



PARTICIPANT ROLLING OUTAGE PLAN



PARTICIPANT ROLLING OUTAGE PLAN

RECORD OF AMENDMENTS			
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3.0	2015 Review - Outage data updated	Rodger Griffiths	03/03/2015
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1 GENERAL

1.1 Scope

This standard meets the system operator's obligation in clause 9.2 of the **Electricity Industry Participation Code (the Code)** to prepare and publish a system operator rolling outage plan.

1.2 Application

This standard applies to Westpower network operation during a supply shortage declaration by the system operator.

1.3 Objective of this Standard

The objective of this document is to comply with clause 9.4 of the Code and thereby to specify criteria, methodologies and principles to be applied in implementing outages to be provided for in participating rolling outage plans.

1.4 Referenced Documents

The actions recommended in this document must also comply with the requirements of the latest available edition of the following Statutory Acts, Regulations, Codes and Standards: -

1.4.1 Legislation

Electricity Act 1992

Electricity (Safety) Regulations 2010 and pursuant Codes of Practice (NZECP)

1.4.2 Industry Rules and Standards

SM-EI Safety Manual - Electricity Industry (SM-EI) – Parts 1 – 3 inclusive, latest versions

1.5 Definitions

Unless stated otherwise, all words and phrases used in this document shall have the meaning defined in:

- Westpower [220S002](#) - *Definitions*;
- Common English language definitions.

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AUFLS	Automatic Under Frequency Load Shedding
Authority	Electricity Authority
Code	Electricity Industry Participation Code 2010 and subsequent amendments
Electricity Act	Electricity Act 2010 and subsequent amendments
Feeder	A high voltage circuit typically supplying up to 2000 consumers
GXP	Transpower Grid Exit Point
GEN	Grid Emergency Notice
PROP	Participant Rolling Outage Plan
Retailers	Electricity Retail Companies
Rolling Outages	Planned electricity disconnections spread over different parts of the network at differing times to avoid prolonged outages at any one location
SOROP	System Operator Rolling Outage Plan
Supply Shortage	Declaration made by the System Operator in consultation with the Electricity Authority under Part 9.14 of the Code
System Operator	Operator of the National Electricity Transmission Grid

1.6 Health and Safety

All works in Westpower's electricity network and its associated equipment shall be performed according to Westpower's standards, Network Operating Centre (NOC) operating instructions and current versions of the Safety Manual – Electricity Industry (SM-EI).

All personnel shall use personal protective equipment (PPE) as per Westpower standard [920S021](#) - *Personal Protective Equipment Requirements* and the requirements of SM-EI when working with materials such as insulating oils, gases and other hazardous substances.

1.7 Copyright

The copyright of this publication is the property of Westpower Limited. No part of this publication may be reproduced by photocopying or by any other means without the prior written permission of Westpower Limited.

1.8 Hazard Identification and Management

A systematic method of identifying all risks shall be applied to all projects and business units, generally as required by *Risk Management Principle and Guidelines AS/NZS ISO 31000:2009*. Appropriate risk mitigation or reduction methods shall then be implemented before work commences on a project or within a business unit.



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1.9 Environmental Considerations

Environmental considerations shall be in accordance with the requirements of [310S035](#) – *Environmental Management System*.

1.10 Enquiries Regarding this Document

Contact Person: General Manager Assets and Engineering Services

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2 BACKGROUND

2.1 Electricity Authority

The Electricity Authority (Authority) is an independent Crown entity responsible for regulating the New Zealand electricity market.

The Authority's objective is to promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers.

2.2 Transpower

Transpower is a State Owned Enterprise, which owns and operates New Zealand's National Grid - the network of high voltage transmission lines and substations that transports electricity from where it is generated to distribution line companies such as Westpower.

As System Operator, Transpower manages the real time operation of New Zealand's electricity transmission system. It keeps the right amount of energy flowing to match generated supply with demand. The System Operator also provides information relating to forecasting and security of supply, together with emergency management as detailed in Part 7 of the Code.

