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# EA-CC01-G03 Load Management

## Guide

Version 3.0

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## Contents

I	Document Control .....	3
II	Approval & Revision History .....	3
III	Document Properties .....	3
IV	Document Contributors .....	3
V	Normative References .....	3
VI	External References .....	4
VII	Internal References .....	4
1	Introduction .....	5
1.1	Purpose .....	5
1.2	Status and Application of This Guide .....	5
2	Load Management System .....	6
3	Load Management .....	7
4	Ownership .....	7
5	Receiver Filter Parameters .....	7
6	Random Individual Command Allocation .....	8
6.1	Dunedin .....	8
6.2	Central Otago .....	8
7	Random Switching Time Delay .....	8
7.1	Dunedin .....	8
7.2	Central Otago .....	8
8	Learn Function .....	8
8.1	Dunedin .....	9
8.2	Central Otago .....	9
9	Load Shifting .....	9
10	Under-Frequency Shed Capability .....	9
10.1	Dunedin .....	9
10.2	Central Otago .....	10
11	Control Period Demand Signal .....	10
12	Decommissioning of Dunedin 1050Hz Ripple Injection .....	10
13	New Services .....	11
Appendix A – Load Management Command Allocations .....		12
Dunedin .....		12
Central Otago .....		15

Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	2 of 18

## I Document Control

Responsibility	Name	Position
Document Approver:	Alec Findlater	GM Regulatory & Commercial
Document Owner:	Jon Stone	Commercial Manager
Document Author:	Alec Findlater	GM Regulatory & Commercial
Document Reviewer:	David Mulder	Senior Planning Engineer
Commercial Change Control Approver: (If required)	N/A	N/A

## II Approval & Revision History

Version	Date	Revision Notes
1.0	28 August 2020	<ul style="list-style-type: none"> <li>Updated to Aurora Energy Standard</li> </ul>
2.0	10 June 2021	<ul style="list-style-type: none"> <li>Decommissioning priority for 1050Hz plant updated (section 12).</li> </ul>
3.0	19 August 2021	<ul style="list-style-type: none"> <li>Decommissioning priority for 1050Hz plant updated (section 12) – NC &amp; PC exchanged.</li> </ul>

For submitting feedback or a change request refer to the Aurora Energy Controlled Document System homepage.

## III Document Properties

Circulation Access	Functional Area	Grouping
Public		

## IV Document Contributors

Name	Position	Content Provided	Page #

## V Normative References

Reference Code	Title
	Electricity Industry Participation Code 2010

Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	3 of 18

## VI External References

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Reference Code	Title
BK	Berwick
CO	Corstorphine
Code	Electricity Industry Participation Code 2010
CPD	Control period demand
ET	East Taieri
HB	Halfway Bush
KV	Kaikorai Valley
MEO	Metering equipment owner
MEP	Metering equipment provider
NC	North City
PC	Port Chalmers
SC	South City
WB	Willowbank

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## VII Internal References

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Reference Code	Title
N/A	N/A

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Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	4 of 18

# 1 Introduction

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## 1.1 Purpose

This document provides information on the Load Management system operated by Aurora Energy Limited. This information is generally provided for use by electricity retailers, and their metering equipment providers and contractors.

## 1.2 Status and Application of This Guide

This guide provides information on the basic parameters of Aurora Energy's load management system. If any aspect of this guide is considered unclear, clarification should be sought from the Commercial Manager.

This guide will be amended periodically, to reflect changes required for continued compliance with legislation and good industry practice. It is recommended that electricity retailers and receiver owners review this guide periodically. The current version of this guide will be maintained on Aurora Energy's website ([www.auroraenergy.co.nz](http://www.auroraenergy.co.nz)) and will apply from the date of publication.

To the extent permitted by law, Aurora Energy Limited, including without limitation its agents and contractors, will not be directly or indirectly liable for any loss, damage or costs arising or in connection with this guide.

