ASHBURTON MVA

YET TO BE SUPPLIED

Figure 23 Ashburton 66/11kV zone substation: Apparent power (MVA) load characteristics

CAREW MVA

YET TO BE SUPPLIED

Figure 24 Carew 66/22kV zone substation: Apparent power (MVA) load characteristics

COLDSTREAM MVA

YET TO BE SUPPLIED

Figure 25 Coldstream 66/11kV zone substation: Apparent power (MVA) load characteristics

DORIE MVA

YET TO BE SUPPLIED

Figure 26 Dorie 66/22kV zone substation: Apparent power (MVA) load characteristics

EIFFELTON MVA

YET TO BE SUPPLIED

Figure 27 Eiffelton 66/11kV zone substation: Apparent power (MVA) load characteristics

FAIRTON MVA

YET TO BE SUPPLIED

Figure 28 Fairton 66/22/11kV zone substation: Apparent power (MVA) load characteristics

HACKTHORNE MVA

YET TO BE SUPPLIED

Figure 29 Hackthorne 66/22kV zone substation: Apparent power (MVA) load characteristics

LAGMHOR MVA

YET TO BE SUPPLIED

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

LAURISTON MVA

YET TO BE SUPPLIED

Figure 31 Lauriston 66/22kV zone substation: Apparent power (MVA) load characteristics

METHVEN33 MVA

YET TO BE SUPPLIED

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

METHVEN66 MVA

YET TO BE SUPPLIED

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

MT HUTT MVA

YET TO BE SUPPLIED

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

MONTALTO MVA

YET TO BE SUPPLIED

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

MT SOMERS MVA

YET TO BE SUPPLIED

Figure 36 Mt Somers 33/22kV zone substation: Apparent power (MVA) load characteristics

NORTHTOWN MVA

YET TO BE SUPPLIED

Figure 37 Northtown 66/11kV zone substation: Apparent power (MVA) load characteristics

OVERDALE MVA

YET TO BE SUPPLIED

Figure 38 Overdale 66/22kV zone substation: Apparent power (MVA) load characteristics

PENDARVES MVA

YET TO BE SUPPLIED

Figure 39 Pendarves 66/22kV zone substation: Apparent power (MVA) load characteristics

SEAFIELD22 MVA

YET TO BE SUPPLIED

Figure 40 Seafield 22/11kV zone substation: Apparent power (MVA) load characteristics

SEAFIELD66 MVA

YET TO BE SUPPLIED

Figure 41 Seafield 66/11kV zone substation: Apparent power (MVA) load characteristics

TINWALD MVA

YET TO BE SUPPLIED

Figure 42 Tinwald 66/22/11kV zone substation: Apparent power (MVA) load characteristics

Figure 43 Waikanui 66/11kV zone substation: Apparent power (MVA) load characteristics

3.2 Alpine Energy

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

- [Figure 44 Albury 110/11kV zone substation: Real power \(MW\) load characteristics](#)
- [Figure 45 Albury 110/11kV zone substation not including OPU connection: Real power \(MW\) load characteristics](#)
- [Figure 46 Bells Pond 110/33/11kV zone substation: Real power \(MW\) load characteristics](#)
- [Figure 47 Old Man Rage 11/22kV zone substation: Real power \(MW\) load characteristics](#)
- [Figure 48 Clandeboye 1 33/11kV zone substation: Real power \(MW\) load characteristics](#)
- [Figure 49 Clandeboye 2 33/11kV zone substation: Real power \(MW\) load characteristics](#)
- [Figure 50 Cooneys Rd 33/11kV zone substation: Real power \(MW\) load characteristics](#)
- [Figure 51 Fairlie 33/11kV zone substation: Real power \(MW\) load characteristics](#)
- [Figure 52 Geraldine 33/11kV zone substation: Real power \(MW\) load characteristics](#)
- [Figure 53 Haldon Lilybank 11/22kV zone substation: Real power \(MW\) load characteristics](#)
- [Figure 54 Pareora 33/11kV zone substation: Real power \(MW\) load characteristics](#)
- [Figure 55 Pleasant Point 33/11kV zone substation: Real power \(MW\) load characteristics](#)
- [Figure 56 Rangitata 33/11kV zone substation: Real power \(MW\) load characteristics](#)
- [Figure 57 Studholme 110/11kV zone substation: Real power \(MW\) load characteristics](#)
- [Figure 58 Tekapo Village 33/11kV zone substation: Real power \(MW\) load characteristics](#)
- [Figure 59 Temuka 33/11kV zone substation: Real power \(MW\) load characteristics at 11kV](#)
- [Figure 60 Temuka 33/11kV zone substation: Real power \(MW\) load characteristics at 33kV](#)
- [Figure 61 Timaru 110/11kV zone substation: Real power \(MW\) load characteristics](#)
- [Figure 62 Twizel Village 33/11kV zone substation: Real power \(MW\) load characteristics](#)
- [Figure 63 Unwin Hut 33/11kV zone substation: Real power \(MW\) load characteristics](#)

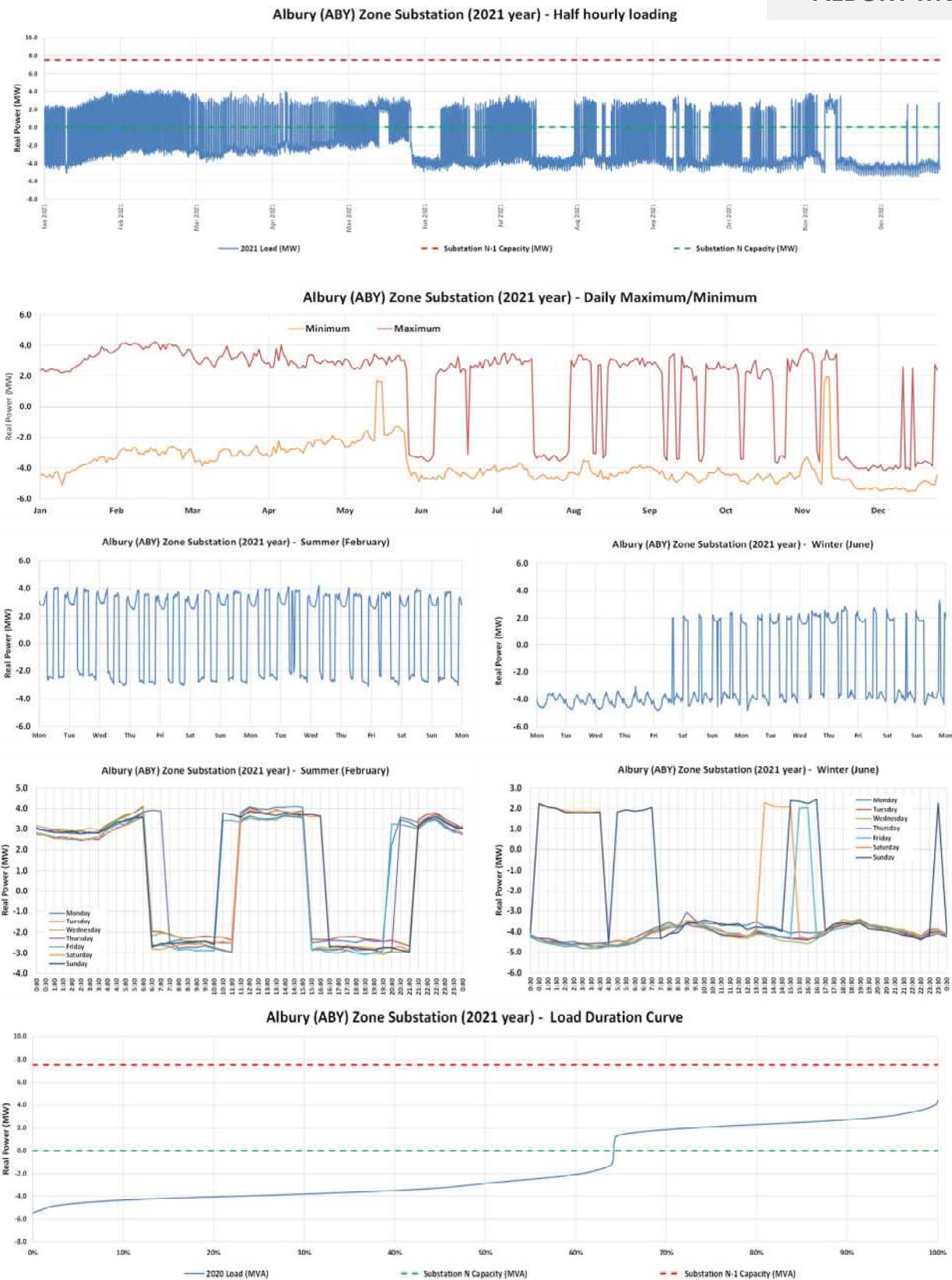
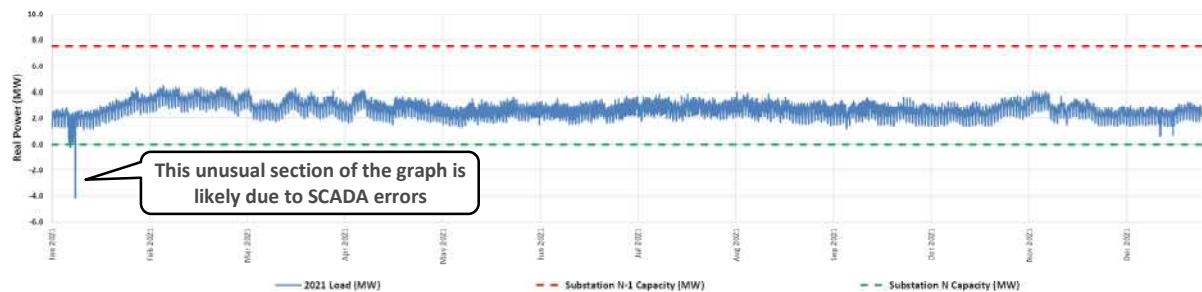
ALBURY MW


Figure 44 Albury 110/11kV zone substation: Real power (MW) load characteristics

ALBURY MW

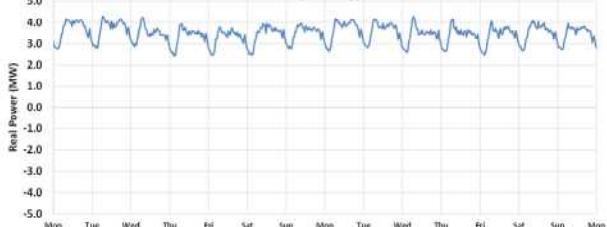
Albury (ABY) Zone Substation (2021 year) not including OPU generation - Half hourly load



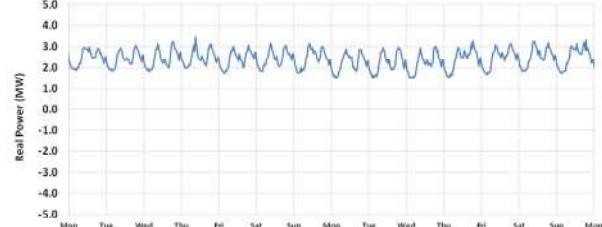
Albury (ABY) Zone Substation (2021 year) not including OPU generation - Daily Maximum/Minimum



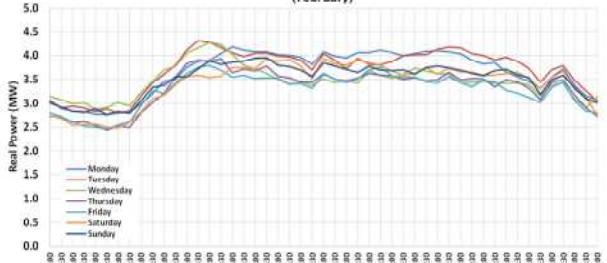
Albury (ABY) Zone Substation (2021 year) not including OPU generation - Summer (February)



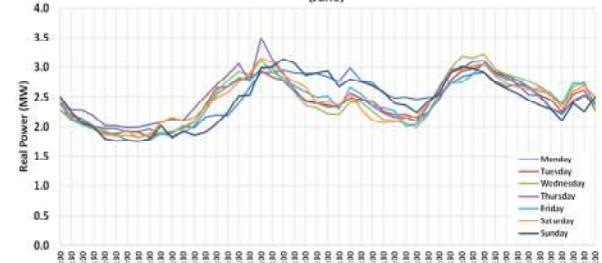
Albury (ABY) Zone Substation (2021 year) not including OPU generation - Winter (June)



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

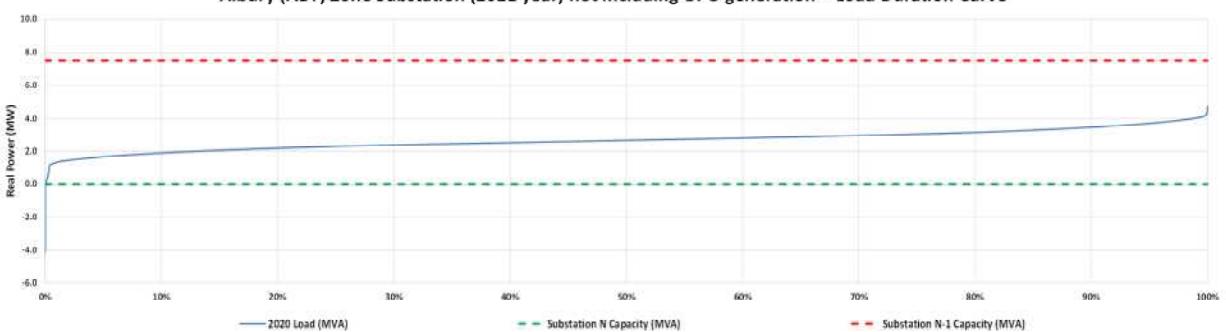


Figure 45 Albury 110/11kV zone substation not including OPU connection: Real power (MW) load characteristics

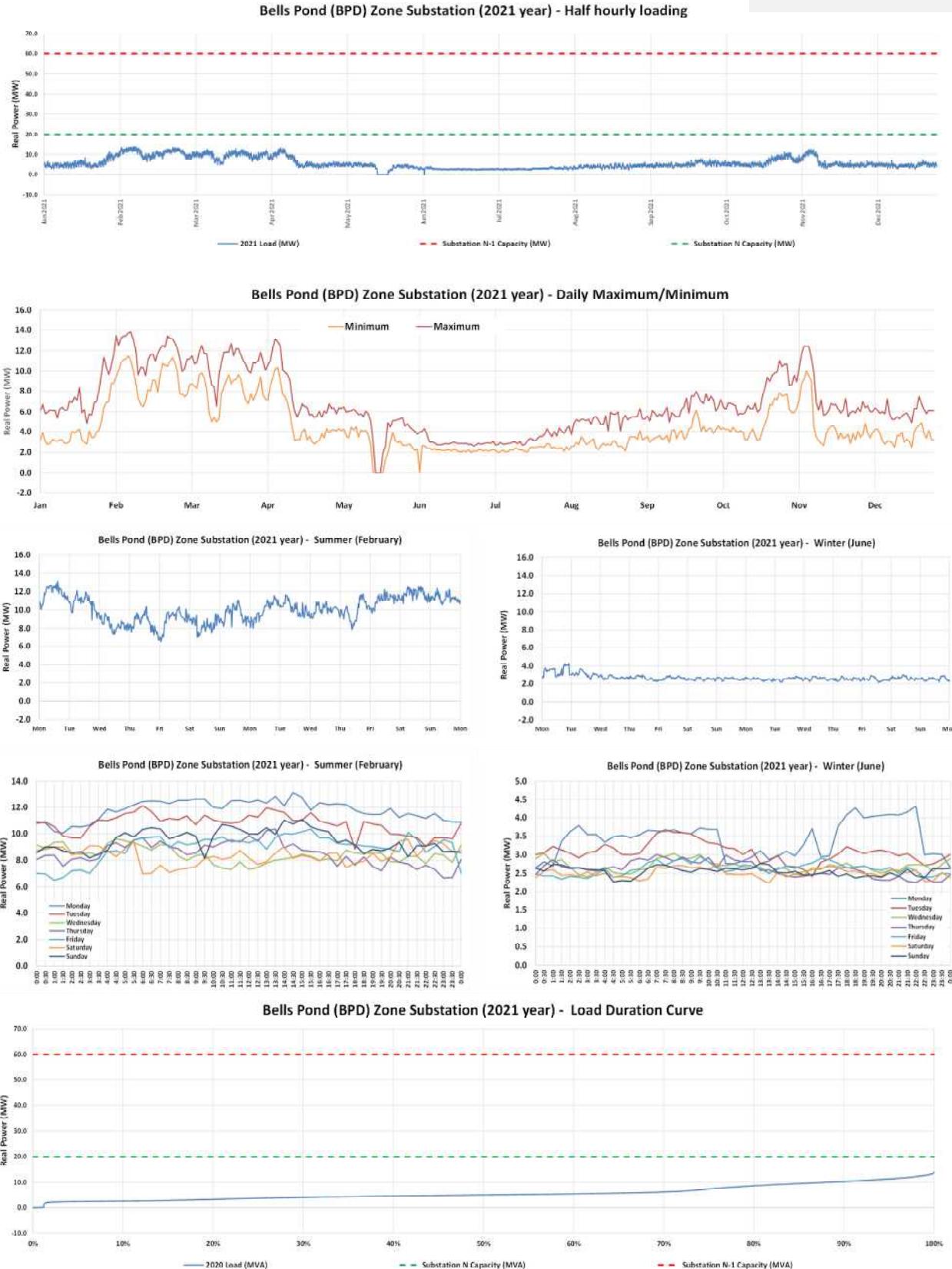
BELLS POND MW


Figure 46 Bells Pond 110/33/11kV zone substation: Real power (MW) load characteristics