2.3 Westpower

Westpower is the electricity network company that owns and maintains the electricity lines, cables and substations that deliver electricity to consumers in the West Coast region including Reefton, Greymouth and the Glacier regions in South Westland. GXP points in the Westpower area are as follows:

Table 1 – GXP Maximum Demand

Grid Exit Point	Asset Owner	Voltage (KV)	Present Maximum Demand (MW)
Greymouth	Westpower	66/11	11.254
Hokitika	Westpower	66/33/11	18.905
Kumara	Westpower	66/11	0.955
Dobson	Transpower/Westpower	110/66/33/11	7.962
Otira	Transpower	66/11	0.238
Reefton	Westpower	110/33/11	7.83
Atarau	Transpower	110	0.406

Peak demand in the Westpower area during the 2014/2015 year was 47.55 MW.

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3 SUPPLY AND DEMAND

Transpower, as the System Operator, controls the transmission network to match generation with consumer demand. Constraints on the ability to manage this may be caused by:

- low lake levels reducing hydro generation;
- failure of a large generator; and
- a fault on critical transmission circuit.

The first two causes above could lead to an energy shortage, while the third could lead to a shortage of transmission capacity.

3.1 Load Reduction by Westpower

Westpower has some ability to reduce load by turning off domestic water heaters via ripple control in the West Coast region.

Further reductions in load would require disconnecting consumers.

3.2 Range of Events

Events that could lead the System Operator to make a supply shortage declaration can in general terms be categorised as:

- Developing Event: Events that evolve over time, for example low hydro lake levels;
- Immediate Event: Events that occur with little or no warning, usually as a result of a transmission line or major generation failure.

3.3 Significant Incident

A Developing or Immediate Event will be classed by Westpower as a significant incident and the General Manager - Assets & Engineering Services (or his nominee) will assemble a team of senior managers and staff to manage the incident.

Communication with retailers will be as per normal notification procedures.

Local Authorities, civil defence and other stakeholders will be notified of significant events by the General Manager - Assets & Engineering Services (or his nominee).

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4 ACTIONS FOR IMMEDIATE EVENTS

Transpower, as the System Operator, is required to keep enough reserve generation to cover the risk of the largest connected generator tripping (or HVDC link failure). They are also required to keep the system frequency at 50Hz. If a large generator trips, it may cause a reduction in frequency which if not rectified can result in other generators tripping and could lead to complete failure of the electricity network.

As reserve generation cannot immediately pick up the load of a disconnected generator, an immediate load reduction is required until additional generation can pick up the load. Automatic load shedding groups reduce load in stages until the frequency stabilises.

4.1 Disconnecting Customers

4.1.1 *Automatic Under Frequency Load Shedding (AUFLS)*

If the load shed by the Reserve Market tripping is insufficient to stabilise the network, further automatic load reduction is required.

Each distribution network company must have available at all times two blocks of load, each of 16% of its total load to be shed by automatic under frequency relays. In the South Island Transpower has installed these relays on selected 33kV feeders at the GXPs. In the Westpower distribution area only Dobson Substation has these relays fitted.

4.1.2 *AUFLS Zones 1 & 2*

If system frequency fails to recover after Reserve market load shed, AUFLS Zone 1 shedding by Transpower will occur. This will disconnect automatically up to 16% of Westpower's load. Zone 2 load blocks do not exist in the Westpower area.

4.1.3 *Manual Load Shedding*

If AUFLS Zone 1 tripping fails to stabilise frequency the System Operator will shed more load. Once the frequency has stabilised the System Operator will advise the Westpower System Control when load can be restored.

4.2 Supply Restoration

Restoration of disconnected load must be restored in conjunction with the System Operator. This is to prevent overloading the transmission network and creating further instability.

4.3 System Operator Declaration

If the System Operator in conjunction with the Authority declares a supply shortage either due to Immediate or Developing Events, rolling outages may be implemented as per Sections 6 & 7 of this document.

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4.4 Transmission Grid Emergency

The System Operator may request Westpower to reduce load under a grid emergency notice (GEN). Westpower would commence with shedding water heating load and then if necessary shed feeders as per Emergency Load Shedding & Restoration procedures.

If an Immediate Event is in place, the grid emergency will take precedence.

