

Appendix 36

Project summary documents for identified projects

1. CPP1 Urban Major Projects – North
2. CPP2 Urban Major Projects – Dallington
3. CPP7 Rural Major Projects – Rolleston
4. CPP33 Pilots and Protection Replacement
5. CPP36 Switchgear Replacement
6. CPP37 Transformers Replacement
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9. CPP53 Connections and Extensions
10. CPP54 Spur Asset Acquisitions
11. CPP60 and 62 Head Office Building and Sundry Land and Building Capex
12. CPP64 Information and Technology Capex
13. CPP101 Overhead Lines 11kV and 400V Scheduled Maintenance
14. CPP108 Transformers Scheduled Maintenance
15. CPP109 Buildings, Grounds and Substations Scheduled Maintenance
16. CPP112 Switchgear Scheduled Maintenance
17. CPP118 Underground Cables Emergency Maintenance
18. CPP119 Network Assets Emergency Maintenance
19. CPP160 Corporate Opex
20. CPP164 Information Solutions – Corporate Systems Opex
21. CPP165 and 171 Commercial, Regulatory and Special Projects Opex
22. CPP167 Infrastructure Management Opex

URBAN MAJOR PROJECTS - NORTH

CPP1

Project Summary

1 April 2013 – 31 March 2019

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1. Project introduction

Project Name	<i>Urban Major Projects - North (CPP1)</i>
Service Category	<i>Provide and operate network infrastructure</i>
Capex Category	<i>Major Projects</i>

Plans to expand Orion's subtransmission network in northern and western Christchurch have been in preparation for some time. The 2010-11 earthquakes have altered these plans, due to asset damage in the east city and changes to load growth predictions. The existing and proposed urban upper network is shown in the Figure overleaf, with the projects in this group highlighted yellow. Works outside the customised price-quality path (CPP) period are shown in blue.