Substation load not supplied

Figure 47 Old Man Rage 11/22kV zone substation: Real power (MW) load characteristics

OLD MAN RAGE
MW

CLANDEBOYE 1 MW

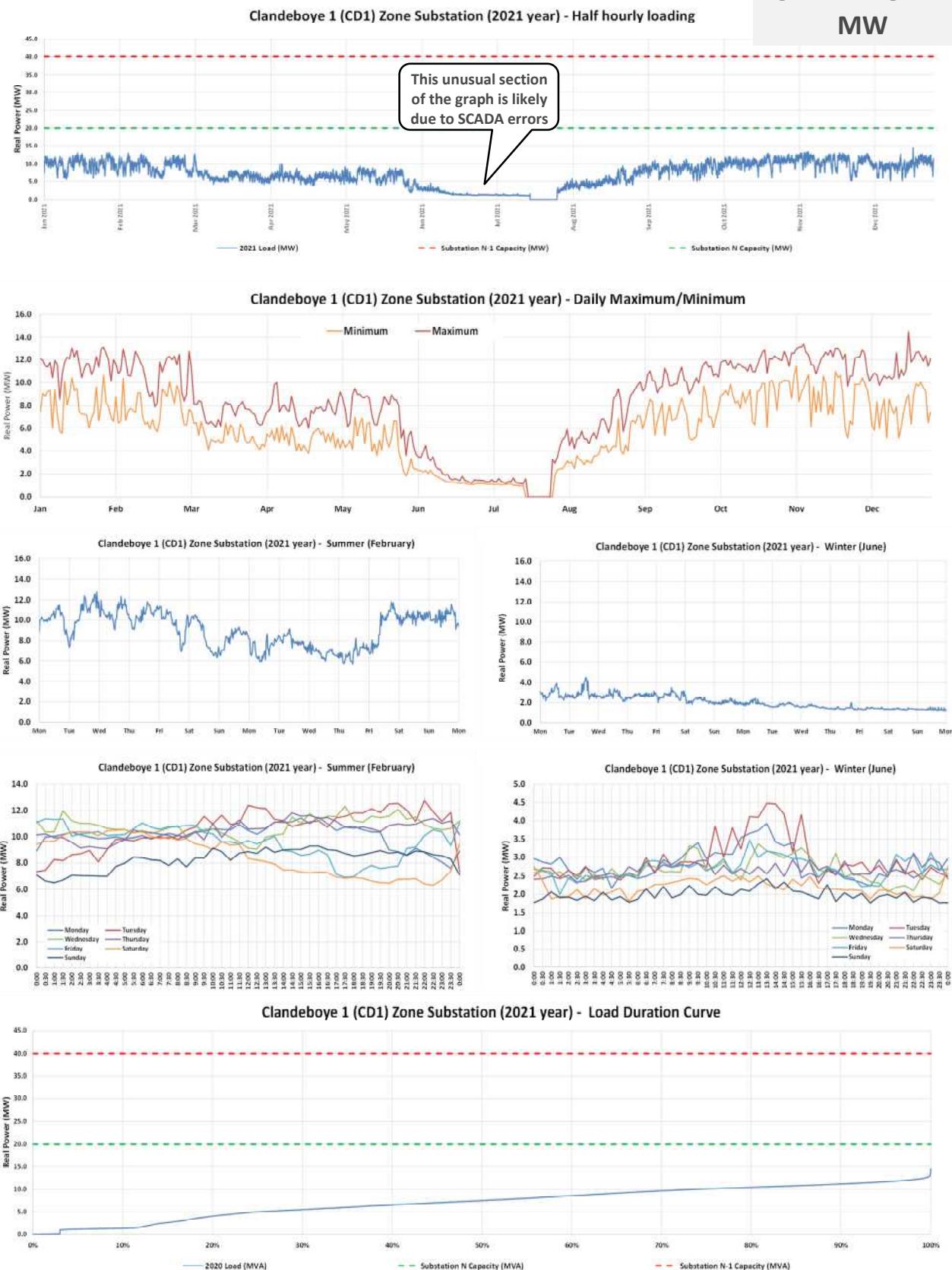


Figure 48 Clandeboye 1 33/11kV zone substation: Real power (MW) load characteristics

CLANDEBOYE 2 MW

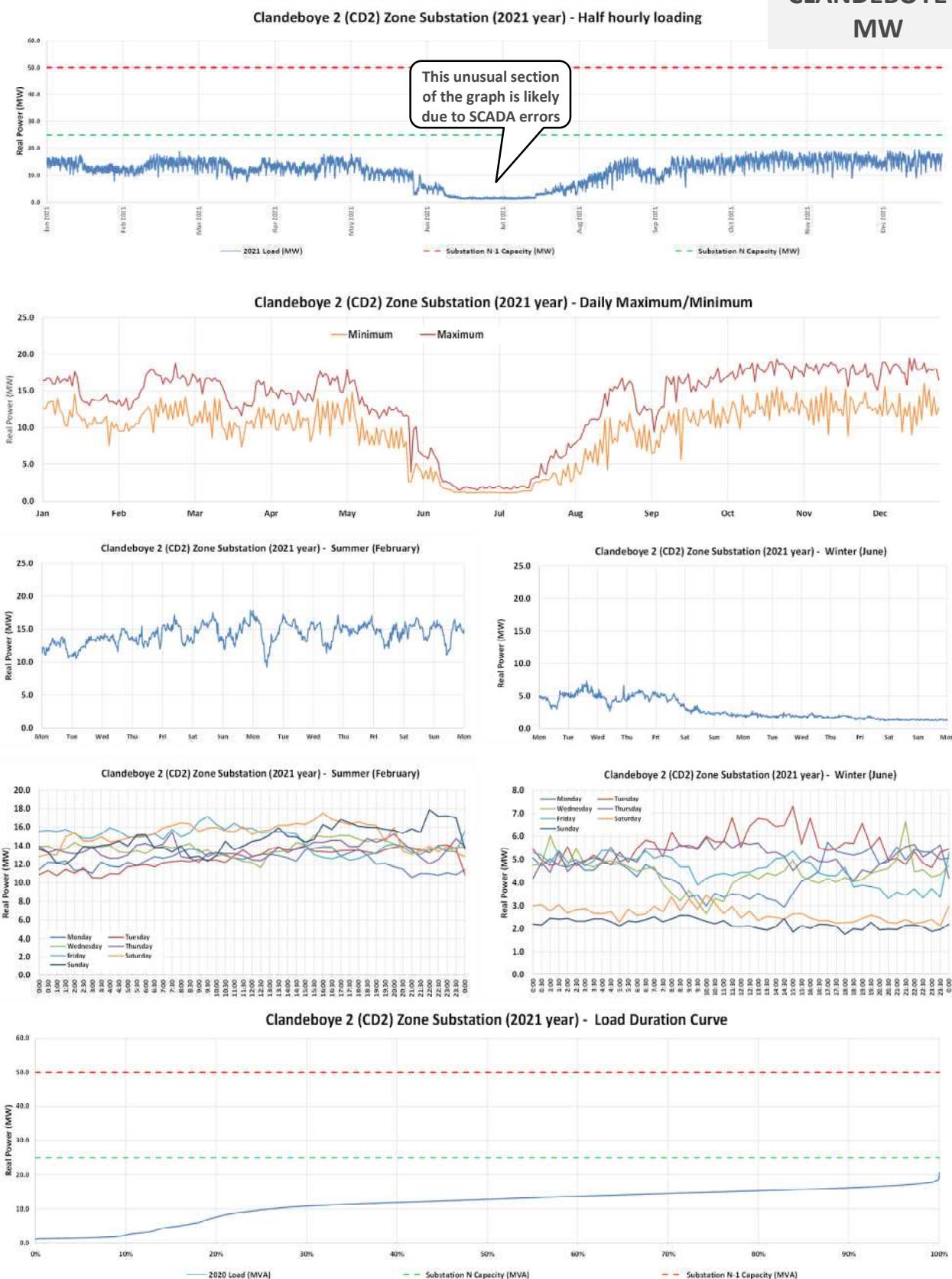


Figure 49 Clandeboye 2 33/11kV zone substation: Real power (MW) load characteristics

COONEYS RD MW

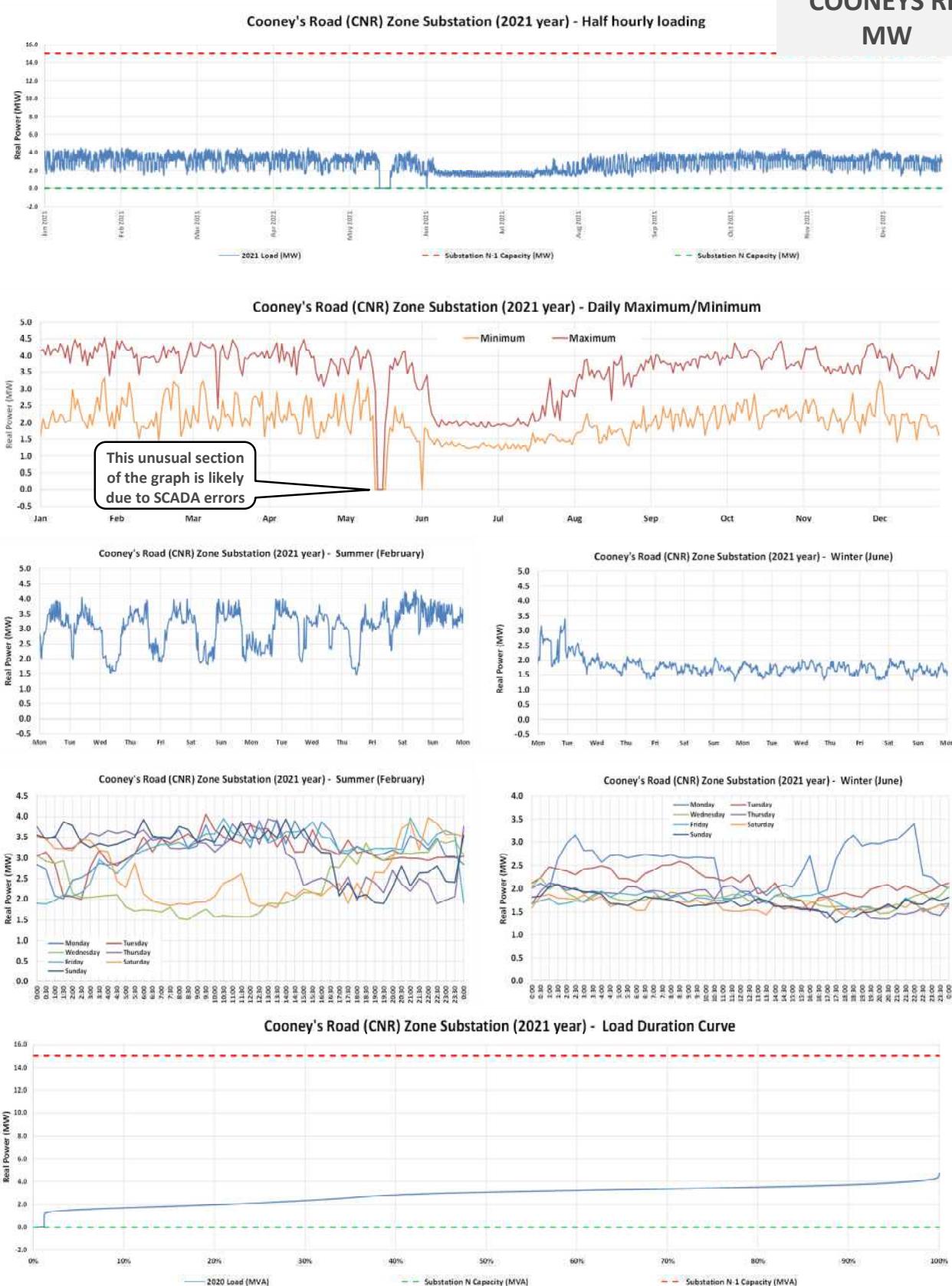


Figure 50 Cooneys Rd 33/11kV zone substation: Real power (MW) load characteristics

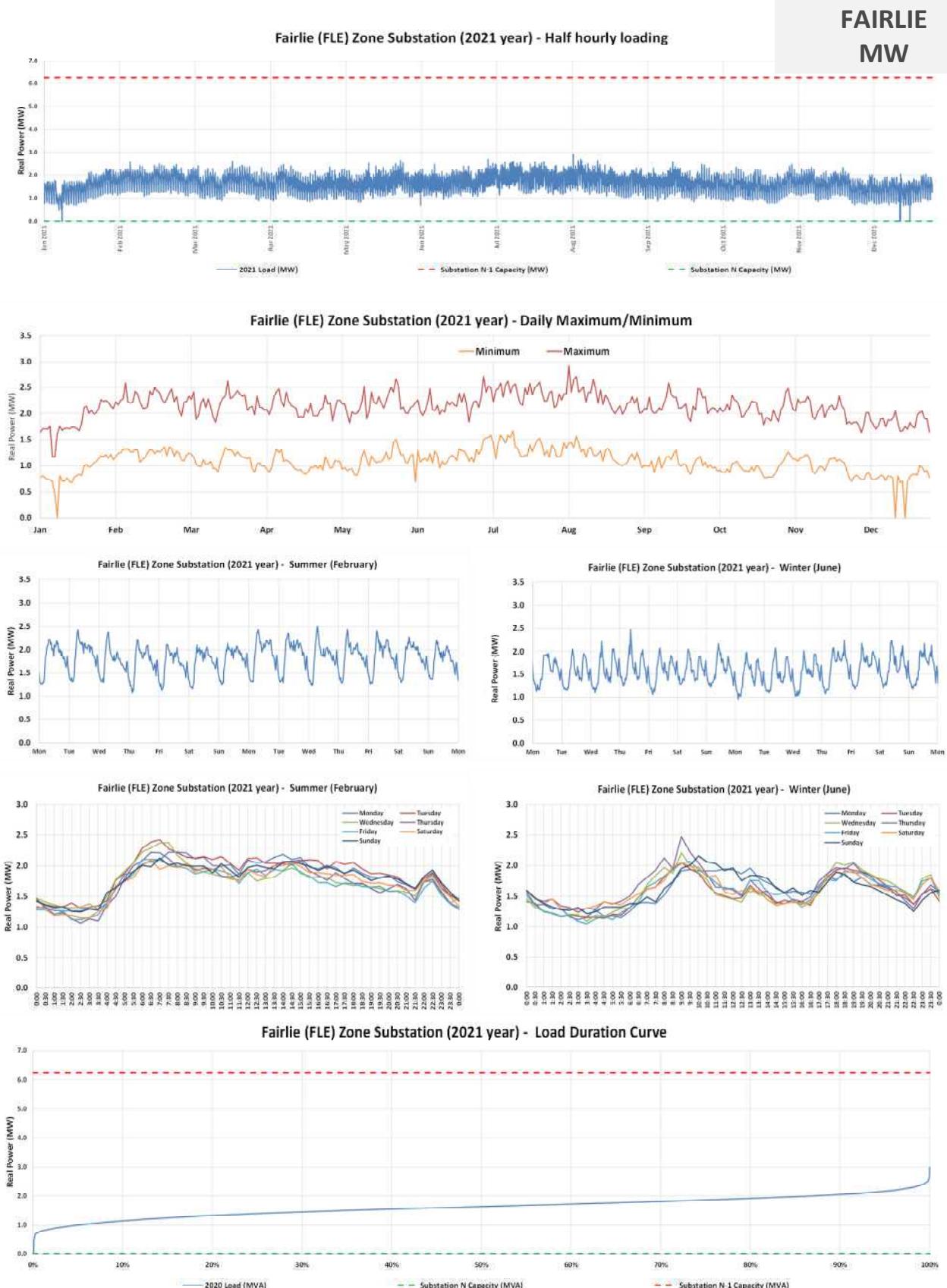


Figure 51 Fairlie 33/11kV zone substation: Real power (MW) load characteristics

GERALDINE MW

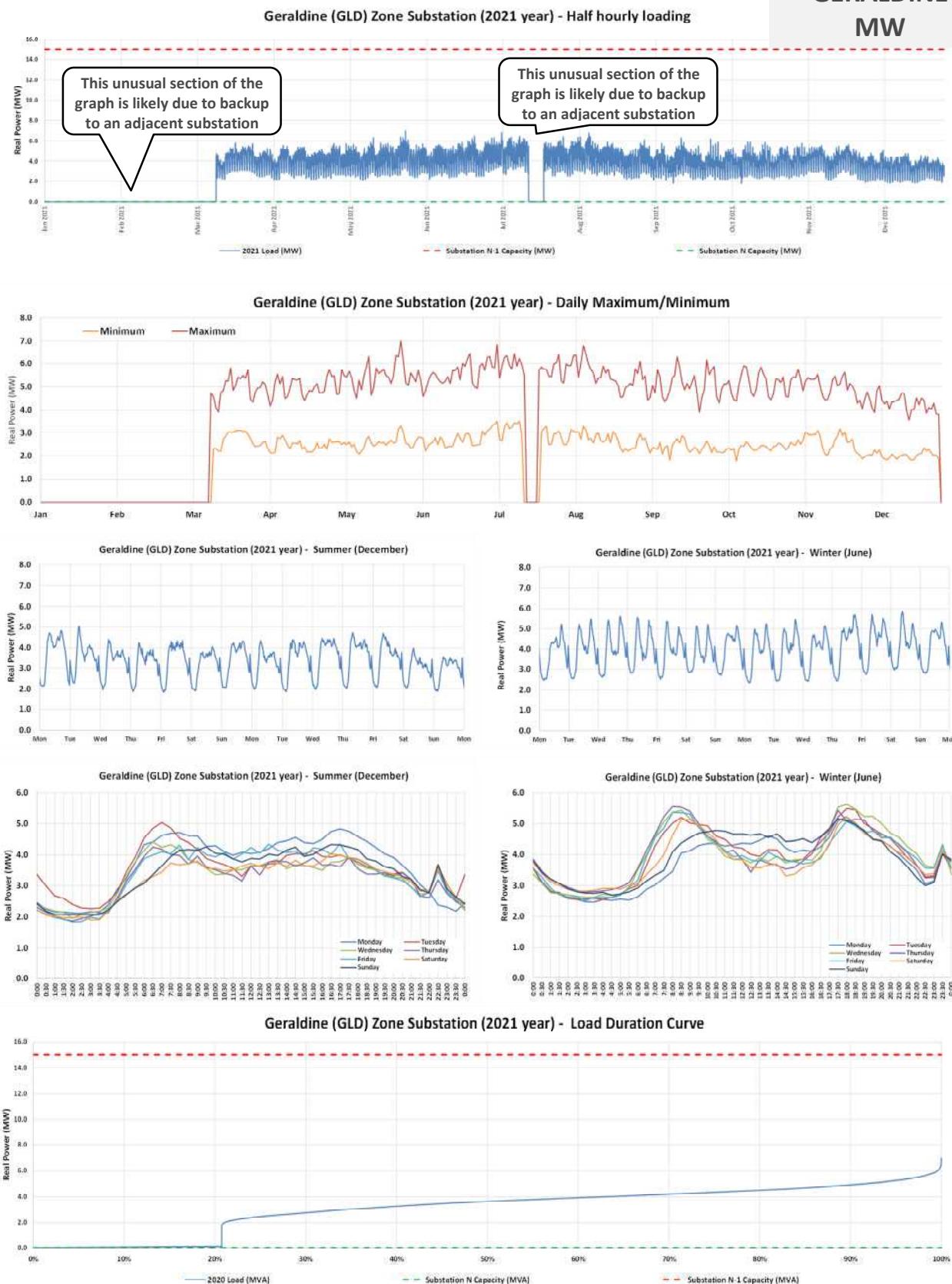


Figure 52 Geraldine 33/11kV zone substation: Real power (MW) load characteristics