5 DEVELOPING EVENTS

Developing Events take some time to unfold, with the opportunity to manage security of supply risks and prepare emergency measures during the early part of the event.

The Code requires the System Operator to commence an official conservation campaign when studies show a hydro storage risk of 10% or more and the System Operator forecasts such a risk will last for a week or more.

5.1 Declaration of Developing Event

The System Operator must use reasonable endeavours to give each participant at least 2 weeks notice of an official conservation campaign commencing.

As a last resort measure, the System Operator may initiate rolling outages after consultation with the Authority, only if there is a shortage of electricity supply (Generation) or transmission capacity if the System Operator considers:

- The normal operation of the market is, or will soon be unable to match supply with demand;
- That, if planned outages are not implemented, unplanned outages are more likely than not.

The System Operator can also make a supply shortage declaration if after consultation with the Authority, it considers that the probability of forced outages required exceeds 50%.

Westpower would disconnect HV feeders (rolling outages) in a controlled manner to enable targets to be reached.

The shedding of water heating load is not a viable option for energy savings as this only defers usage and would not save energy.

Where possible it is Westpower's plan to use the standard planned outage notification procedure to retailers.

5.2 Criteria for Rolling Outages

To ensure Public Health and Safety is preserved and costs to the economy are minimised the following table shows a desired criteria for selecting feeders to be included in rolling outages.

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Table 2 - Priority Loads

Priority	Priority Concern	Maintain Supply To:
1	Public Health and Safety	Major hospitals, air traffic control centres, and emergency operation centres.
2	Important public services	Energy control centres, communication networks, water and sewage pumping, fuel delivery systems, and major port.
3	Public Health and Safety	Minor hospitals, medical centres, schools, and street lighting.
4	Food production	Dairy farms and milk production facilities.
5	Domestic production	Commercial and industrial premises.
6	Disruption to consumers	Residential premises.

These priorities are intended as guidelines, and because rolling outages will be implemented on a feeder by feeder basis, it is not possible to discriminate between individual consumers on the same feeder. For example, a predominantly residential feeder may also have small pockets of commercial or industrial consumers.

5.3 AUFLS Criteria

Currently, the same criteria for rolling outages as shown in Table 1 are also used to select 33kV feeders (zone substations) for AUFLS tripping. Thus, AUFLS load blocks are predominantly from lower priority load categories however some higher priority consumers would also be affected. AUFLS relays are installed at Dobson Sub on the 66/33kV transformers, therefore all load supplied out of Dobson on the 33kV Bus would be shed. This would affect Rapahoe, Ngahere and Arnold Substations together with the loss of 3MW approx generation at Trustpowers Arnold Power Station.

For system security reasons, AUFLS blocks are excluded from rolling outages. Therefore all 33kV/11kV feeders fed off the Dobson 33kV Bus have not been used in the 'supply shortage' rolling outages. An exemption for AUFLS blocks may be available but notice is only likely to be advised several hours before the commencement of rolling outages. The short notice would make AUFLS exemption unusable, as it would be too late to amend the publicly available outage schedule and so AUFLS exemption will not be considered.

5.4 Shutdown Notification

When requested to reduce demand with rolling outages, Westpower plans to use the planned outage procedures, to advise retailers in advance, of pending outages.

The time and extent of advertised outages will be approximate.



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5.5 Vulnerable consumers and Priority Sites

Westpower will endeavour to give retailers as much advance notice as possible of pending rolling outages to enable them to notify vulnerable consumers.

5.6 Grid Emergency during a Developing Event

If the System Operator declares a Grid Emergency during a Developing or Immediate event, the Grid Emergency will take priority. As water heating load generally would not be used to reduce load in a Developing or Immediate event, Westpower would have the water heating load available for load reduction when required for the Grid Emergency.

If water heating load is insufficient, the rolling outage feeders may have to be rearranged to comply with the Grid Emergency. After the Grid Emergency is over, the rolling outages pattern would continue.

5.7 Supply Restoration

Disconnected load must be restored in conjunction with the System Operator. This is to prevent overloading the transmission network and creating instability.