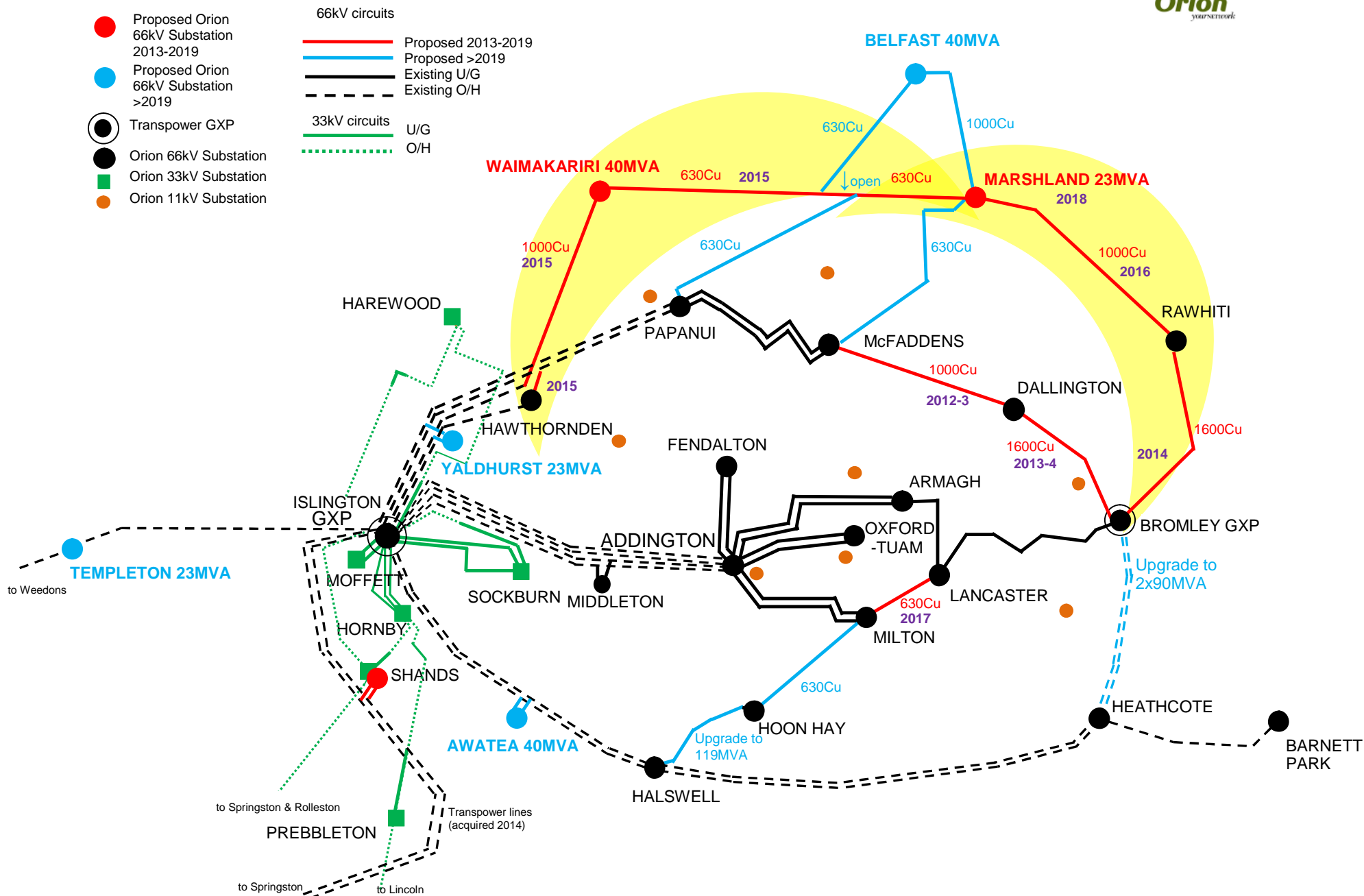
1.1 Assets included

The projects in this Urban North group (see below) flow out of the 2012 *Urban Network Architecture Subtransmission Review* NW70.60.05 and the *Rawhiti 66kV Options* paper (Appendix A). The connections to the new Rawhiti zone substation (projects 619 and 650) are explicitly earthquake related. The remainder would have been constructed in any case but their exact form and timing are influenced by the effects of and learnings from the earthquakes.

	Orion project ID	Project title	Budget \$000
FY13	606	QEII Park diesel generators	2,899
FY14	521	Land acquisition for Marshland substation	500
FY14	619	Bromley to Rawhiti 66kV link	10,953
FY15	525	Waimakariri substation stage 1	5,312
FY15	641	Hawthornden-Waimakariri 66kV link	7,494
FY15	651	Marshland to Waimakariri 66kV link	10,738
FY16	634	Belfast Diesel Generation - Stage 1	1,285
FY16	650	Rawhiti to Marshland 66kV link	11,429
FY18	488	Marshlands zone substation	6,255
FY18	541	Hawthornden T-off	1,300
FY18	542	Waimakariri substation stage 2	2,377
Total			60,542

Budget for projects in Urban North Group

Urban subtransmission network



1.2 Aims and objectives

The objectives of this suite of projects are:

- to restore N-1 security of supply to Rawhiti zone substation, following the destruction of two Bromley-Brighton cables and Brighton zone substation. This will be done in a way consistent with the network architecture proposed by the Architecture Review, i.e. a cable from Bromley and one from Islington via Waimakariri and Marshland
- to provide capacity and security of supply to north and northwest Christchurch, as load develops (hastened by post-earthquake relocation of demand)
- to provide for the replacement of the four Papanui 66/11kV transformers, according to Orion's chosen network architecture. This means the reduction of firm capacity from 76 to 40MVA, and the transfer of load to other zone substations

There is currently no transformation capacity north of a line from the airport to Brighton – roughly one third of the Christchurch land area. At present this region is served from zone substations up to 7km away from the load. The central north is supplied from a single heavily loaded primary ring (at its practical limits of supply, decreasing security of supply). Further growth cannot be accommodated by extending the 11kV network without departing significantly from the conclusions of our network architecture study, and our Security of Supply Standard (SoSS).