Substation load not supplied

Figure 53 Haldon Lilybank 11/22kV zone substation: Real power (MW) load characteristics

**HALDON
LILYBANK MW**

PAREORA MW

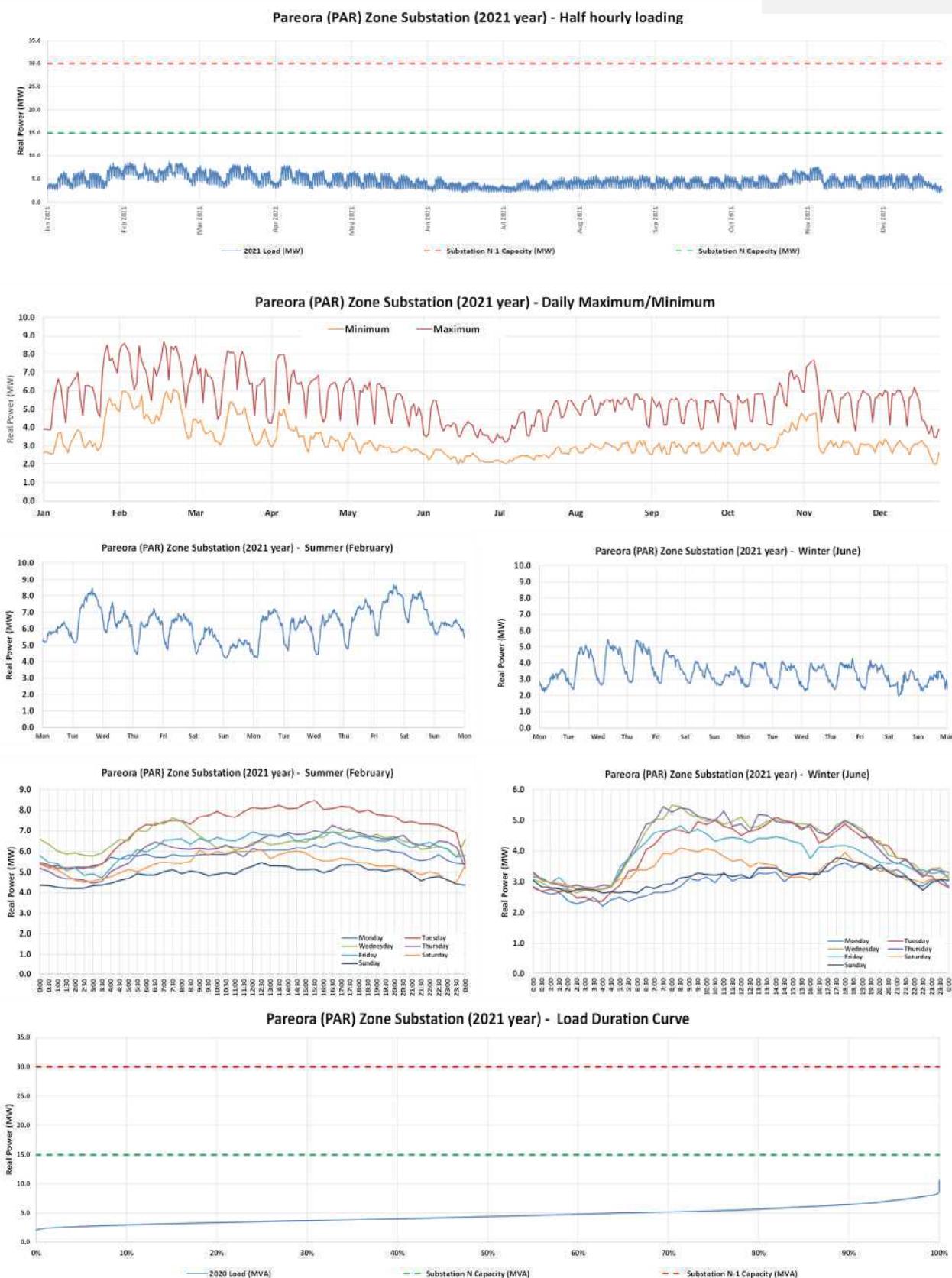


Figure 54 Pareora 33/11kV zone substation: Real power (MW) load characteristics

PLEASANT POINT MW

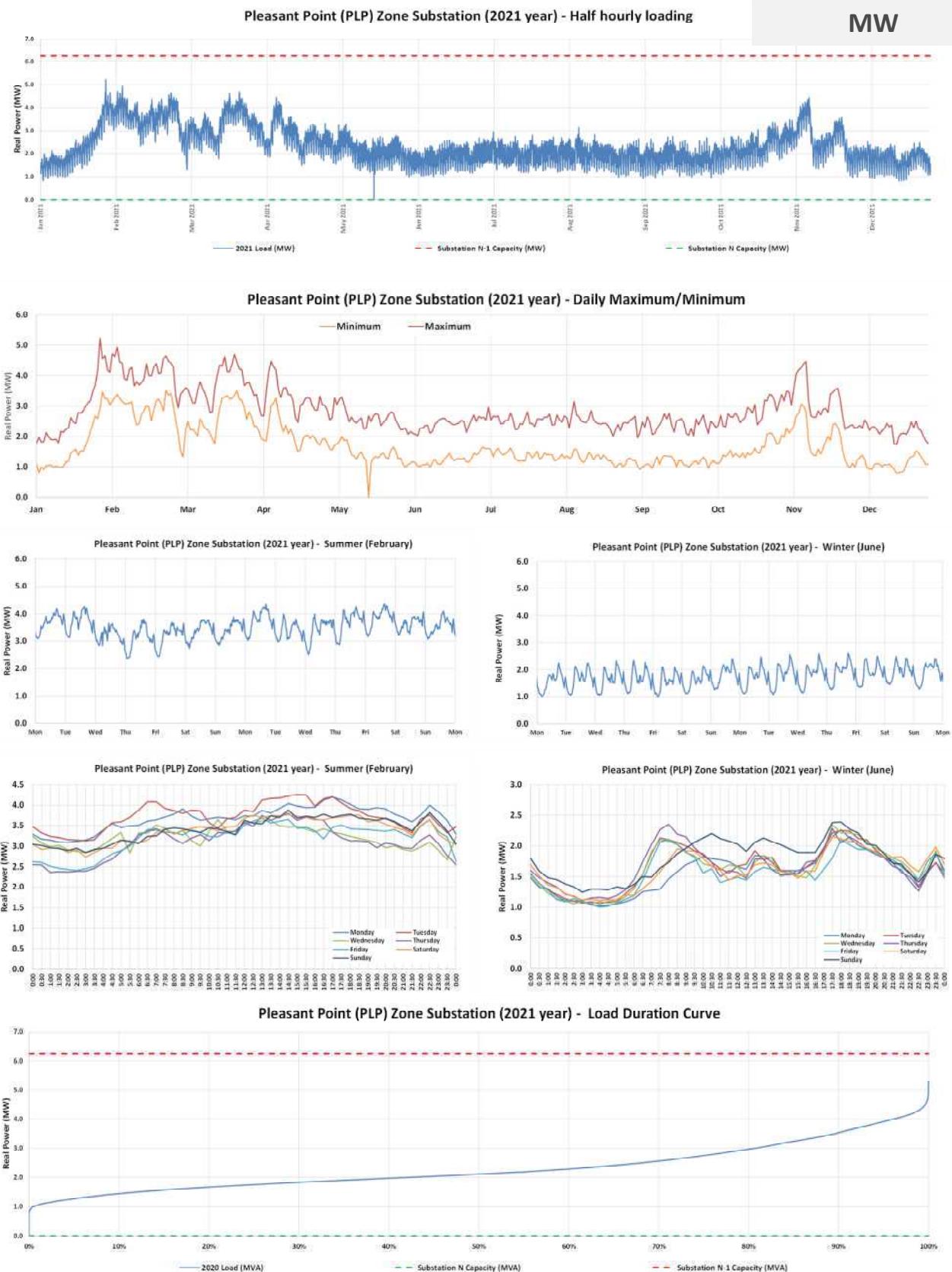


Figure 55 Pleasant Point 33/11kV zone substation: Real power (MW) load characteristics

RANGITATA MW

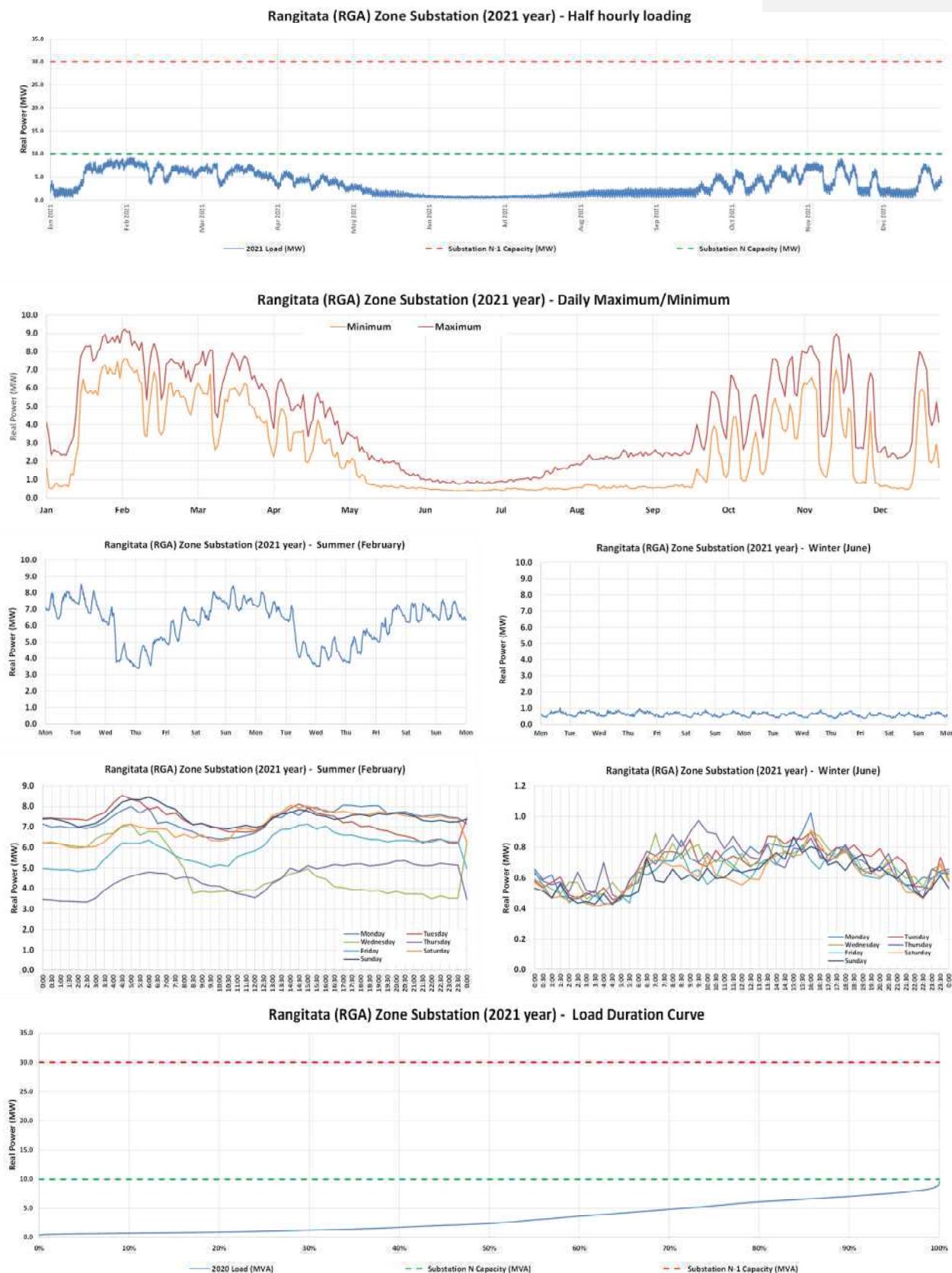


Figure 56 Rangitata 33/11kV zone substation: Real power (MW) load characteristics

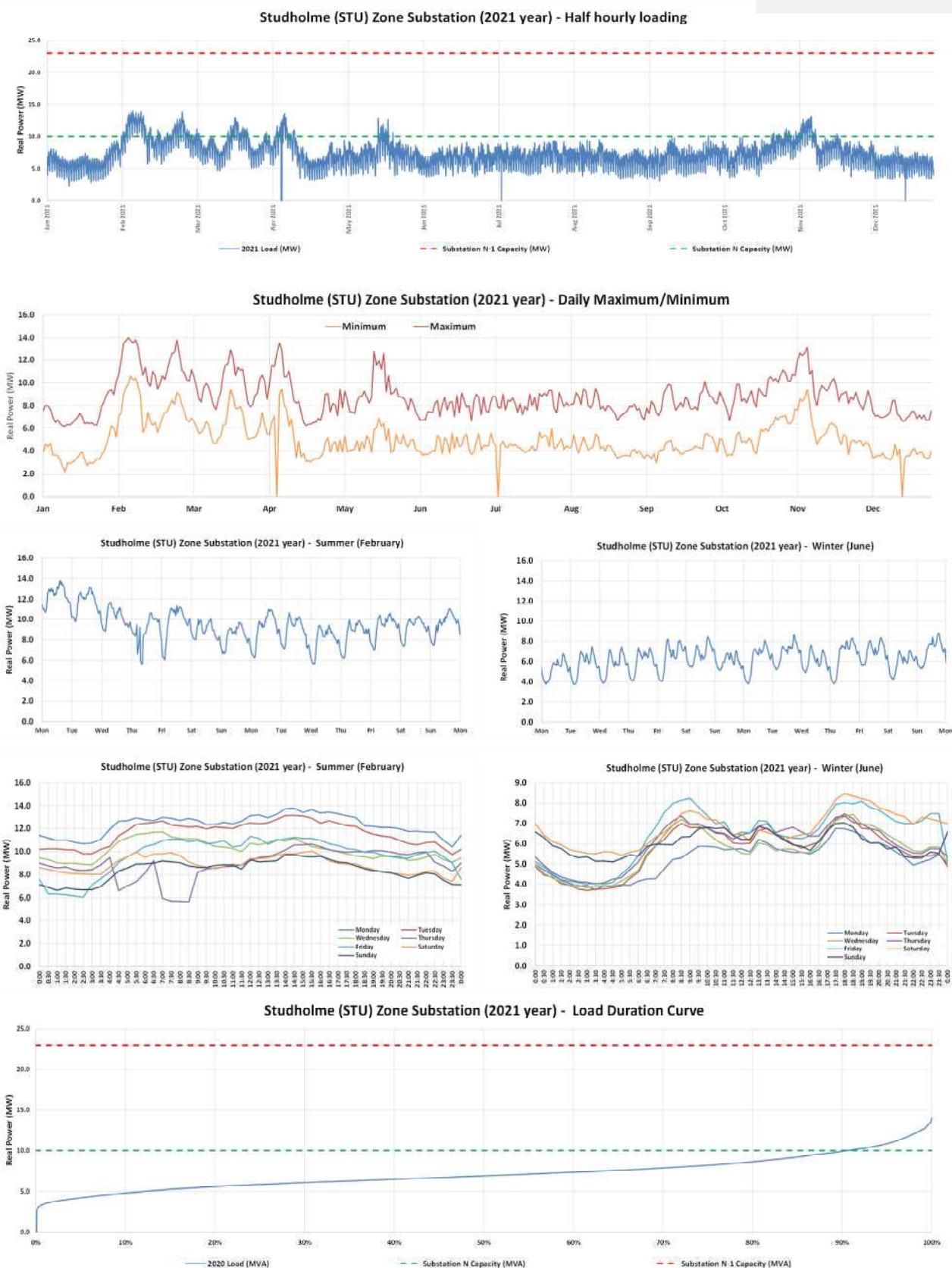
STUDHOLME MW


Figure 57 Studholme 110/11kV zone substation: Real power (MW) load characteristics