5.8 Communication

Westpower will keep media and consumers informed of planned interruptions to supply before and during the outages. Media will be informed as per Westpower's standard communications procedure, and the retailers will be responsible for consumer notification.

5.8.1 *Communication with System Operator*

All communications with the System Operator will be using Transpower's TPSN telephone in Greymouth.

Prior to notifying and implementing rolling outages, Westpower will consult with the System Operator to establish a process for load shedding and restoration.

The System Operator can contact Westpower using the following details:

Westpower Ltd

Ph. (03) 7689300

Fax (03) 7682766

TPSN 7784

P.O. Box 375 Greymouth 7800

146 Tainui St, Greymouth

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5.9 WESTPOWER Staff Responsibilities

Table 3 - WESTPOWER Staff Responsibilities

Role	Westpower Person Responsible
Receive communication from Electricity Authority	General Manager - Assets & Engineering Services
Receive communication from System Operator	System Controllers
Implement this plan	Network Manager (Stations)
Weekly savings reporting	Network Manager (Comms)
Retailer notification	System Controllers
Revoking rolling outages	Network Manager (Stations)
Reporting to Electricity Authority	General Manager - Assets & Engineering Services
Reporting to media, public agencies	Chief Executive

Within one day of declaration of a supply shortage, the Network Manager (Stations) will notify the System Operator of the updated contact details including telephone numbers and email address for each of the positions named in Table 3.

5.10 Rolling Outages Strategy and Methodology

The Network Manager (Stations) and the Network Manager (Comms) together with the System Controllers will review weekly targets and prepare plans for weekly rolling outages based on savings required. The plans will be forwarded to the retailers for consumer and media notification.

Rolling outages will wherever possible disconnect feeders using priority listed in Table 1.

Planned energy savings will be based upon network energy usage for the same period the previous year.

5.11 Target Monitoring

For load shedding to a weekly target, the Energy Analyst will monitor energy savings against target and, together with the Network Manager (Stations), review future load shedding to increase or decrease the amount of rolling outages to enable the weekly target to be met. The Network Manager (Comms) will be responsible for daily and weekly reporting of consumption relative to target levels. The Network Manager (Comms) will also be responsible for providing the predicted load for the next week on a seven day rolling basis. This prediction is to be by GXP for each half hour.

As part of the monitoring process, Westpower is required to report to the System Operator.

The following information is required:

- A rolling 'week ahead' load forecast (beginning at a time specified by the System Operator) that forecasts Westpower's reasonable expectation of the half hourly load at each grid exit point. This will take into account the impact of any rolling outages;

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- Any expected change to the forecast for a grid exit point of more than 20% for any trading period, as soon as reasonably practical;
- The level of consumption relative to the target levels;
- The nature and extent of the rolling outages.

5.12 Log of Rolling Outages

System Controllers will log times of disconnection and reconnection of all feeder interruptions and enter in the log. The log sheet to be used by System Controllers is shown in Appendix 1.

These will be used to monitor the rolling outage program.

6 ROLLING OUTAGES

When instructed by the System Operator, following a supply shortage declaration, to reduce demand, rolling outages will be instigated by the Network Manager (Stations) as per this plan and outage strategy.

The Network Manager (Stations) will ensure load shedding schedules are prepared, System Control rosters are adjusted as required, and load is controlled and monitored to meet desired targets.

Schedules of estimated load shedding, restoration times and quantities are to be forwarded to the System Operator seven days before the planned outage. If significant variation +/- 20% is noticed, or expected, from the schedules provided to the System Operator then Westpower shall advise the System Operator of this change.

6.1 Feeder Selection

Feeders are to be disconnected as follows. These lists are based upon priority guidelines shown in Table 1. Generally feeders will be chosen from top of table first.

The number of feeders chosen for any week will depend upon the level of savings required to meet target. (See Appendix 2)

Where possible, Westpower will try to comply with priorities in Table 1 to select feeders for rolling outages and will endeavour to keep rolling outages to a minimum to achieve a 5% savings target in each priority step.

The forecast presented below is percentage load savings based on total system load of 45MW including Dobson.