New 66/11kV sites are therefore required, with their configuration and subtransmission connections determined by the network design principles current at the time of design. Orion's 2012 *Urban Network Architecture Subtransmission Review* NW70.60.05 concluded that the optimal arrangement is a meshed network of 40MVA zone substations which allows the urban area to be supplied from either Islington or Bromley and Springston grid exit points (GXPs). These projects provide a major advance towards this goal, with a new 160MVA link between Islington and Bromley.

Four new zone substations are envisaged, of which two (Waimakariri and Marshland) are within the CPP period. Four major cables will link these into the network; Hawthornden to Waimakariri, Waimakariri to Marshland, Marshland to Rawhiti, and Rawhiti to Bromley. These cables provide the cross-GXP ties needed for prudent network resilience, and bring a second route-diverse supply to Rawhiti zone substation.

The Papanui zone substation has four banks of single-phase transformers (with a combined firm capacity of 76MVA) which are nearing the end of their life cycle. It is intended to replace these with two three-phase 40MVA units, which is the standard Orion substation configuration. Over 20MVA of load will then need to be transferred to other zone substations. Papanui's closest neighbours (McFaddens and Fendalton) are close to capacity, and the future transfer of the Ilam 66/11kV transformers to the proposed Yaldhurst zone substation means Hawthornden is unable to take Papanui load. The proposed Waimakariri and Marshland zone substations will share the Papanui load transfers in addition to the new load in their surrounding districts.

Other projects in this group include supplying Hawthornden/Ilam from two of the four Islington-Papanui 174MVA tower lines recently acquired from Transpower, instead of the two Orion 60MVA tower lines; diesel generators at QEII Park to provide security of supply to Parklands until Dallington and Rawhiti zone substations are on N-1 connections; and diesel generators at Belfast to provide security of supply and reinforcement deferral benefits until Belfast zone substation is constructed.

The timing of some of this work is influenced by Transpower's plans to replace 66kV switchgear at Islington GXP, and the need to replace the 66/11kV transformers at Papanui zone substation. A New Investment Contract with Transpower will be needed in FY18 to rearrange the Islington bays onto which our 66kV lines are connected (see SLD page 18).

1.3 Drivers

The drivers for this suite of projects and their timing are meeting load growth in a way that complies with the architecture review and our SoSS (which specified load thresholds for new investment) and to replace damaged assets in east Christchurch.

Load forecasts produced by the Strategic Planning group (see 3.2 Forecast Load, below) forecast changes in residential, business and industrial load distributions in the northern urban area of Christchurch. The current network configuration (because of the impacts of the earthquake) is not consistent with our SoSS and has a temporary overhead line.

The initiatives within this project would result in the northern urban area of Orion's Christchurch network achieving consistency with our security of supply criteria¹ (Class C2) for urban loads exceeding 15MW. Class C2 loads shall be supplied by an uninterrupted N-1 subtransmission network.

Another driver of this suite of projects is restoring/replacing earthquake damaged assets including the existing Bromley-Brighton cables which have been damaged beyond repair by the earthquakes, such that it had to be replaced with the temporary overhead line which needs to be removed by March 2014.

1.4 Obligations

An external obligation is the expiry in mid 2014 of the consent for the temporary Bromley-Rawhiti 66kV overhead line, which has determined the timing of major cable investment.

Our proposal is consistent with local authority plans and requirements which require new electricity infrastructure to be underground in the urban area.

Like all companies we are subject to the general provisions of a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

¹ As published in Section 5.3.1 of our Asset Management Plan

- Electricity Act
- Energy Companies Act
- Electricity Industries Act
- Local Government Act
- Electricity Reform Act
- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act.