## 1.3 Definitions

Aspect	Definition
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Code	Electricity Industry Participation Code 2010
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## 1.4 Acronyms

Short Form	Long Form
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BK	Berwick
CO	Corstorphine
Code	Electricity Industry Participation Code 2010
CPD	Control period demand
ET	East Taieri
HB	Halfway Bush
KV	Kaikorai Valley
MEO	Metering equipment owner
MEP	Metering equipment provider
NC	North City
PC	Port Chalmers
SC	South City
WB	Willowbank

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Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	5 of 18

## 1.5 Accountabilities

### 1.5.1 GM Regulatory & Commercial

Accountable for ensuring that this guide is maintained, and available on Aurora Energy's website.

### 1.5.2 Commercial Manager

Accountable for ensuring that the commercial aspects of this standard are regularly reviewed and updated as needed.

## 2 Load Management System

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Aurora Energy operates a load management system for several key purposes relating to operational management of the electricity network. These include:

- Reducing capital investment in the distribution network by encouraging consumers to shift demand from peak periods to off-peak periods, reducing line charges to customers over the longer-term;
- Reducing peak loads at Transpower substations at times of peak regional demand, thereby reducing Transpower interconnection charges and reducing line charges to customers;
- Signalling the occurrence of higher priced control periods to customers, enabling them to take avoidance action through their own demand management systems; and
- Lowering demand on the electricity network during fault restoration.

Aurora Energy's load management system is also used to provide a range of customer services, including:

- Transferring storage heating loads (water heating, under-floor heating and night-store heating) to less expensive tariff periods;
- Switching street and amenity lighting on and off; and
- Providing energy tariff options to electricity retailers.

Aurora Energy's load management system comprises a range of ripple signal injection devices located at five key facilities. A 317Hz signal is injected into 33/66kV subtransmission lines, which penetrates through the distribution system to ripple receiver relays on customers' meter boards.

In the Dunedin network, there is a range of legacy injection equipment at zone substations that injects a 1050Hz signal directly into the 6.6/11kV distributions system. This legacy equipment is at end-of-life and is being decommissioned with urgency.<sup>1</sup>

Our intended timetable for the decommissioning of the 1050Hz system is included within Section 11, and it is expected that electricity retailers and/or their MEPs/MEOs migrate their receiver equipment to the newer 317Hz frequency.

Multiple commands are created by varying the nature of the ripple signal injected by the load management system. Receivers are placed at customers' installations and contain up to three relays that are programmed to specific commands. Upon receiving a ripple signal matching its programmed command, the relay activates and changes state to either 'on' or 'off'. The receivers on the Aurora Energy network are owned by either electricity retailers or third-party metering equipment providers. The only receivers owned by Aurora Energy are located within distribution substations to provide the switched street lighting supply.

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<sup>1</sup> We first advised the progressive decommissioning of the 1050Hz ripple injection equipment with the first edition of this guide, in June 2010, and prohibited installation of 1050Hz receiver relays from that date.

Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	6 of 18

Both the Dunedin and Central Otago systems offer 100 individual commands and 19 master commands. Each individual command may be invoked separately; however, it is sometimes necessary to quickly manage large blocks of load, therefore individual commands are normally assigned master commands that allow collective operation. The current allocation of load management commands is shown in Appendix A.

### 3 Load Management

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The facility to manage certain loads at peak times allows Aurora Energy to reduce associated costs, including Transpower charges. Economic signals encouraging the installation of ripple receivers to allow load management are provided through lower line charges for managed loads. Additionally, electricity retailers can offer lower tariffs.

Since savings are available to consumers permitting load management of their installation, it is recommended that the following appliances be controlled:

- Storage water heaters;
- Residential storage water heaters above 135 litres;
- Plug in electric vehicles on an 8-hour service at night;
- Storage space heaters;
- Under-floor heating;
- Electric kilns
- Spa and swimming pools.

Modern load management relays can directly switch resistive loads up to 9kW. Loads greater than 9kW will require a contactor to be supplied and installed at the consumer's cost. Three phase loads also require installation of an appropriately rated contactor.