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Table 4 – 5% Savings

Priority	Outages Per Week	Outage Duration [h]	Expected Weekly Savings [kWhr]	Energy Savings
1	-	-	0	0.00%
2	-	-	0	0.00%
3	-	-	0	0.00%
4	-	-	0	0.00%
5	5	1.5	55.63	1.71%
6	7	2	120.75	3.72%
			176.38	
Average Weekly winter volume			3250	
Estimated percentage savings				5.43%

Table 5 – 10% Savings

Priority	Outages Per Week	Outage Duration [h]	Expected Weekly Savings [kWhr]	Energy Savings
1	-	-	0	0.00%
2	-	-	0	0.00%
3	-	-	0	0.00%
4	4	1	51.83	1.60%
5	5	2	74.17	2.28%
6	6	4	205.83	6.33%
			331.83	
Average Weekly winter volume			3250	
Estimated percentage savings				10.21%

Table 6 – 15% Savings

Priority	Outages Per Week	Outage Duration [h]	Expected Weekly Savings [kWhr]	Energy Savings
1	-	-	0	0.0%
2	-	-	0	0.0%
3	-	-	0	0.0%
4	5	2	129.58	3.99%
5	5	3	111.25	3.42%
6	7	3	239.46	7.37%
			480.29	
Average Weekly winter volume			3250	
Estimated percentage savings				14.78%

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Table 7 – 20% Savings

Priority	Outages Per Week	Outage Duration [h]	Expected Weekly Savings [kWhr]	Energy Savings
1	-	-	0	0.00%
2	6	2	23.00	0.71%
3	6	2	20.00	0.62%
4	6	3	233.25	7.18%
5	5	3	111.25	3.42%
6	7	4	241.50	7.43%
			629.00	
Average Weekly winter volume			3250	
Estimated percentage savings				19.36%

Table 8 – 25% Savings

Priority	Outages Per Week	Outage Duration [h]	Expected Weekly Savings [kWhr]	Energy Savings
1	-	-	0	0.00%
2	7	4	19.17	0.59%
3	5	2	16.67	0.51%
4	4	4	207.32	6.38%
5	6	6	267.00	8.22%
6	7	5	301.88	9.29%
			812.04	
Average Weekly winter volume			3250	
Estimated percentage savings				24.99%

Outages will be programmed between 0800 and 1800 on all days. Night time is excluded from the cut period for safety reasons. Initially outages will be scheduled for mid-afternoon to limit the economic effects.

Timing of outages will be approximate and could vary daily due to network or System Operator constraints.

The tables above show the planned outage duration for each specified savings level.

6.2 Contingent Events

If an unplanned event occurs, such as a Civil Defence emergency that could alter the planned rolling outages, System Controllers will be responsible for communication with retailers of any changes to the advertised program.



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6.3 Consumer Liaison

For major consumers, with dedicated HV feeder supplies, short term rolling outages may not be appropriate. As an alternative, longer single outages could be offered if that was easier for them to plan for.

Other consumers are advised to contact their retailer for information on the priority of the feeder they are supplied from and outage times.

6.4 Vulnerable Consumers

Retailers maintain lists of consumers with health and safety issues. It is not feasible for Westpower to prevent rolling outages affecting individual vulnerable consumers.

During rolling outages, general media releases will advise consumers with health problems as to their best course of action.

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6.6 APPENDIX 2 Schedule of Feeders to be shed during PROP

Priority	Zone Sub	Area	Controlled By	Device	Load [MW]
6	Fox	Fox	Westpower	L37	0.15
6	Fox	Fox	Westpower	L26	0.2
6	Fox	Fox	Westpower	CB1	0.5
6	Rutherglen	Rutherglen	Westpower	L11	0.25
6	Rutherglen	Rutherglen	Westpower	L45	0.70
6	Cobden	Cobden	Westpower	L43	0.25
6	Cobden	Cobden	Westpower	L44	1
6	Greymouth	South Beach	Westpower	CB6	1.5
6	Arnold	Jacksons	Westpower	L53	0.1