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a “lifeline” utility, Orion must comply with the Civil Defence Emergency Management (CDEM) Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand's communities. The Act requires us to:

- be able to function to the fullest possible extent during and after an emergency
- have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- help define the Crown's CDEM goals and objectives in a National CDEM Strategy
- participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- be capable of managing our own response to emergencies

- develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary NW70.00.14
- Asset Risk Management NW70.60.02

2. Relevant policies and planning standards

This project includes a large variety of work and the detailed design and construction will be in line with our design standards, technical specifications and policies as summarised in NW 70.50.03 – *Document Control*. In particular this project will be implemented in compliance with the following sections:

- 9.2 Infrastructure
 - 9.2.1 Management
 - 9.2.3 Design Standards
 - 9.2.4 Technical Specifications
- 9.5 Contracts
 - 9.5.1 Management
- 9.7 Procurement & Stock Management
 - 9.7.2 Equipment Specifications

There are some works associated with these projects that require bespoke design to reflect the particular needs and/or environment of each project. For example, the zone substation site civil works and 66kV cable works will require unique specification solutions while still complying with the necessary high level requirements such as the building code etc.

One relevant Technical Specification is:

- NW74.23.32 Cable Subtransmission 66kV (Bromley to Dallington/Rawhiti)

The principal studies which determine the architecture of the subtransmission build are summarised in:

- the *Urban Network Architecture Subtransmission Review* NW70.60.05
- the *Rawhiti 66kV Options* paper 2012 (Appendix A)
- the *Security of Supply Standard* 2007 (see 2.1 below)
- Orion papers on diesel generation (Appendices C and D)

A relevant geotechnical engineering report is included in Appendix E.

Other relevant documents are the *Urban 11kV Network Architecture Review* NW70.60.06.

The following sections provide a summary of the most relevant high level reports, policies, standards and specifications.

2.1 Security of supply standard

Our SoSS is published in Section 5.3.1 of our 2012 Asset Management Plan (AMP). This standard was originally introduced shortly after the 1998 Auckland CBD blackout and modified slightly following an urban architecture review in 2006. The structure of our SoSS is based on the UK P2/6 standard and the 2006 update included a national and international benchmarking component. Our 2006 process and recommendations were reviewed by SKM before consulting with Retailers, Canterbury Manufacturers Association, Major Electricity Users Group and Grey Power.

The Orion SoSS has a deterministic structure but the thresholds are based on probabilistic analysis utilising average probabilities of asset failure and the average Value of Lost Load (VoLL) to customers. As a precursor to determining the structure and thresholds of a SoSS it is necessary to consider many factors including:

- the different network architecture options (ring vs. radial)
- the construction options (overhead vs. underground)
- the different customer/load segment expectations (VoLL and Demand Side Management (DSM))

The key point is that how the desired level of security of supply is achieved is just as important as achieving it. The development of a SoSS is an iterative process. Changes in technology, customer expectations or the cost of assets can affect the optimum architecture of the network which in turn can affect the structure and thresholds in the SoSS. The architecture of our network is discussed in more detail below.

The initiatives within this project are consistent with our security of supply criteria² (Class C2) for urban loads exceeding 15MW. Class C2 loads shall be supplied by an uninterrupted N-1 subtransmission network.

2.2 66kV architecture review

To make sure that our network architecture and resulting SoSS is keeping pace with changes to our modelling inputs (VoLL, asset failure rates, new technologies, DSM, etc) we have largely completed³ a review of our urban 66kV and 11kV architecture. This has also provided an opportunity to take account of the resiliency learnings during the Christchurch earthquakes. The review has largely supported our current SoSS and we do not expect any changes to the existing categories although additional criteria to capture our planned resilience to GXP or zone sub 'site' contingencies will be required.

The review also concluded that a 66kV ring bus design over a more conventional single bus design provided a better balance of costs and benefits.