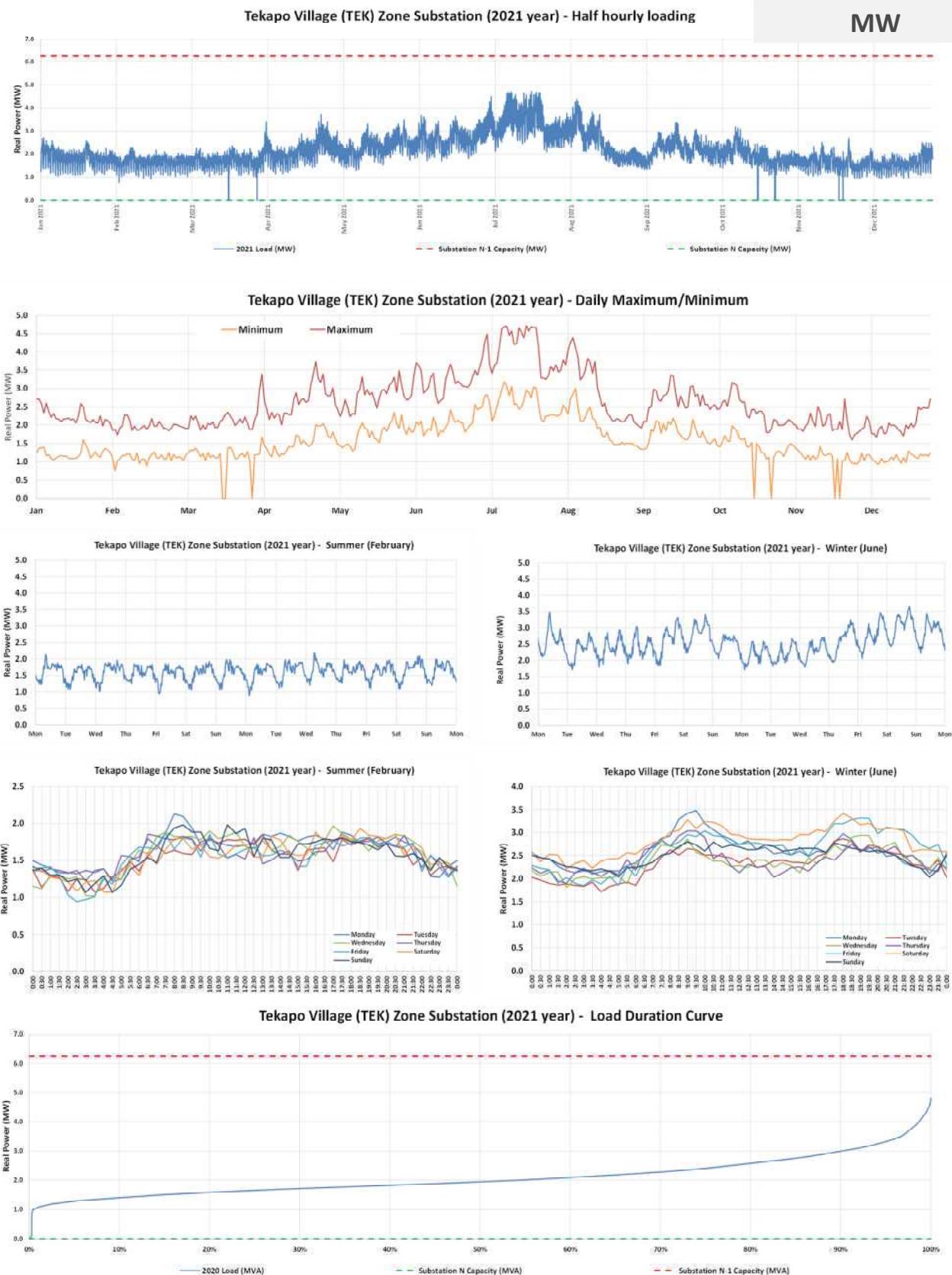
**TEKAPO VILLAGE
MW**


Figure 58 Tekapo Village 33/11kV zone substation: Real power (MW) load characteristics

TEMUKA MW

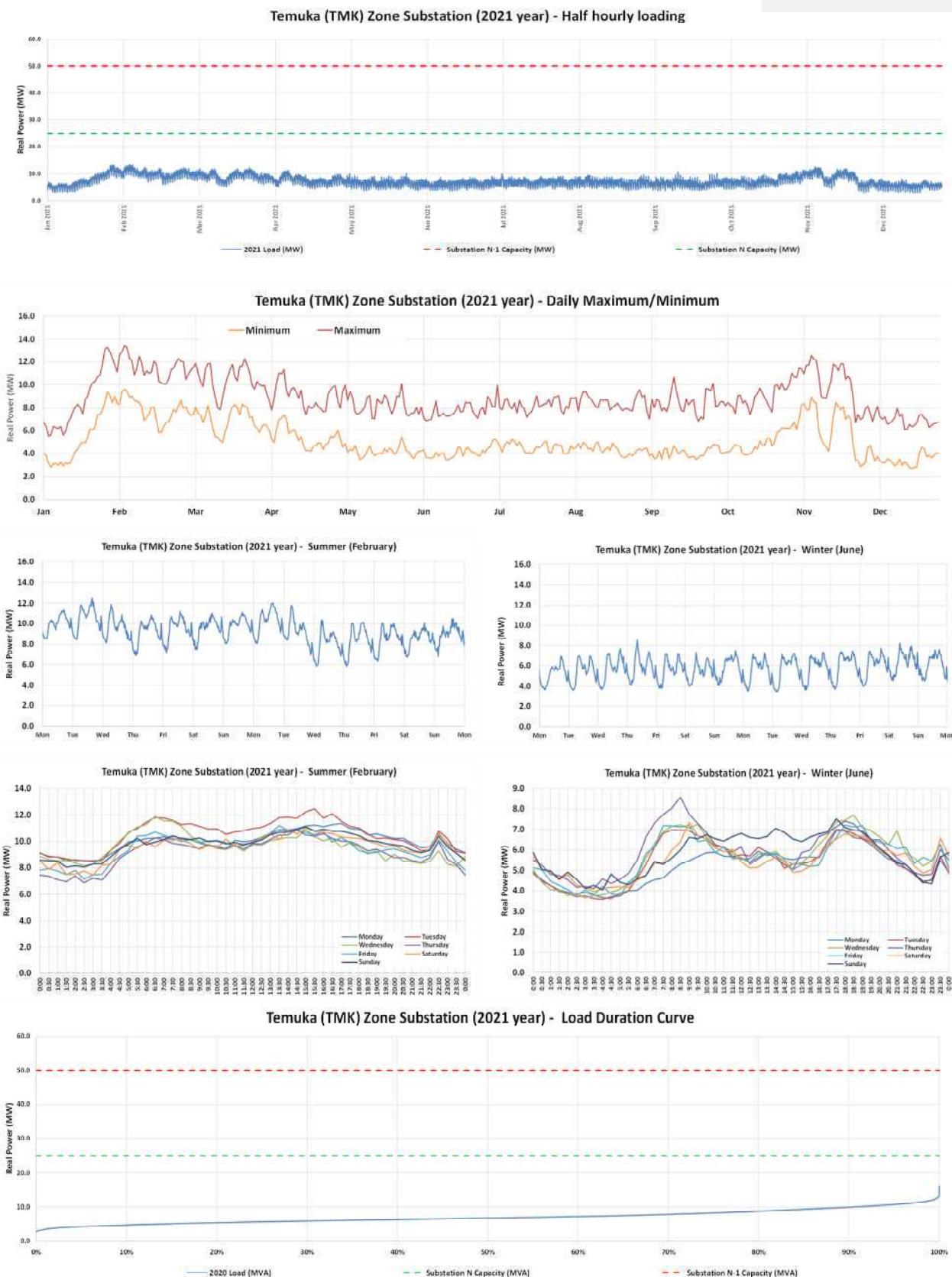


Figure 59 Temuka 33/11kV zone substation: Real power (MW) load characteristics at 11kV

TEMUKA MW

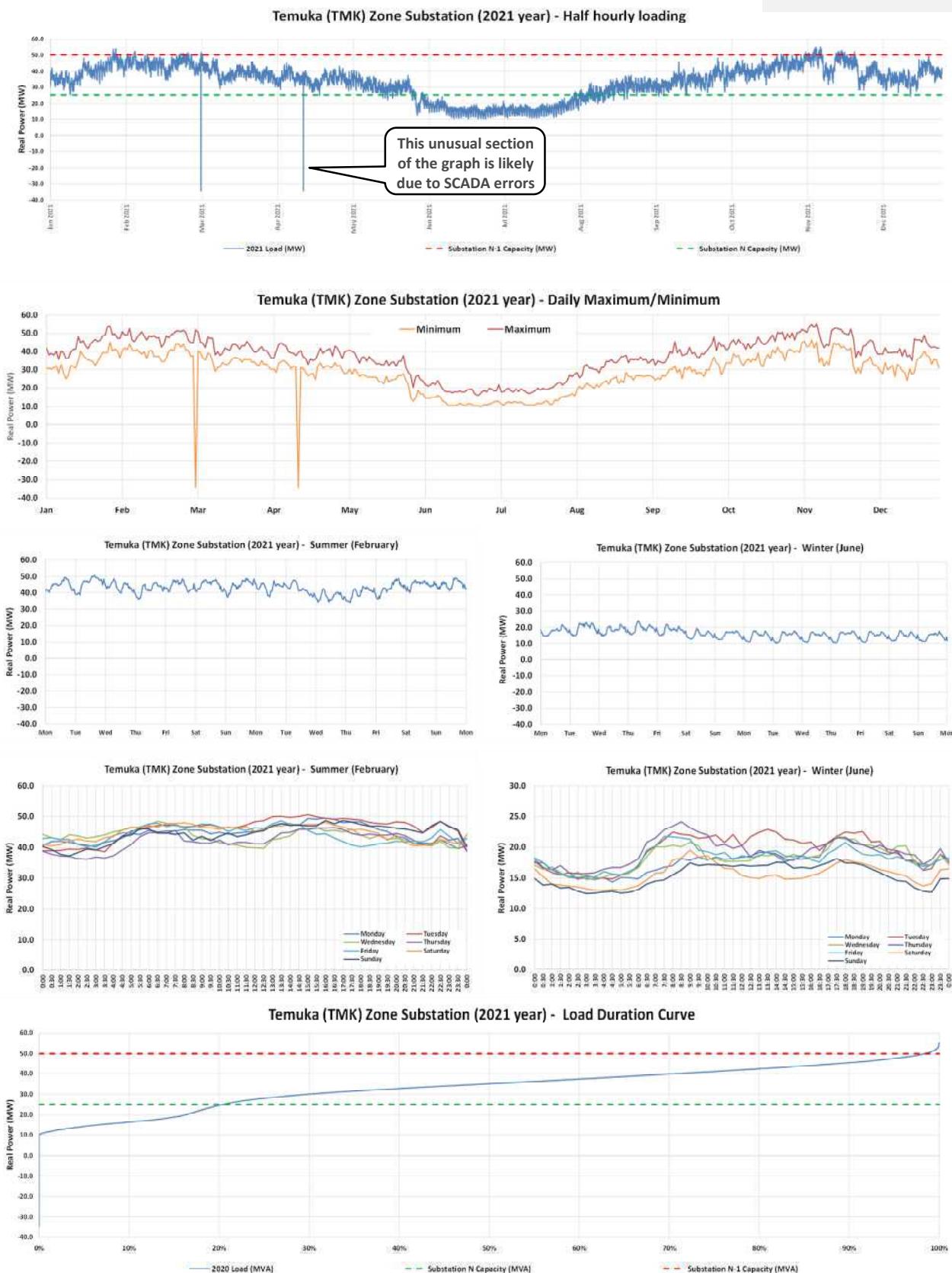


Figure 60 Temuka 33/11kV zone substation: Real power (MW) load characteristics at 33kV

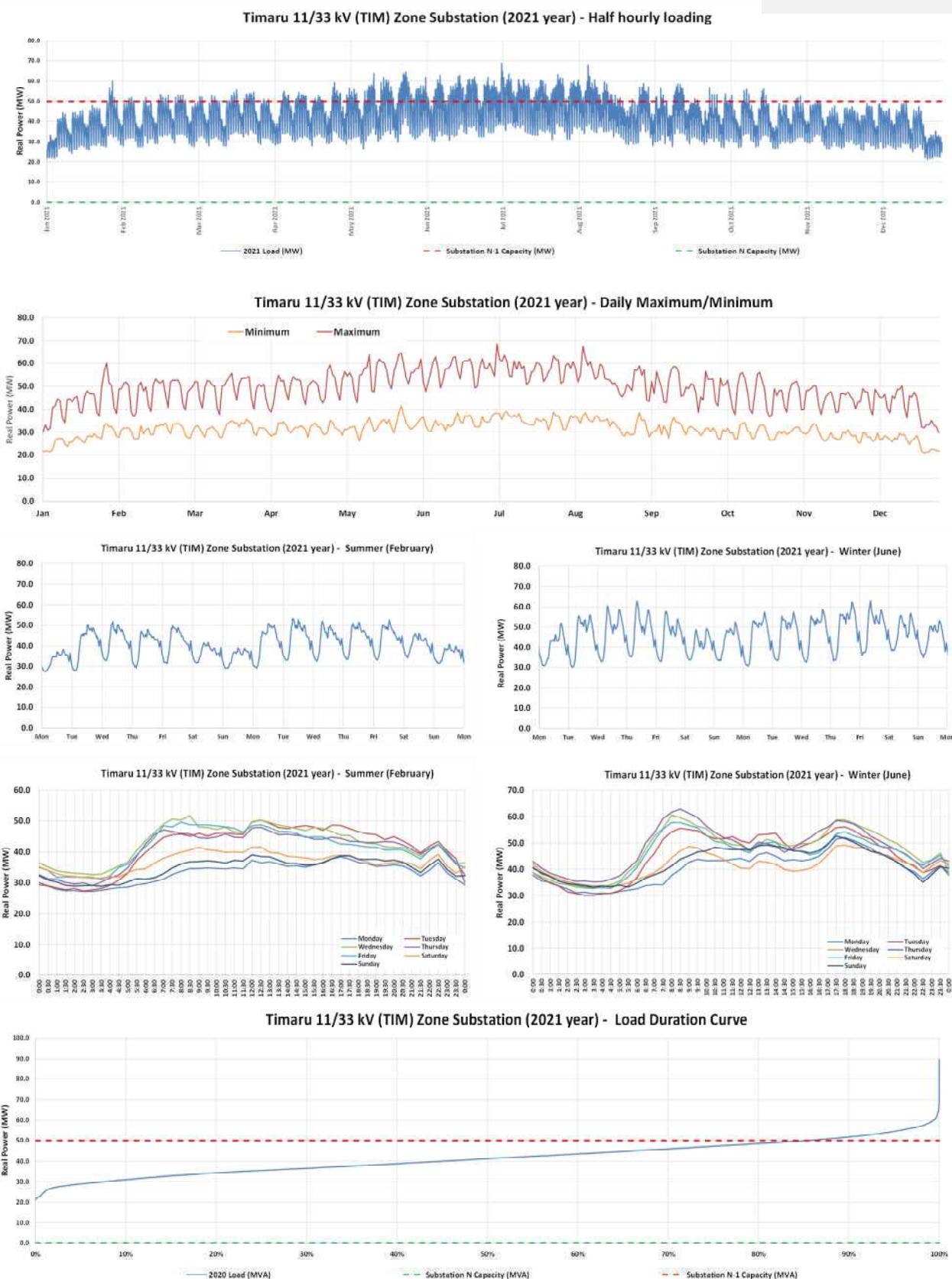
TIMARU MW


Figure 61 Timaru 110/11kV zone substation: Real power (MW) load characteristics

TWIZEL VILLAGE MW

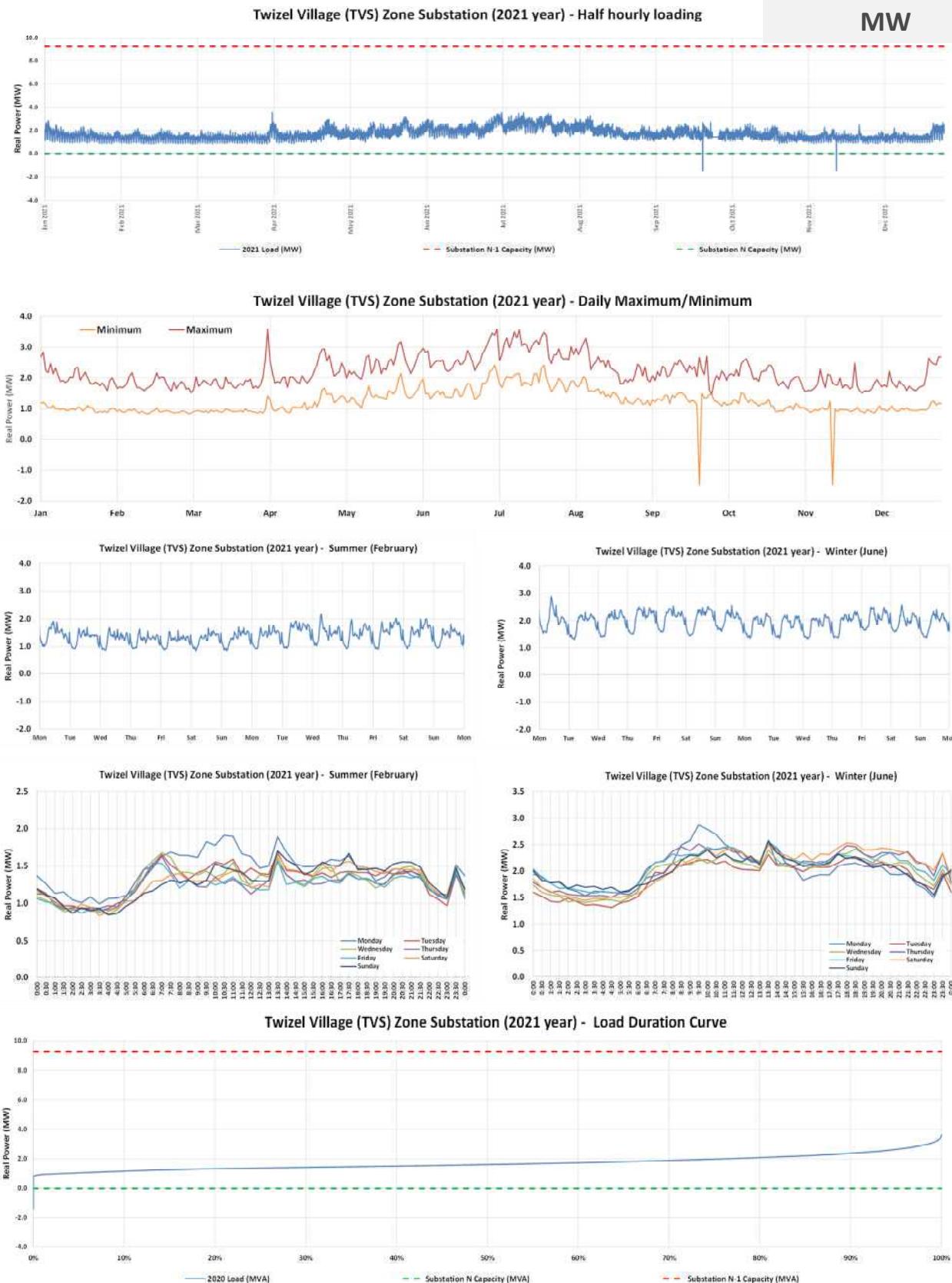


Figure 62 Twizel Village 33/11kV zone substation: Real power (MW) load characteristics