Further information regarding line charges for managed and off-peak time period loads is available in Aurora Energy's Network Connection Standard and Use-of-System Pricing Methodology documents.

### 4 Ownership

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Aurora Energy owns the load management injection equipment only.

Electricity retailers are responsible under the Code for the metering of installations, and typically contract MEPs/MEOs for provision of this function. Accordingly, Aurora Energy has no ownership interest in load management receiver relays.

Aurora Energy cannot place any restriction on which MEP/MEO is used at installations within its network, nor will it become involved in any disputes between MEPs/MEOs regarding to asset displacement.

### 5 Receiver Filter Parameters

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**317Hz Injection:** The standard settings for the filter are 317Hz, 0.5%  $\mu$ f (operate voltage), Narrow (3.9%) filter bandwidth.

**1050Hz Injection:** The standard settings for the filter are 1042Hz, 0.5%  $\mu$ f (operate voltage), Broad (6%) filter bandwidth. No new 1050Hz relays are to be installed.

Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	7 of 18

## 6 Random Individual Command Allocation

### 6.1 Dunedin

Application	Commands to be Randomly Allocated
Domestic water heating	00; 01; 02; 03; 04; 05; 06; 07; 08; 09

### 6.2 Central Otago

Application	Commands to be Randomly Allocated
Domestic water heating	00; 01; 02; 03; 04; 05; 06; 07; 13; 14
Off-peak storage heating (13hr)	08; 09; 10

## 7 Random Switching Time Delay

To ensure that large load changes are avoided, time delays are required for certain applications when load is restored. Time delays are to be of random duration between 0 and 60 seconds and must occur regardless of whether the application is initiated by individual or master command. Time delays are not to occur when load is switched off.

The following applications are to employ random time delays. All other applications require immediate switching.

### 7.1 Dunedin

Application	Commands to Requiring Random Time Delay
Domestic water heating	00; 01; 02; 03; 04; 05; 06; 07; 08; 09
Domestic thermal (kilns, spas, etc.)	20
Domestic hot water (no load shift)	21
General controllable load	31
Commercial hot water	33
Commercial storage heating	34

### 7.2 Central Otago

Application	Commands to Requiring Random Time Delay
Domestic water heating	00; 01; 02; 03; 04; 05; 06; 07; 13; 14
Peak controlled water heating	11

## 8 Learn Function

This feature is to be enabled for time-based programs to provide a back-up feature should there be short term issues with signal injection.

The following parameters are required to be set for the commands listed in the table below;

Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	8 of 18



- Failsafe enabled after 24 hours since the last signal
- Learn function enabled.

The following applications are to have the learn function enabled:

## 8.1 Dunedin

Application	Commands Requiring Learn Function
Plug in electric vehicles	36; 37; 38
General night load	39
11-hour storage heating	40
8-hour storage heating	42
Day / Night Meter register changeover	50

## 8.2 Central Otago

Application	Commands Requiring Learn Function
Off-peak storage heating (13hr)	08; 09; 10
Plug in electric vehicles	36; 37; 38
Irrigation pumps	50
Day / Night Meter register changeover	52
Water or storage heating (11hr)	53; 54
Night only	58
Budget water heating (11hr)	59

## 9 Load Shifting

Water heating loads may also be load shifted in accordance with the protocols with electricity retailers as set out in the Use-of-System Agreement.

## 10 Under-Frequency Shed Capability

If receivers have this capability, the enable / disable and test commands are to be set to the commands as listed in the tables in Appendix A for the Dunedin and Central Otago areas. The shed command is to be linked to relays associated with the commands listed below.

At present, newly installed receivers should be set to have this function disabled (but able to be enabled by the appropriate Decabit command) as no arrangements are in place for this service.