During FY13, we intend to review the architecture of our low voltage urban network and also the rural subtransmission and 11kV network. Whilst we are not expecting significant change, the architecture review will consider many other factors and until that work is complete the current SoSS is considered appropriate.

² As published in Section 5.3.1 of our 2012 Asset Management Plan

³ Technical analysis complete, reports at draft stage (NW70.60.05 and NM70.60.06)

2.3 Prioritisation of works

At a high level this project mainly requires the use of 66kV underground cable and zone substation contractors. This kind of resource is also required on a number of other projects to be completed in the ten year timeframe. More detail about how we prioritise projects is described in section 5.3.4 of our 2012 Asset Management Plan and expanded further in NW 70.60.14 – *Project Prioritisation and Deliverability Process*.

Orion has a successful history in managing a succession of multi-million dollar civil and electrical works which demonstrates a proven institutional ability to predict and manage contractor workstreams.

A dominant factor in prioritising this project is our publicly stated aim to remove the 66kV temporary overhead line from Bromley to Rawhiti by March 2014.

Replacement of end-of-life assets and coordination with Transpower works also influence the staging of these projects.

2.4 Tenure of substation sites, line corridors and cable routes

Where possible we install our underground reticulation in the berm of a public road. This does not require specific permission. Although no easement is required we notify and/or seek approval of our design/offset from other utilities and local authorities including CCC, ECAN, Telecom/Chorus, etc. and also NZTA.

This Urban North Subtransmission plan involves 66kV cable routes across Christchurch City Council land. Easement negotiations are currently underway.

We secure the tenure of our zone substation sites by 'Title'. The timing of land purchases for zone substation sites is made by judgement taking account of:

- current or future zoning of the land
- land availability – multiple options or not
- what plant screening might be required in advance of construction
- strategic nature of project – other comparable alternatives exist
- confidence that the project will be implemented
- a preference to work with land owners rather than use our 'requiring authority' status

This project requires the acquisition of land for two new zone substations at Marshland and Waimakariri.

Land has been difficult to obtain in Marshlands and we have an agreement in place with the developers to secure a site for us. The developer has recently identified potential land parcels and we intend to seize this opportunity by securing a site in FY14.

The proposed Waimakariri site is on CCC land. We own surplus land in Burwood next to the Travis Country Wetlands that the CCC is interested in owning. It is proposed to swap these sites (valuations indicate equal value) and we are currently working through this process.

3. Network constraints and service targets

3.1 Constraints and timing

The objectives of this suite of projects are:

- to restore N-1 security of supply to Rawhiti zone substation, following the destruction of two Bromley-Brighton cables and Brighton zone substation in the 2011 earthquake. This will be done in a way consistent with the network architecture proposed by the Architecture Review, i.e. a cable from Bromley and one from Islington via Waimakariri and Marshland
- to provide capacity and security of supply to north and northwest Christchurch, as load develops (hastened by post-earthquake relocation of demand)
- to provide for the replacement of the four Papanui 66/11kV transformers, according to Orion's chosen network architecture. This means the reduction of firm capacity from 76 to 40MVA, and the transfer of load to other zone substations

The first objective requires the laying of cables from Bromley to Rawhiti and Hawthornden to Rawhiti as soon as practical. The second requires (among other things) new zone substations on the Hawthornden-Rawhiti cable, which may take place after the cable has been installed.

Transpower's plan to replace 66kV switchgear at Islington has a bearing on the timing of projects. The long-term plan requires one less bay than is currently used for Orion, so avoiding the replacement of this bay is desirable.

The switchgear at Bishopdale switching station (fed at 11kV from Papanui) is due for replacement in FY18. In the long-term architecture plan for the northwest there is no need for this substation once Waimakariri zone substation is in place and Papanui load is reduced. Staging other projects to avoid the investment in switchgear replacement is also desirable.

The 11kV switching stations at Grimseys-Winters and 187 Grimseys Rd will similarly be able to be removed rather than replaced at the end of their switchgear life cycle, if Marshland zone substation is in place. This will not have any impact on the forecast expenditure during the CPP period as the end of their switchgear life cycle is outside the CPP period.