UNWIN HUT MW

Substation load not supplied

Figure 63 Unwin Hut 33/11kV zone substation: Real power (MW) load characteristics

3.3 Network Waitaki

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

- **Figure 64** Chelmer Street 33/11kV zone substation: Real power (MW) load characteristics
- **Figure 65** Duntroon 33/22kV zone substation: Real power (MW) load characteristics
- **Figure 66** Eastern Road 33/11kV zone substation: Real power (MW) load characteristics
- **Figure 67** Enfield 33/11kV zone substation: Real power (MW) load characteristics
- **Figure 68** Five Forks 33/11kV zone substation: Real power (MW) load characteristics
- **Figure 69** Hampden 33/11kV zone substation: Real power (MW) load characteristics
- **Figure 70** Kurow 33/11kV zone substation: Real power (MW) load characteristics
- **Figure 71** Maheno 33/11kV zone substation: Real power (MW) load characteristics
- **Figure 72** Ngapara 33/11kV zone substation: Real power (MW) load characteristics
- **Figure 74** Omarama 33/11kV zone substation: Real power (MW) load characteristics
- **Figure 75** Otematata 33/11kV zone substation: Real power (MW) load characteristics
- **Figure 76** Papakaio 33/11kV zone substation: Real power (MW) load characteristics
- **Figure 77** Parsons Road 33/11kV zone substation: Real power (MW) load characteristics
- **Figure 78** Pukeuri 33/11kV zone substation: Real power (MW) load characteristics
- **Figure 79** Redcastle 33/11kV zone substation: Real power (MW) load characteristics
- **Figure 80** Ruataniwha 33/11kV zone substation: Real power (MW) load characteristics

CHELMER STREET MW

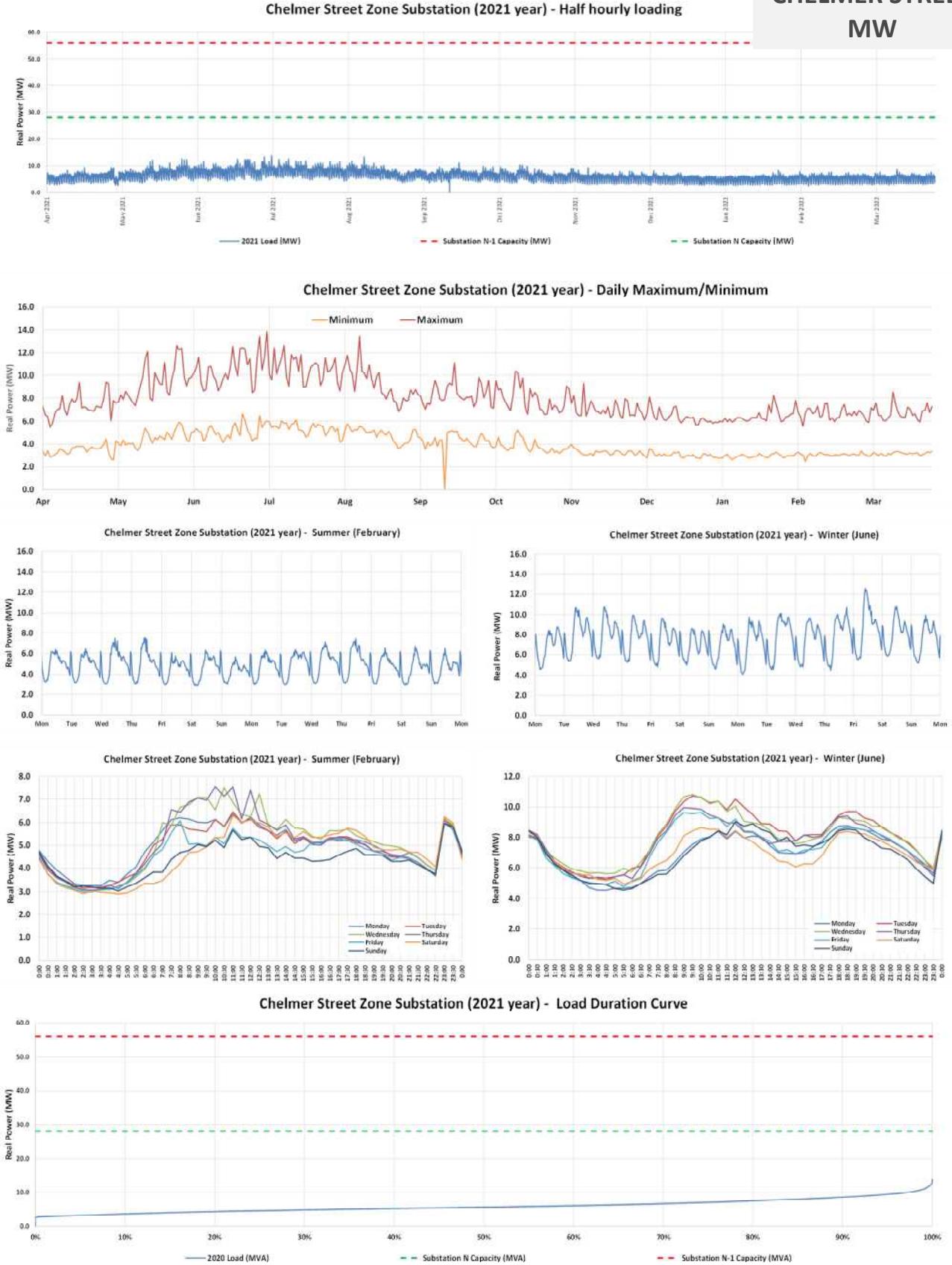


Figure 64 Chelmer Street 33/11kV zone substation: Real power (MW) load characteristics

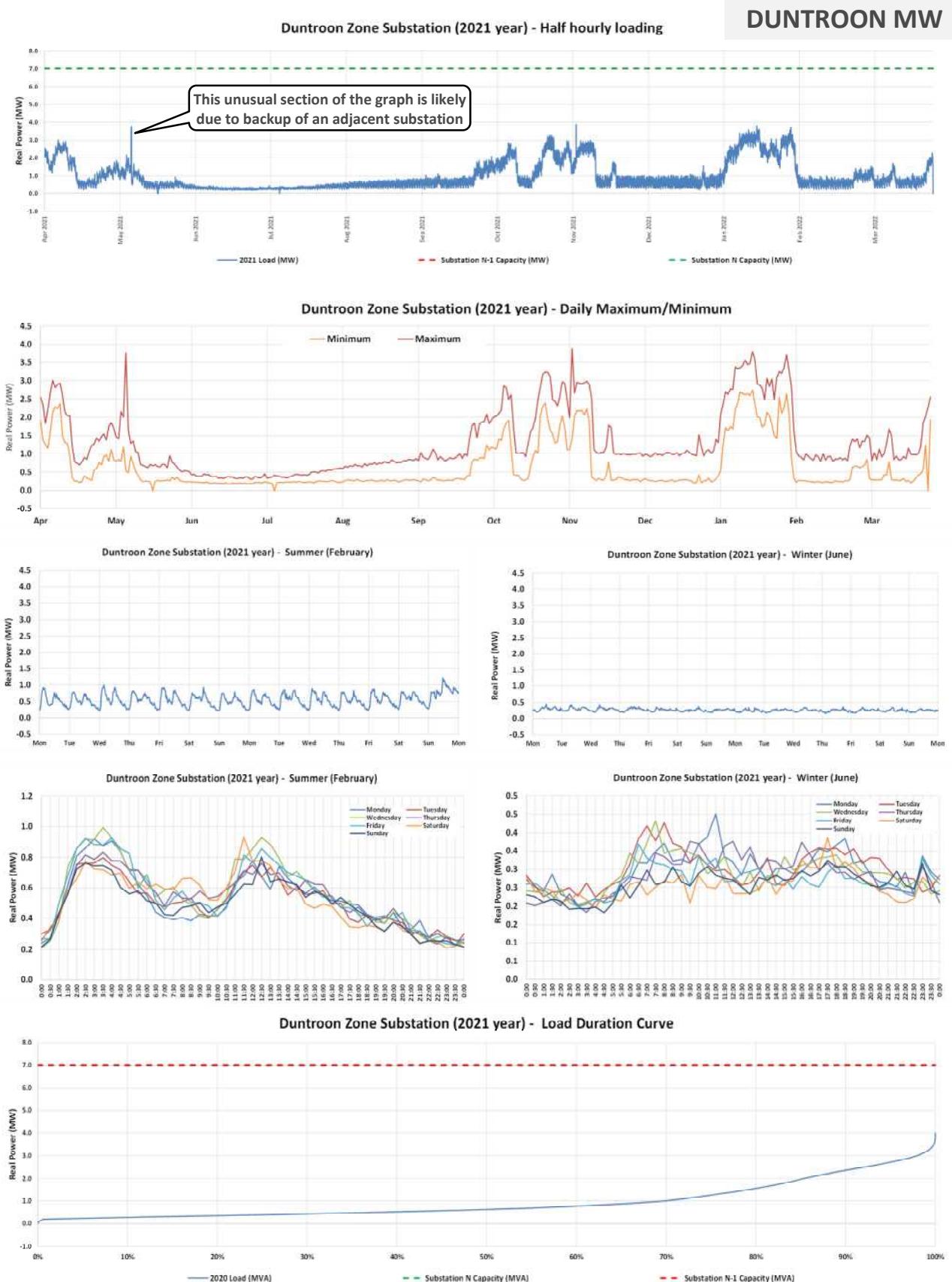


Figure 65 Duntroon 33/22kV zone substation: Real power (MW) load characteristics

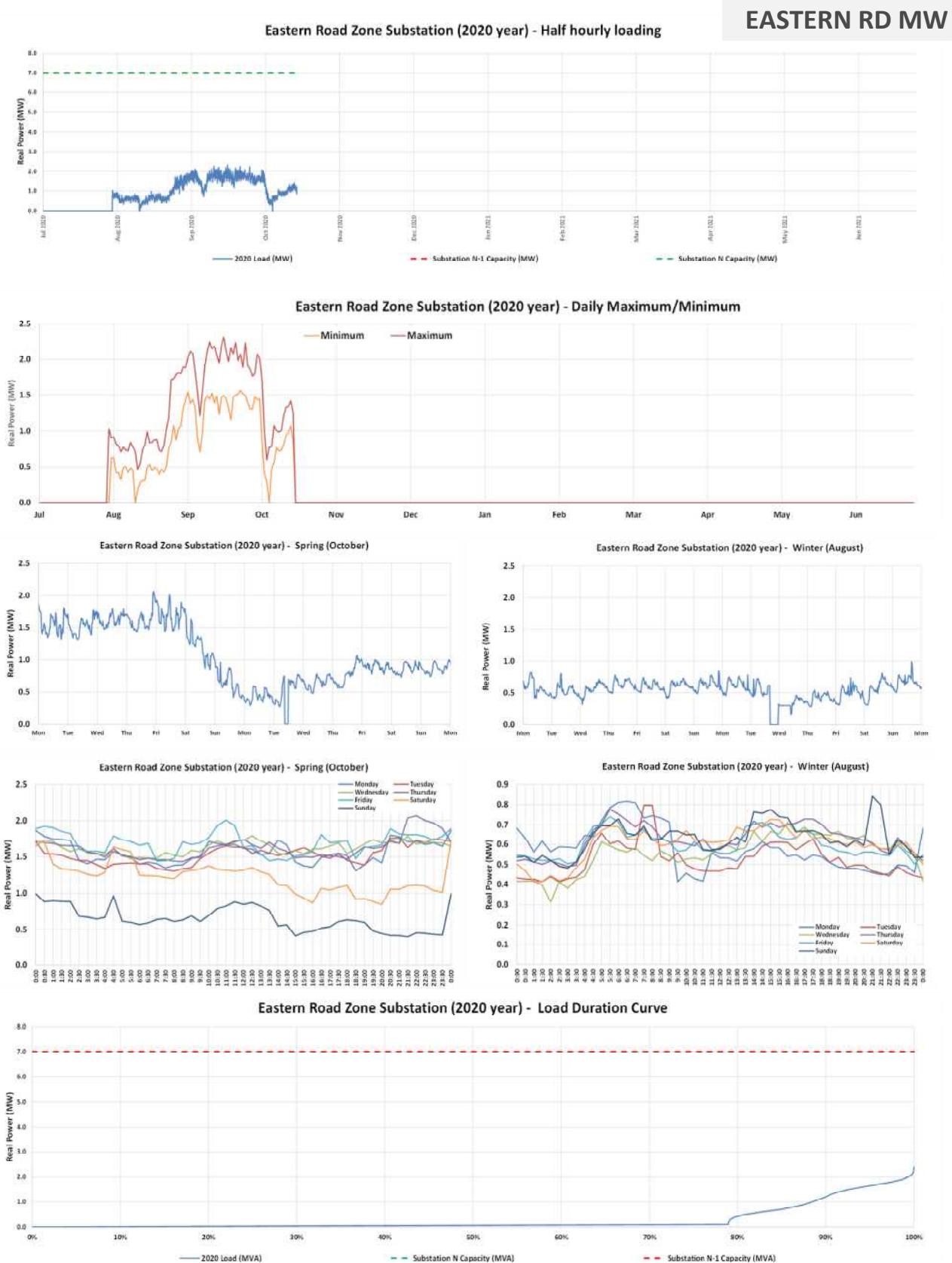


Figure 66 Eastern Road 33/11kV zone substation: Real power (MW) load characteristics