### 10.1 Dunedin

Application	Commands Linked to Under-frequency Shed
Domestic water heating	00; 01; 02; 03; 04; 05; 06; 07; 08; 09
Domestic thermal (kilns, spas, etc.)	20

Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	9 of 18

Domestic hot water (no load shift)	21
General controllable load	31
Commercial hot water	33
Commercial storage heating	34
Plug in electric vehicles	36; 37; 38
General night load	39
11hr storage heating	40
8hr storage heating	41

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## 10.2 Central Otago

Application	Commands Linked to Under-frequency Shed
Domestic water heating	00; 01; 02; 03; 04; 05; 06; 07; 13; 14
Off-peak storage heating (13hr)	08; 09; 10
Peak controlled water heating	11
Plug in electric vehicles	36; 37; 38
Irrigation pumps	50
Water or storage heating (11hr)	53; 54
Night only	58
Budget water heating (11hr)	59

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## 11 Control Period Demand Signal

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A control period demand signal is available and is initiated automatically when Aurora Energy is managing load. This signal can be used by consumers to automatically reduce or avoid their demand during higher priced control periods by operating "peak-reducing" generators of building management systems. Otherwise a simple notification can be provided to allow the consumer to manually switch off significant loads. Provision of the CPD signal is normally restricted to commercial and industrial installations with demand exceeding 150kVA, along with practical scope to transfer demand away from control periods.

Further information on CPD pricing is available in Aurora Energy's Use-of-System Pricing Methodology.

## 12 Decommissioning of Dunedin 1050Hz Ripple Injection

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Dunedin load management has historically been performed via 1050 Hz 6.6/11kV ripple injection plants at each of the city's 18 zone substations. In 2010, Aurora signalled to retailers that load management via the 1050Hz frequency would end and instructed that ripple receivers installed from 2010 onwards were to be configured to the 317Hz frequency.

Since 2010, Aurora has operated the 1050Hz and 317Hz frequencies in parallel; however, the 1050Hz signal is being progressively decommissioned as substation development requires the removal of the ripple injection plants.

Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	10 of 18

The table below outlines Aurora's intended timeline to decommission the 1050Hz signal. Electricity retailers need to ensure that all load control devices are configured to the 317Hz frequency for the stated areas, by the intended date of decommissioning. Upon request, Aurora will provide details of the ICPs contained within each area.

Area or Channel to be Replaced / Reconfigured	Deadline
Berwick Area	Completed
Neville Street and adjoining feeders	Completed
Streetlighting relays	Completed
Outram and adjoining feeders ET3 and MG6	ASAP
CPD relays (channel 52)	ASAP
Andersons Bay and adjoining feeders PC3, PC7, SK2, SK7 & SK8	March 2022
Smith Street and adjoining feeders HB10, HB12, KV9, NC2, NC9, NC10, SC16, & WB4	March 2022
Halfway Bush remainder	March 2022
North City remainder	March 2022
Green Island and adjoining feeders CO2, CO3, CO6, CO7 & ET2	March 2023
Ward Street	March 2023
South City remainder	March 2023
Port Chalmers remainder	March 2023
North East Valley	March 2023
St Kilda remainder	March 2024
Corstorphine remainder	March 2024
Mosgiel	March 2024
Willowbank and adjoining feeders	March 2025
Kaikorai Valley remainder	March 2025
East Taieri remainder	March 2026

## 13 New Services

Aurora Energy has unallocated commands in both the Dunedin and Central Otago load management systems that may be used to provide new services. Some charges may apply for setup and on-going maintenance of the service.

It must be noted that commands should be used for their intended purpose only (load management, tariff changing, etc) and Aurora Energy accepts no responsibility for the consequences of incorrect or misused channel assignments.

Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	11 of 18

## Appendix A – Load Management Command Allocations

### Dunedin

Master	Individual	Description	Notes
100	00	Domestic hot water	Minimum 16hr service target
100	01	Domestic hot water	Minimum 16hr service target
100	02	Domestic hot water	Minimum 16hr service target
100	03	Domestic hot water	Minimum 16hr service target
100	04	Domestic hot water	Minimum 16hr service target
101	05	Domestic hot water	Minimum 16hr service target
101	06	Domestic hot water	Minimum 16hr service target
101	07	Domestic hot water	Minimum 16hr service target
101	08	Domestic hot water	Minimum 16hr service target
101	09	Domestic hot water	Minimum 16hr service target
102	10	Spare	
102	11	Spare	
102	12	Spare	
102	13	Spare	
102	14	Spare	
103	15	Spare	
103	16	Spare	
103	17	Spare	
103	18	Spare	
103	19	Spare	
103	20	Domestic thermal (kilns, spas, etc.).	Minimum 16hr service target
103	21	Domestic hot water (no load shift)	Minimum 16hr service target - Required to be changed to an alternative Domestic hot water channel when replaced with 317Hz
103	22	Spare	

Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	12 of 18

## Load Management Guide

103	23	Spare	
103	24	Spare	
105	25	Spare	
105	26	Spare	
105	27	Spare	
105	28	Spare	
105	29	Spare	
	30	Interruptible load	No longer used
106	31	General controllable load	Required to be changed to an alternative Commercial hot water channel when replaced with 317Hz
106	32	Church heating	No longer used
106	33	Commercial hot water	Minimum 16hr service target
106	34	Commercial storage heating	Minimum 16hr service target
107	35	Spare	
107	36	Plug in electric vehicles	Off, 0600 – 2200
107	37	Plug in electric vehicles	Off, 0630 - 2230
107	38	Plug in electric vehicles	Off, 0700 - 2300
107	39	General night load	Off, 0700 – 2300
108	40	11hr Storage heating.	Off, 0700 – 1330 and 1630 - 2300
108	41	Spare	
108	42	8hr Storage heating	Off, 0700 – 2300
108	43	Spare	
108	44	Spare	
109	45	Spare	
109	46	Spare	
109	47	Spare	
109	48	Spare	
109	49	Spare	
110	50	Day / night register change	Off, 0700 – 2300
110	51	Spare	
	52	Control period demand	On when control period On, Normally Off

Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	13 of 18

## Load Management Guide

	53	Under frequency load shedding enable	
	54	Under frequency load shedding test	
111	55	Street lighting – Arterial roads	Off, dawn – dusk
111	56	Street lighting – Suburban roads	Off, dawn – dusk
111	57	Spare	
111	58	Spare	
111	59	Spare	
112	60	Zone substation 2% voltage control	Emergency use only
112	61	Zone substation 3% voltage control	Emergency use only
112	62		
112	63		
112	64		
	65	Consumer signalling	No longer used
	66	Block channel 65, emergency test run.	No longer used
	67	Interruptible load warning	No longer used
112	68	Spare	
112	69	Spare	
114	70	Spare	
114	71	Spare	
114	72	Spare	
114	73	Spare	
114	74	Spare	
114	75	Spare	
114	76	Spare	
114	77	Spare	
114	78	Spare	
114	79	Spare	
116	80	Spare	
116	81	Spare	
116	82	Spare	
116	83	Spare	

Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	14 of 18

## Load Management Guide

116	84	Spare	
117	85	Spare	
117	86	Spare	
117	87	Spare	
117	88	Spare	
117	89	Spare	
118	90	Spare	
118	91	Spare	
118	92	Spare	
118	93	Spare	
118	94	Spare	
	95	Spare	
	96	Spare	
	97	Spare	
	98	Spare	
	99	Spare	

## Central Otago

Master	Individual	Description	Notes
100	00	Domestic hot water	Minimum 16hr service target
100	01	Domestic hot water	Minimum 16hr service target
100	02	Domestic hot water	Minimum 16hr service target
100	03	Domestic hot water	Minimum 16hr service target
100	04	Domestic hot water	Minimum 16hr service target
100	05	Domestic hot water	Minimum 16hr service target
100	06	Domestic hot water	Minimum 16hr service target
100	07	Domestic hot water	Minimum 16hr service target
100	08	Off-peak storage heating (13hrs)	Off, 0730-1000; 1200-1500; 1700-2000; 2200-0030
100	09	Off-peak storage heating (13hrs)	Off, 0730-1010; 1210-1505; 1705-2010; 2210-0030
100	10	Off-peak storage heating (13hrs)	Off, 0730-1020; 1220-1510; 1710-2020; 2220-0030
100	11	Peak controlled water heating	Minimum 20hr service target

Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	15 of 18

Load Management Guide

100	12	Spare	
100	13	Domestic hot water	Minimum 16hr service target
100	14	Domestic hot water	Minimum 16hr service target
100	15	Spare	
	16	Spare	
	17	Spare	
	18	Spare	
	19	Spare	
	20	Spare	
	21	Spare	
	22	Spare	
	23	Spare	
	24	Spare	
	25	Spare	
	26	Spare	
	27	Spare	
	28	Spare	
	29	Spare	
	30	Spare	
	31	Spare	
	32	Spare	
	33	Spare	
	34	Spare	
	35	Spare	
107	36	Plug in electric vehicles	Off, 0600 – 2200
107	37	Plug in electric vehicles	Off, 0630 - 2230
107	38	Plug in electric vehicles	Off, 0700 - 2300
	39	Spare	
108	40	Street lighting – Alexandra, Queenstown, Commonage	Off, dawn – dusk
108	41	Street lighting - Earnsclough and Frankton	Off, dawn – dusk
108	42	Street lighting - Clyde and Dalefield	Off, dawn – dusk

Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	16 of 18



Load Management Guide

108	43	Street lighting - Omakau, Lauder Flat, Camp Hill and Arrowtown	Off, dawn – dusk
108	44	Street lighting - Roxburgh, Queensberry, Lindis Crossing, and Glenorchy	Off, dawn - dusk
108	45	Street lighting - Ettrick, Wanaka, and Fernhill	Off, dawn – dusk
108	46	Street lighting - Roxburgh Hydro, Cromwell, and Closeburn	Off, dawn – dusk
108	47	Reserved for future street lighting control.	
108	48	Reserved for future street lighting control.	
108	49	Reserved for future street lighting control.	
110	50	Irrigation pumps (14hr)	Off, 0700-1100; 1500-2100 (June to August only)
	51	Control period demand	On when control period On, Normally Off
	52	Day / night tariff change	Off, 2300-0700
	53	Water or storage heating (11hr)	Off, 0710-1330; 1630-2310
	54	Water or storage heating (11hr)	Off, 0720-1300; 1600-2320
	55	Under frequency load shedding enable	
	56	Under frequency load shedding test	
	57	Spare	
	58	Night only	Off, 0700-2300
	59	Budget water heating (11hr)	Off, 0700-1030; 1230-1600; 1700-2330
	60	Reserved for switching Aurora equipment	
	61	Reserved for switching Aurora equipment	
	62	Reserved for switching Aurora equipment	
	63	Reserved for switching Aurora equipment	
	64	Reserved for switching Aurora equipment	
	65	Reserved for switching Aurora equipment	
	66	Reserved for switching Aurora equipment	
	67	Reserved for switching Aurora equipment	
	68	Reserved for switching Aurora equipment	
	69	Reserved for switching Aurora equipment	
	80	Temporary load shed - Queensberry	No longer used
	81	Temporary load shed - Queensberry	No longer used

Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	17 of 18

Load Management Guide

82	Spare	
83	Spare	
84	Spare	
85	Spare	
86	Spare	
87	Spare	
88	Spare	
89	Spare	
90	Spare	
91	Spare	
92	Spare	
93	Spare	
94	Spare	
95	Spare	
96	Spare	
97	Spare	
98	Spare	
99	Spare	

Doc ID	Functional Area	Document Owner	Approver	Issued	Version	Page
AE-CC01-G03	Regulatory & Commercial	Commercial Manager	GM Regulatory & Commercial	19/08/2021	3.0	18 of 18