Our subtransmission plan takes into account the efficient use of capital. The four Islington-Papanui and two Islington-Hawthornden circuits provide 820MVA of capacity into the urban north. The four Islington-Addington circuits (to be acquired from Transpower in FY15) add another 700MVA. It is proposed to take the lower-capacity Islington-Hawthornden lines out of service and reinstate the currently out-of-service Islington-Papanui circuit 2. This will reduce by one the number of 66kV bays required at Islington. Only one of the two Islington-Papanui double tower lines will extend to Papanui; the other will extend to Hawthornden to supply that site and connect to the Waimakariri cable. This will allow for the potential future removal of one of the Hawthornden-Papanui double tower lines.

CIAL intends to expand airport operations and the airport apron in the area which includes the site of Harewood zone substation. This may result in the site being relinquished. Harewood is important in the security of supply to the airport and other high-value loads. The

plan needs to provide for this possibility; the proposed Yaldhurst zone substation (expected to lie outside the CPP horizon) will have sufficient capacity to meet projected demand.

3.1.1 Security of supply (66kV)

The most urgent constraint being addressed is that Rawhiti zone substation does not meet the security of supply standard for an urban site with more than 15MVA peak load, which is uninterrupted N-1.

In addition, the fact that both Rawhiti and Dallington are both at present on single 66kV feeds in areas susceptible to seismic damage, and that they are adjacent substations which normally back each other up in a contingency, and that Rawhiti is on the edge of the network with little other support, results in a particularly vulnerable supply to the damaged eastern suburbs. An N-2 event (concurrent loss of both lines) is a credible contingency which would result in unserved load in winter for the duration of repair time. The diesel generation at QEII Park is designed to allow all customers to be supplied in this situation (provided the lower network is in sufficient health).

It is clear that restoring security of subtransmission to these substations is of the highest priority. Once Dallington has N-1 supply in FY14, an N-2 event will result in the loss of only one of the eastern zone substations. By FY16, both will be supplied by two cables each over diverse routes, from Bromley and Islington GXP.

At present the two Hawthornden and two Ilam 66/11kV banks (63MVA firm capacity) are supplied from Islington GXP via a double tower line. While this provides an N-1 feed, the common-mode risk of a tower event affecting both lines is a credible contingency and would result in the loss of both substations. The ability of the surrounding network to cover this outage over 11kV ties is being eroded, and significant planned commercial expansion around CIAL will accelerate this vulnerability. A solution proposed in previous AMPs was to provide a third independent supply to Hawthornden/Ilam by tee-ing off one of the Islington-Papanui tower lines. Following the Architecture Review, the plan was revised to reinforce security of supply to Hawthornden in the short term via 11kV ties from Waimakariri zone substation, deferring the Hawthornden tee-off and altering its design to allow for the decommissioning of the Islington-Hawthornden tower lines.

3.1.2 Capacity and security of supply (11kV)

The Papanui site has four transformers which normally operate as two independent 11kV busses fed by two transformers each. Most of the load on the eastern bus is on a major primary ring with six feeders, including Grimseys-Winters 11kV switching station. This ring serves a large area in the central urban north and is forecast to exceed firm capacity in 2018. Forecast load growth in Belfast and Chaney's will start to exceed the N-1 capacity of the 11kV network over a similar time period, and voltage constraints are starting to appear in normal operating conditions. These constraints could be relieved by either of the proposed Marshland or Waimakariri zone substations. Connecting the Marshland site via Rawhiti would leave both these substations on the same single 66kV radial feed from Bromley until the Hawthornden-Waimakariri-Marshland link can be completed (FY16). By contrast the Waimakariri site can be connected to Hawthornden in FY15, so that only one substation is at risk from a single cable fault before FY16. Load growth in the Waimakariri catchment is forecast to occur earlier than for Marshland. Given these factors, and the importance of

Waimakariri to security of supply in the Hawthornden/CIAL area, the decision has been made to install Waimakariri in FY15 (one transformer initially). The construction of Marshland can be deferred by the use of diesel generation at the future Belfast zone substation site.