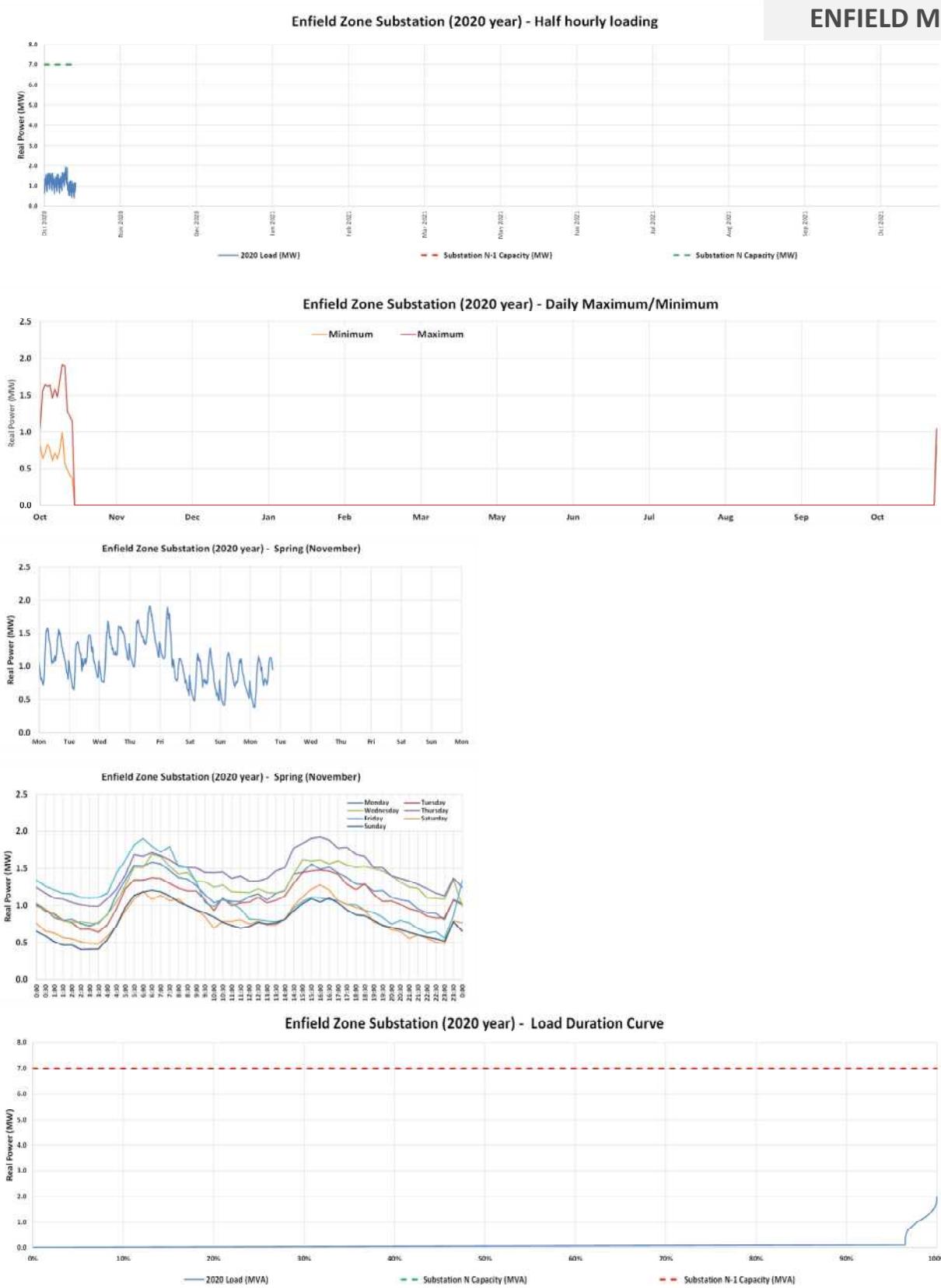
ENFIELD MW


Figure 67 Enfield 33/11kV zone substation: Real power (MW) load characteristics

FIVE FORKS MW

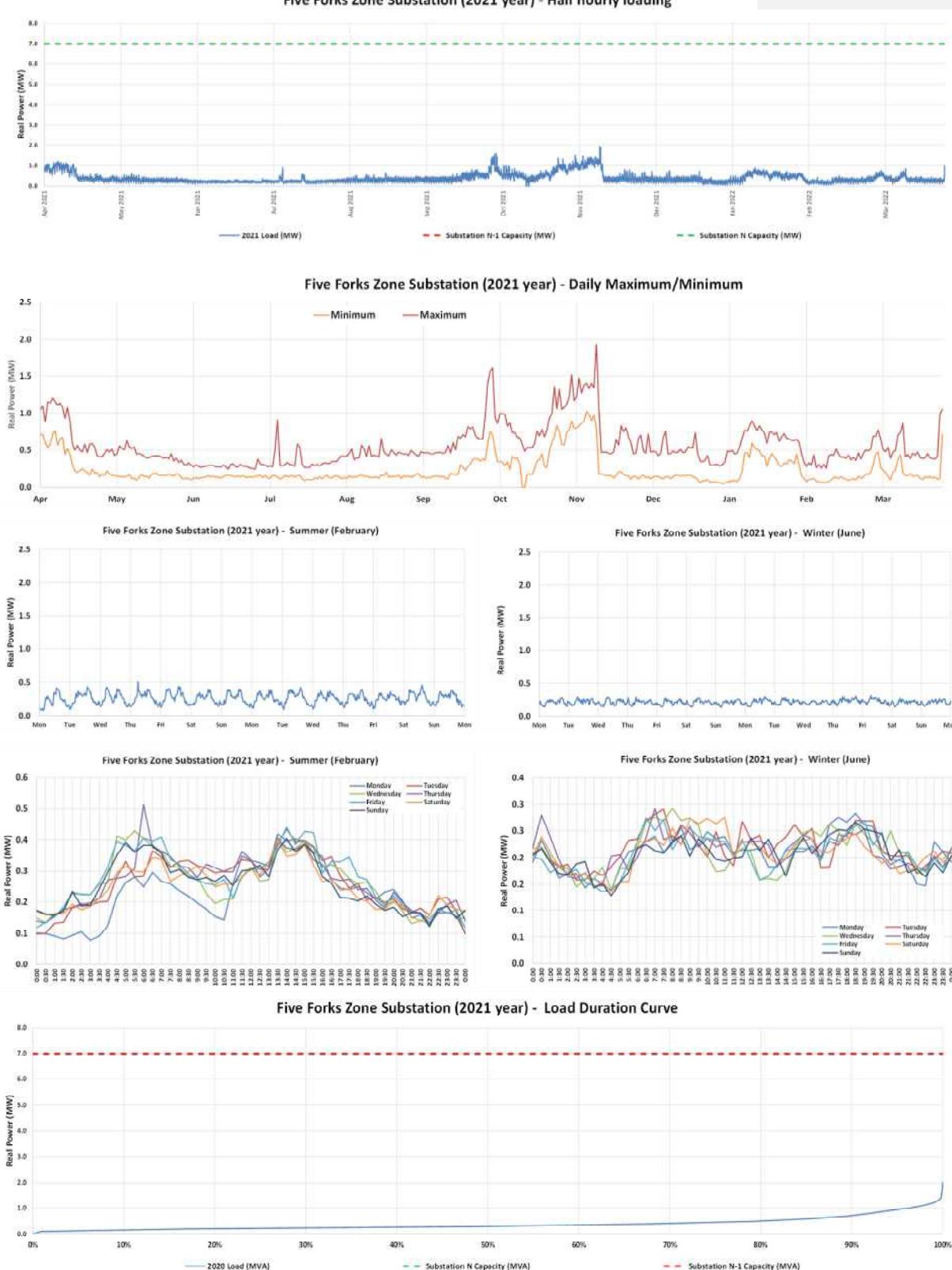


Figure 68 Five Forks 33/11kV zone substation: Real power (MW) load characteristics