Priority	Zone Sub	Area	Controlled By	Device	Load [MW]
6	Hokitika	L Kaniere	Westpower	L21	0.15
6	Hokitika	Kaniere	Westpower	L5	0.4
6	Kumara	Serpentine	Westpower	L34	0.15
6	Kumara	Kumara village	Westpower	CB1	1.1
6	Reefton	Reefton	Westpower	CB5	2.5
6	Ross	Ross	Westpower	CB3	0.2
6	Wahapo	Okarito	Westpower	CB1	0.1
6	Ngahere	Ngahere	Westpower	3	1
6	Ngahere	Roa	Westpower	L31	0.1

Priority	Zone Sub	Area	Controlled By	Device	Load [MW]
5	Globe	Env./Offices	Westpower	CB2	0.35
5	Kumara	Turiwhate	Westpower	L50	0.1
5	Greymouth	CBD2	Westpower	CB9	2
5	Kumara	Camerons	Westpower	LB28	0.4
5	Globe	Plant General	Westpower	CB3	0.25
5	Globe	Flotation Area	Westpower	CB4	0.1

Priority	Zone Sub	Area	Controlled By	Device	Load [MW]
5	Franz Josef	CBD	Westpower	CB1	1.3
5	Hokitika	CBD	Westpower	CB12	1.8
5	Arnold	Stillwater	Westpower	CB3	1.5
5	Franz Josef	Rural	Westpower	CB3	0.6
5	Blackwater	Mawheraiti	Westpower	CB1	0.5



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Priority	Zone Sub	Area	Controlled By	Device	Load [MW]
4	Arnold	Moana	Westpower	L29	1
4	Hokitika	WMP	Westpower	CB5	3.5
4	Hokitika	Rimu/Takutai	Westpower	L4	0.2
4	Hokitika	Stafford	Westpower	L2	0.4
4	Whataroa	Whataroa	Westpower	CB1	0.45
4	Kumara	Taramakau	Westpower	L51	0.15
4	Logburn	Atarau	Westpower	CB1	0.5
4	Arnold	Moana	Westpower	L29	1

Priority	Zone Sub	Area	Controlled By	Device	Load [MW]
4	Harihari	Robertson Rd	Westpower	CB1	0.4
4	Ngahere	Atarau	Westpower	L58	0.6
4	Blackwater	Totara Flat	Westpower	L36	0.6
4	Ross	Birchfields	Westpower	CB1	0.2
4	Reefton	Inangahua	Westpower	L14	0.6
4	Hokitika	WMP	Westpower	CB9	3.1

Priority	Zone Sub	Area	Controlled By	Device	Load [MW]
4	Reefton	Cronadun	Westpower	CB4	0.4
4	Waitaha	Waitaha	Westpower	CB1	0.2
4	Hokitika	Kowhitirangi	Westpower	L6	1.35
4	Hokitika	WMP	Westpower	CB11	1.5
4	Harihari	Wanganui Flat	Westpower	CB3	0.4

Priority	Zone Sub	Area	Controlled By	Device	Load [MW]
3	Ngahere	Blackball	Westpower	CB1	1.4
3	Greymouth	GYM Sub to L44	Westpower	13	0.6

Priority	Zone Sub	Area	Controlled By	Device	Load [MW]
2	Greymouth	CBD	Westpower	CB12	1.3
2	Greymouth	Blaketown	Westpower	L3	1

Priority	Zone Sub	Area	Controlled By	Device	Load [MW]
1	Greymouth	Boddytown	Westpower	CB11	2.5
1	Hokitika	Seaview	Westpower	CB4	1.5



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7 DOCUMENT CHANGE REQUEST

Memo To: **General Manager Assets and Engineering Services
Westpower Limited
P O Box 375
Greymouth.**

Change Details:

(Attach separate sheets as necessary).

Paragraphs Affected:

Priority:

Urgent

(Within 1 week)

Routine

(Within 12 months)

Low

(Next Review)

Submitted By (Print Name)	Date
----------------------------------	-------------

Document Change Request - Acknowledgement

Dear

Thank you for your suggestion regarding changes to the above mentioned document.

Your request has been noted and added to our works program. Should we require any additional information regarding your notification then we will be in contact with you.

Thank you for your contribution to improving the standard of Westpower’s documentation.

Regards,

.....

**General Manager Assets and
Engineering Services**

.....

Date