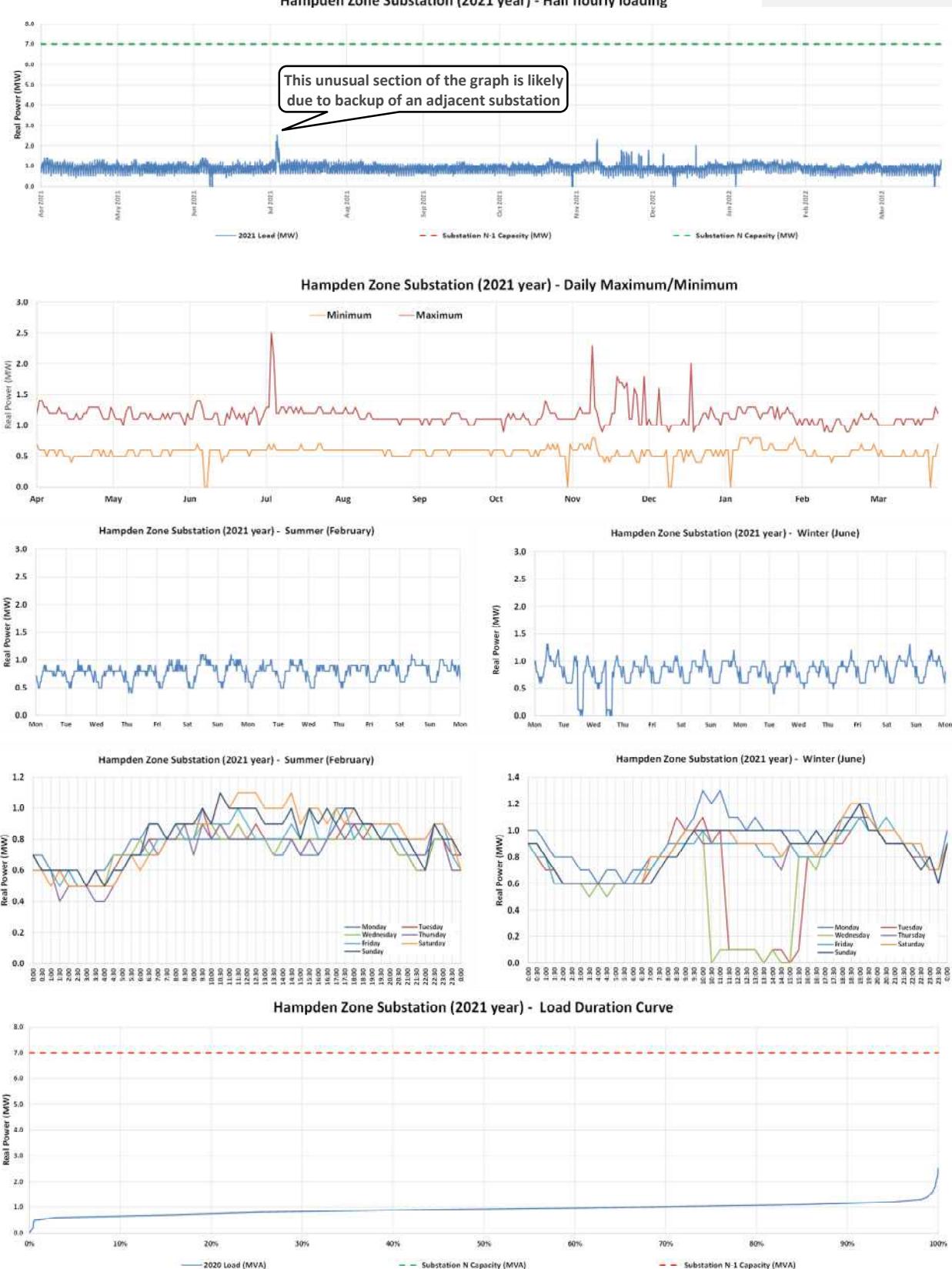
HAMPDEN MW


Figure 69 Hampden 33/11kV zone substation: Real power (MW) load characteristics

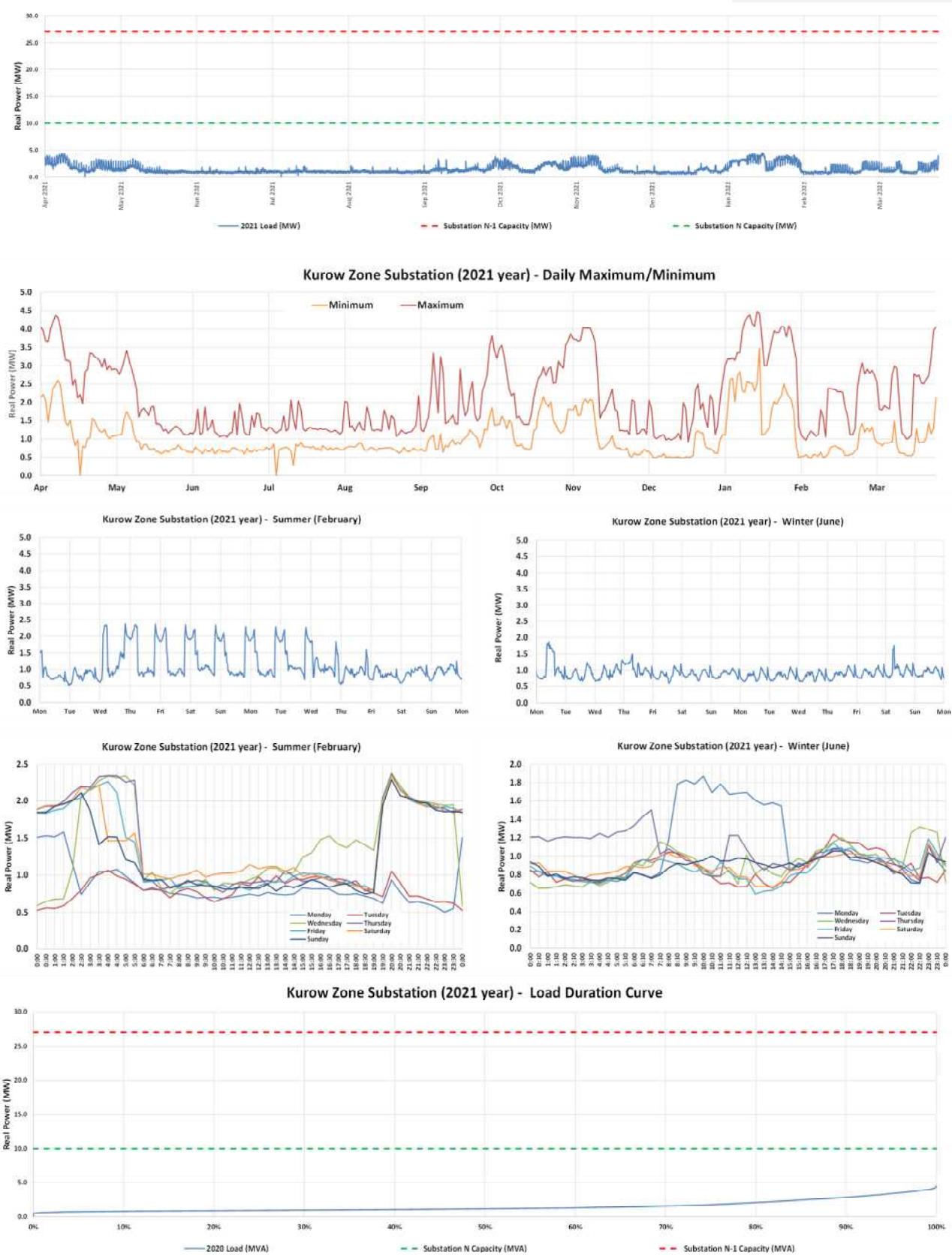
KUROW MW


Figure 70 Kurow 33/11kV zone substation: Real power (MW) load characteristics

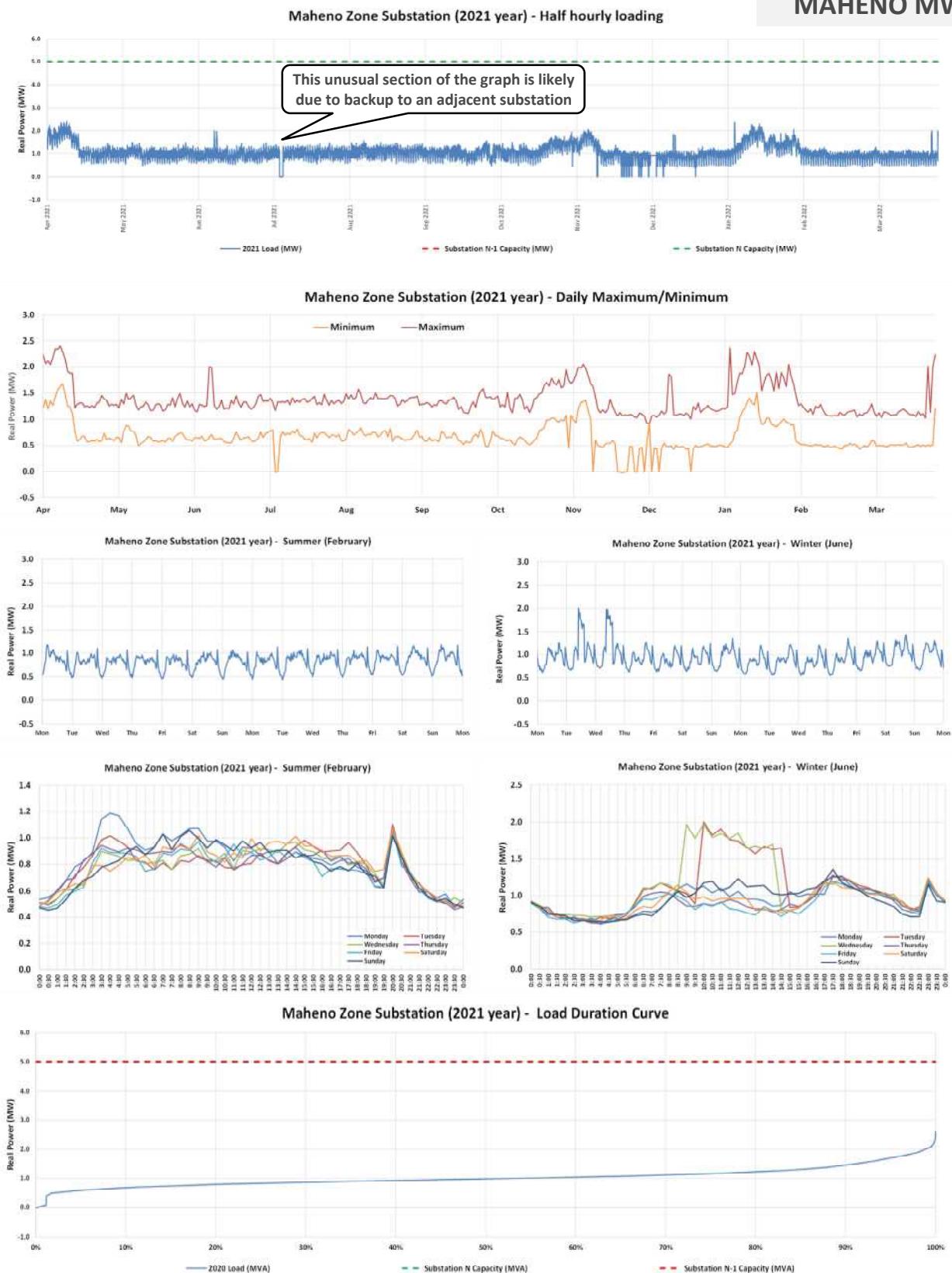
MAHENO MW


Figure 71 Maheno 33/11kV zone substation: Real power (MW) load characteristics

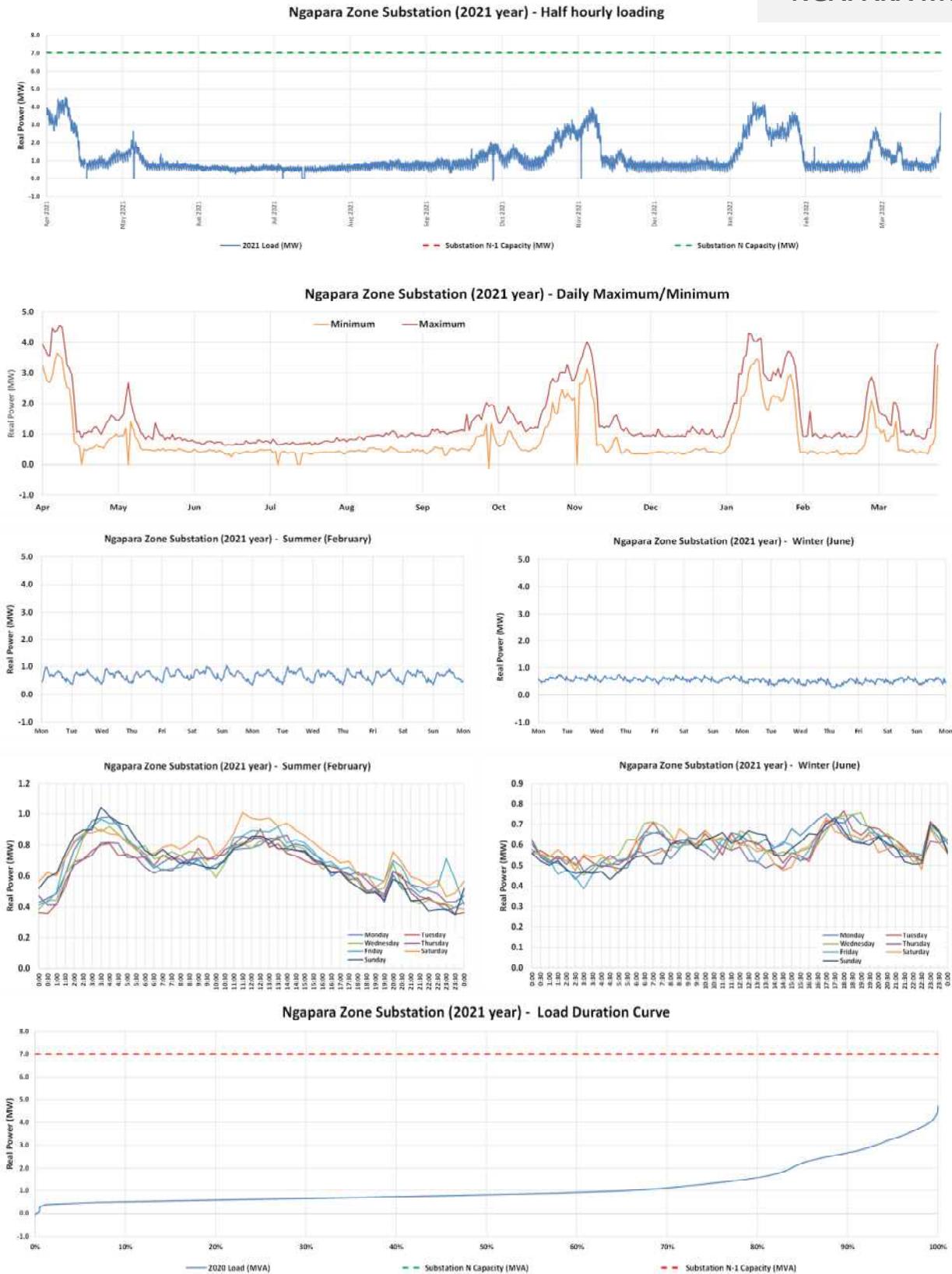
NGAPARA MW


Figure 72 Ngapara 33/11kV zone substation: Real power (MW) load characteristics

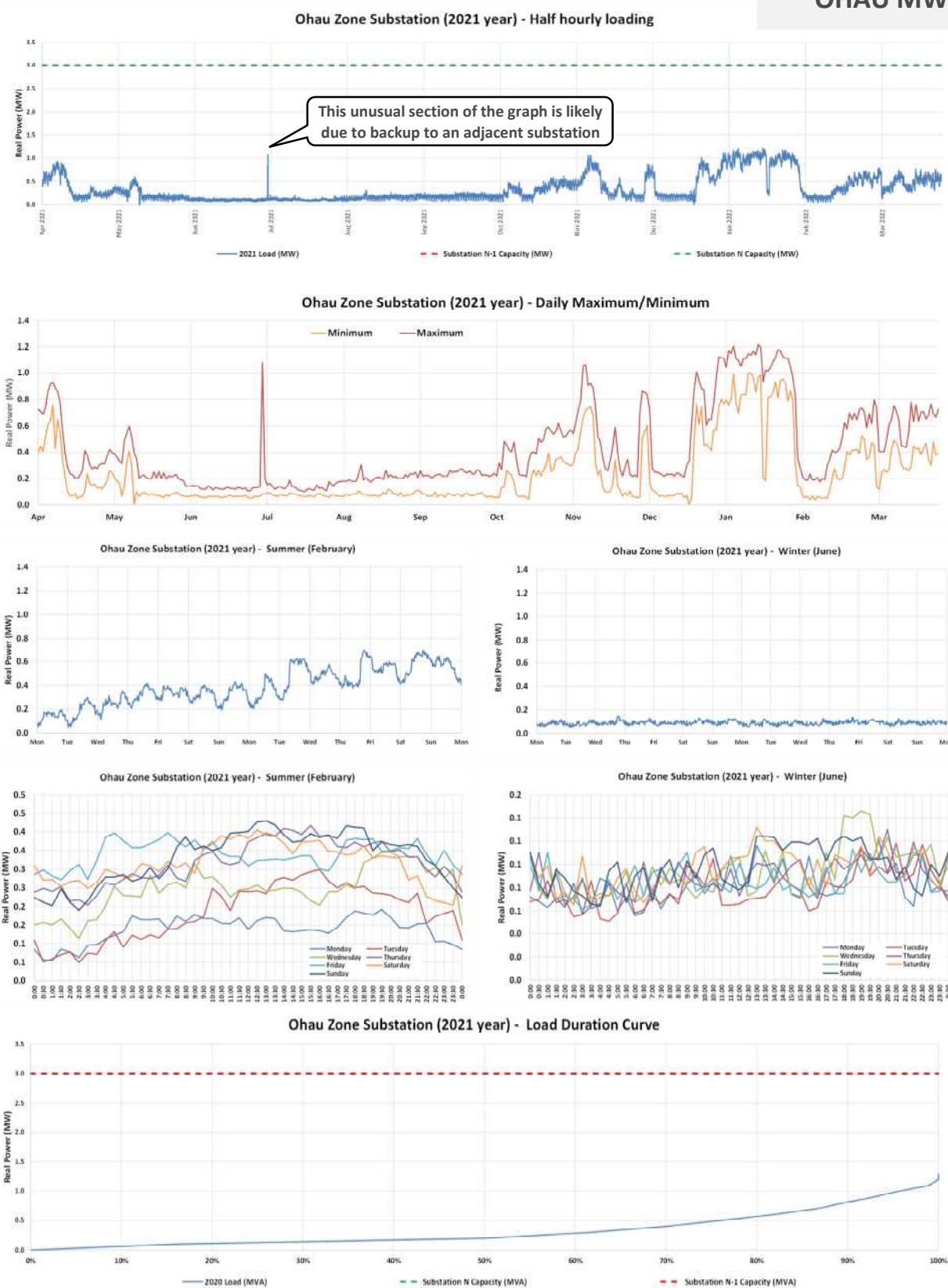
OHAU MW


Figure 73 Ohau 33/11kV zone substation: Real power (MW) load characteristics

OMARAMA MW

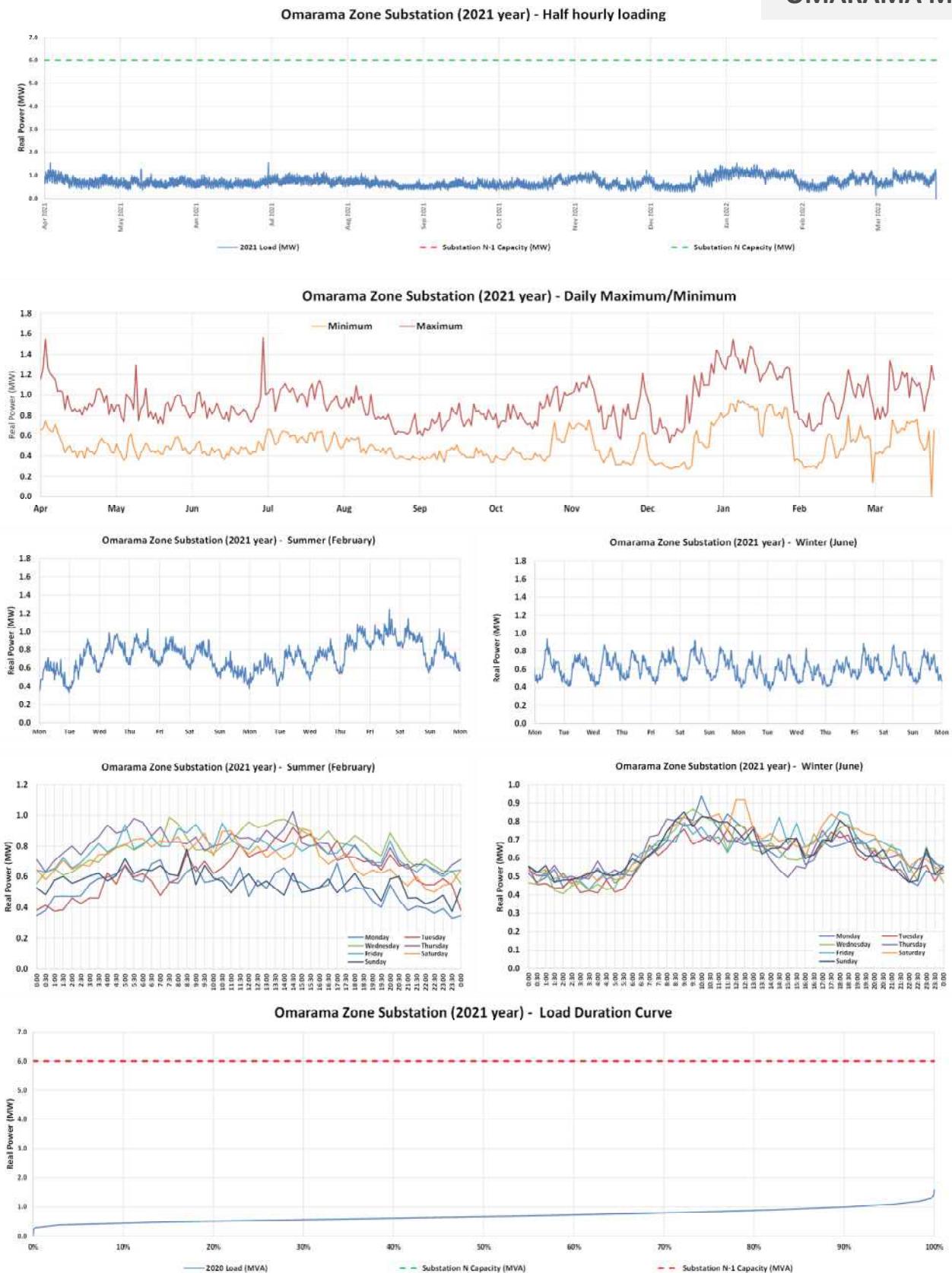


Figure 74 Omarama 33/11kV zone substation: Real power (MW) load characteristics

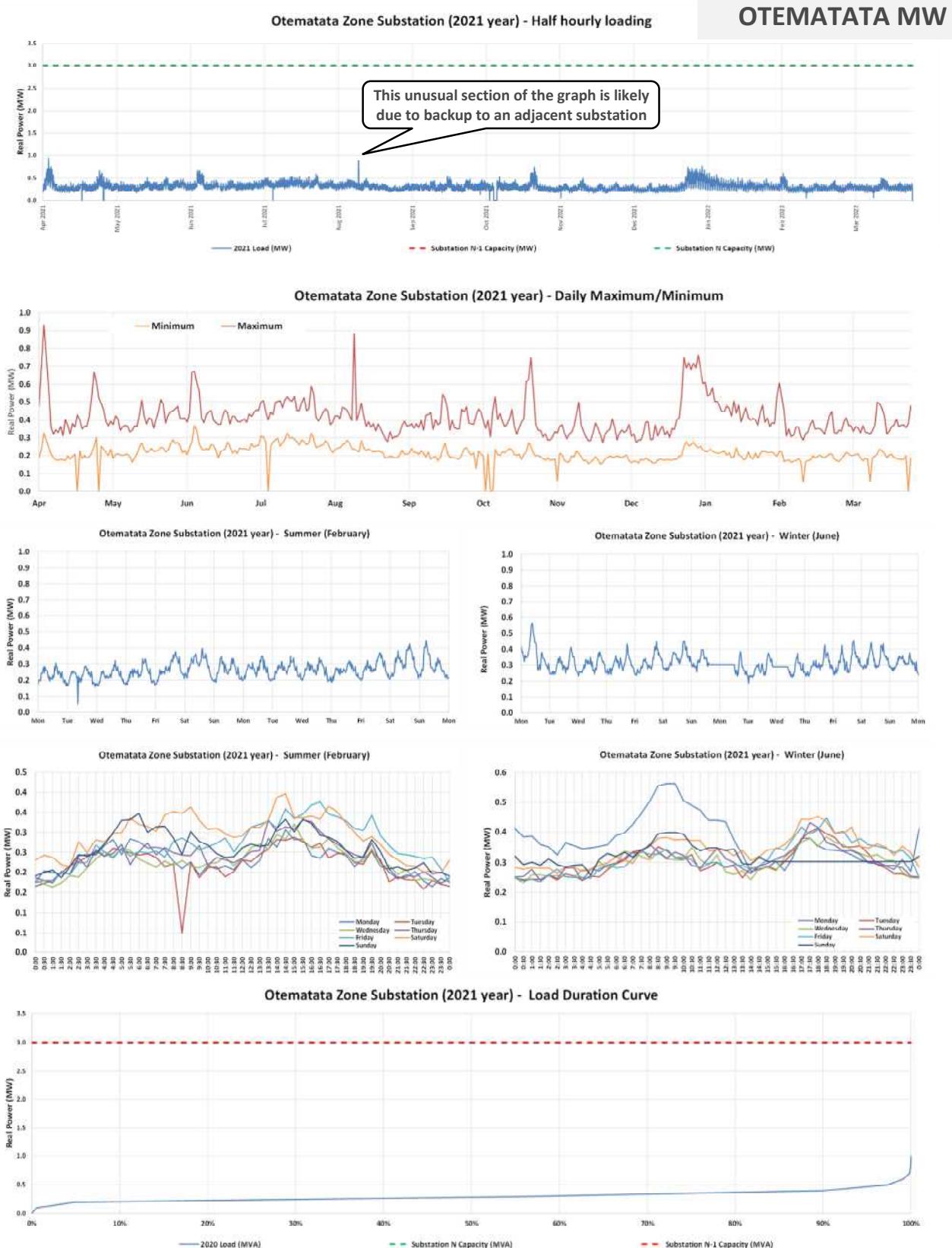


Figure 75 Otematata 33/11kV zone substation: Real power (MW) load characteristics

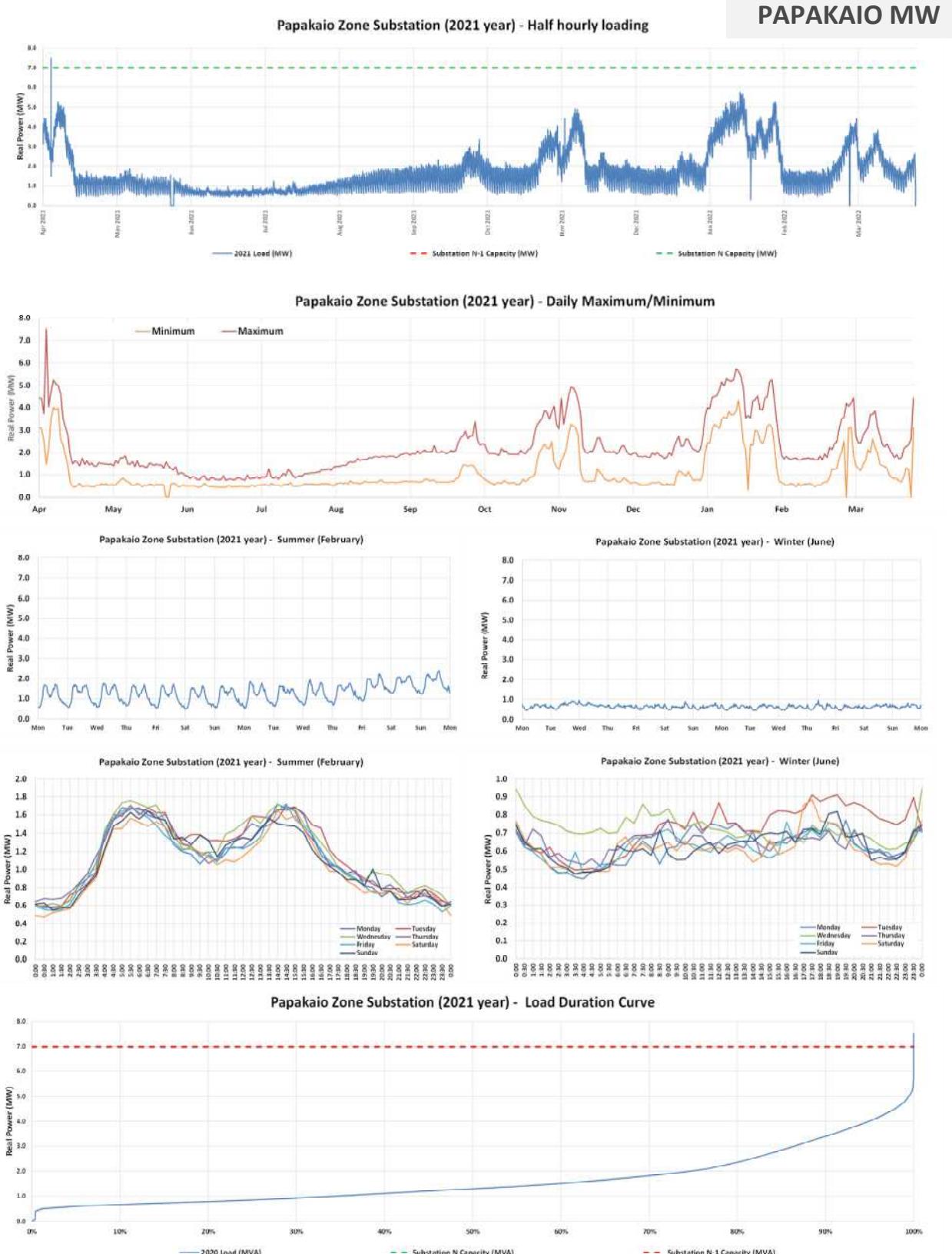


Figure 76 Papakaio 33/11kV zone substation: Real power (MW) load characteristics

PARSONS ROAD MW

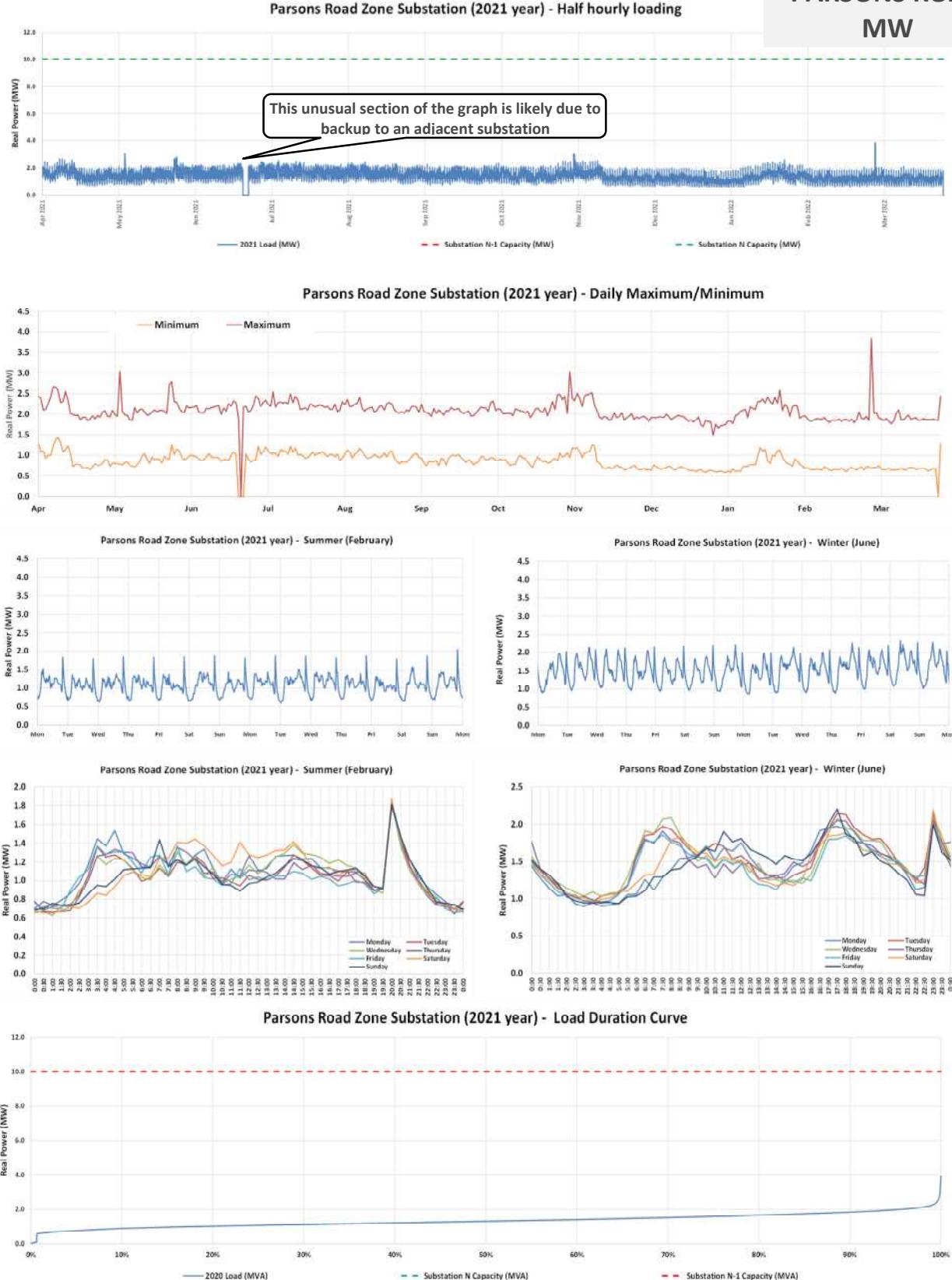


Figure 77 Parsons Road 33/11kV zone substation: Real power (MW) load characteristics

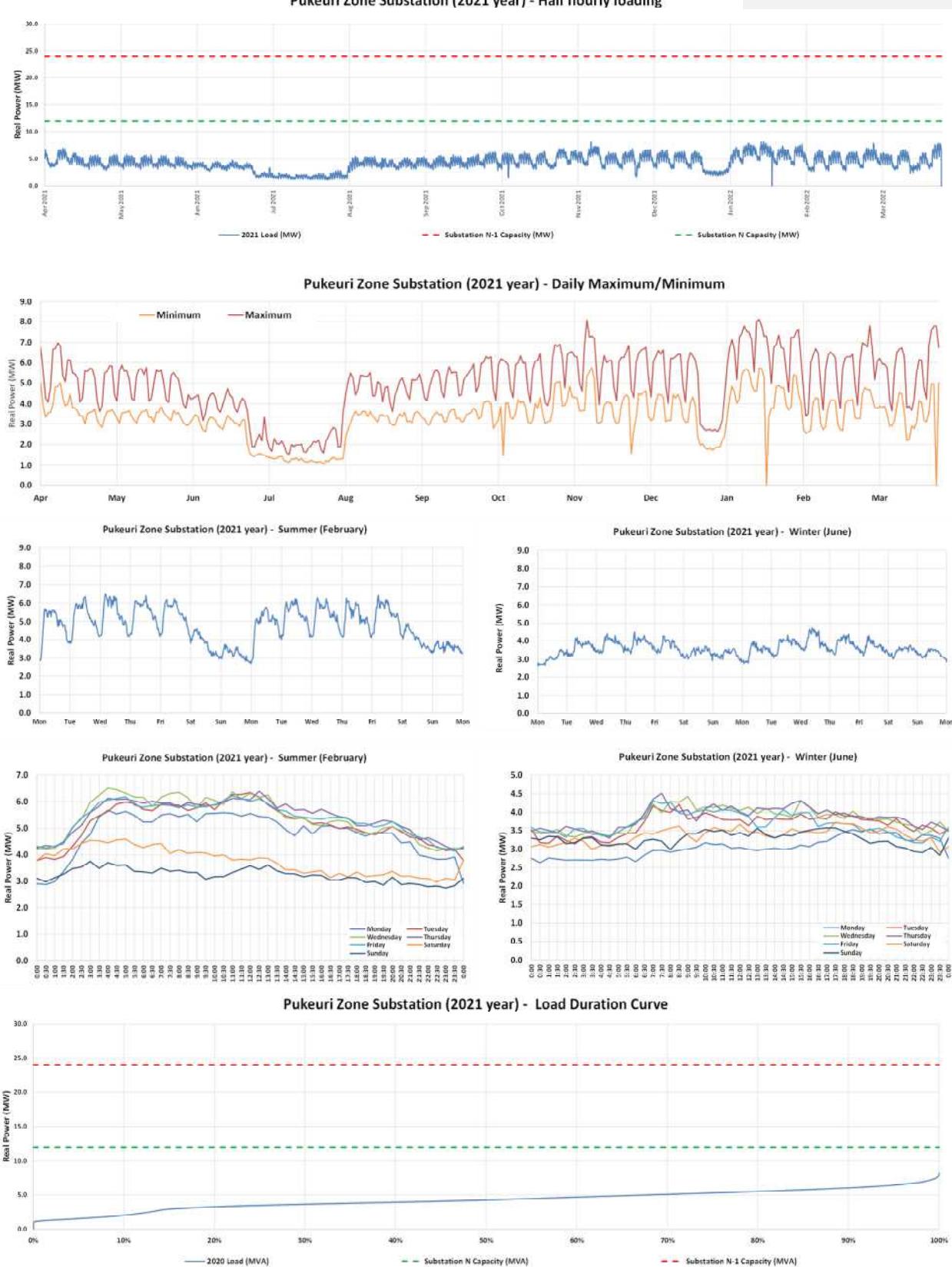
PUKEURI MW


Figure 78 Pukeuri 33/11kV zone substation: Real power (MW) load characteristics

REDCASTLE MW

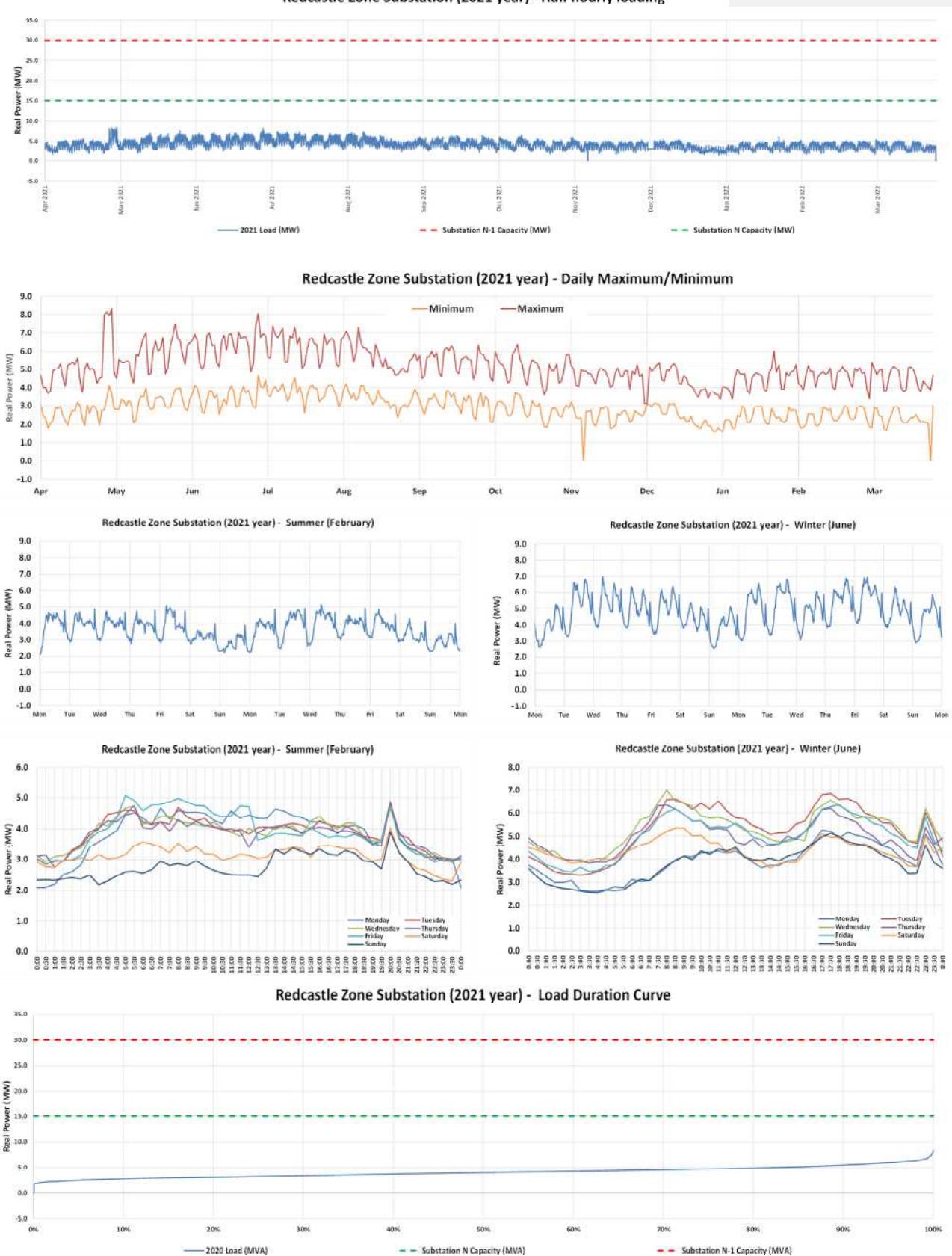


Figure 79 Redcastle 33/11kV zone substation: Real power (MW) load characteristics

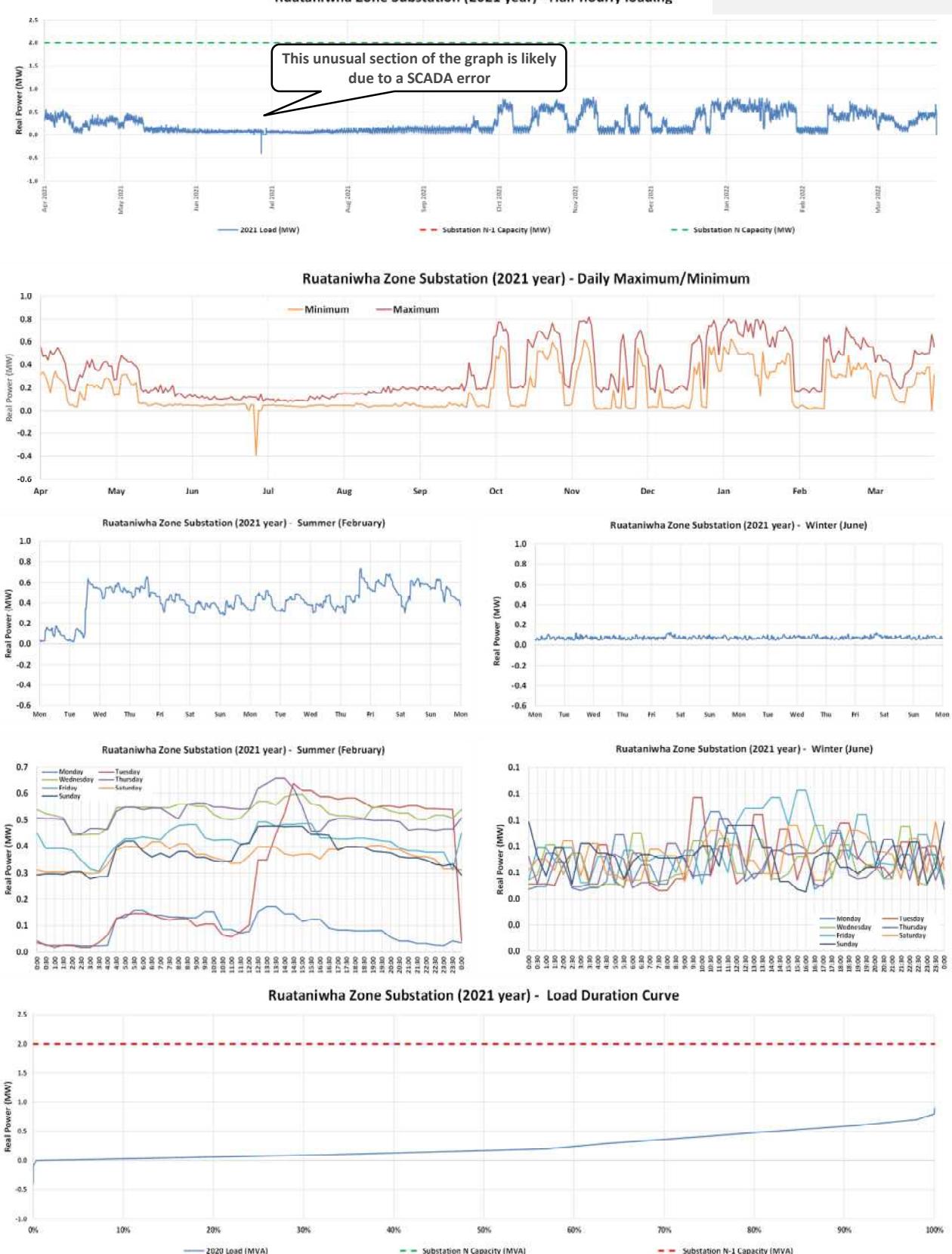
RUATANIWHA MW


Figure 80 Ruataniwha 33/11kV zone substation: Real power (MW) load characteristics