3.1.3 Asset replacement

When Transpower had ownership of the Papanui site, its asset replacement programme included plans for the four Papanui banks to be replaced during the period FY16 - FY18. While detailed condition analysis has yet to be carried out by Orion, we need to prepare for this event. We intend to replace these banks with two 20/40MVA units according to our architecture standard. This means the loss of 36MVA firm capacity, and over 20MVA of load must be transferred to other zone substations⁴.

The existing adjacent substations (McFaddens and Fendalton) are at or near capacity, and the combined Hawthornden/Ilam must be kept below 40MVA to allow for the removal of the Ilam transformers to the proposed Yaldhurst zone substation. The load transfer from Papanui must therefore be taken up by Waimakariri and Marshland. This drives the second stage of the Waimakariri substation (second transformer, bringing the site up to N-1 security) and the construction of Marshland.

Transpower's asset replacement plan also has the Islington 66kV breakers to be replaced during the period FY16 – FY18. This is another reason to complete the rearrangement of the lines out of Islington by FY18, so that bay 222 can be decommissioned and refurbishment costs avoided.

3.2 Forecast load

The 66kV cable works in this plan are primarily driven by the need to replace damaged assets and their timing is not triggered by load growth. The zone substations are partially driven by load growth however. Our load forecasting methodology is described in NW70.60.12 *Long Term Load Forecasting Methodology for Subtransmission and Zone Substations*.

The principal growth areas covered by these projects are the Russley-CIAL area; Belfast; and the Marshlands subdivisions along Prestons Rd.

Our detailed demand forecasting system is focussed mostly on the total load on zone substations and it addresses constraints on subtransmission and transformer capacity. A few primary rings known to be close to 11kV cable capacity are included in the load growth model. We also maintain separate load-flow models which can be used to predict other constraints which don't show up in the main forecast, such as low voltage under normal or contingency conditions and restrictions in 11kV tie capacity which limits the ability of substation outages to be covered by adjacent substations. These constraints are not related to subtransmission and transformer capacity and so are not indicated directly by our main load forecast data, but must be determined by a separate modelling process. They are nonetheless driven by load growth forecasts, usually with a more localised focus than the zone substation forecasts.

⁴ Rather than replace four banks at Papanui it is more efficient to replace two, and install the other two in another zone substation closer to the load.

It is these 11kV constraints which are driving the need for a Waimakariri zone substation (proposed for FY15), before the subtransmission constraints become binding. They are:

- the ability of Harewood and Papanui substations to provide 11kV support for the N-2 Hawthornden-Ilam event (loss of both tower lines) is already marginal. Growth around the airport will exceed this capability in the next year or two. Waimakariri substation and the 11kV feeders installed to connect it into the network will provide for this contingency
- the ability of Papanui/Bishopdale to support load in the Russley/CIAL area in a Hawthornden N-2 transformer event is becoming constrained by the capacity of the 11kV network. Waimakariri substation and the 11kV feeders installed to connect it into the network will also provide for this contingency
- the growth expected around Belfast and Chaney's will result in low voltage at peak loads. This is already modelled to drop below 0.98p.u. due to the distance from the nearest zone substations, and will be soon become marginal under normal conditions and severe in contingencies where the feed will come over even longer distances. Waimakariri substation and the 11kV feeders installed to connect it into the network will resolve these problems in the short term. Later, diesel generation will further support the contingency situation, until growth finally requires the construction of Belfast zone substation.

The other key driver for a Waimakariri zone substation is the need to transfer load from Papanui when the 66/11kV banks need replacing during the period FY16 – FY18.

Looking further ahead, Waimakariri is needed to keep the combined Hawthornden-Ilam load under 40MVA for when the Ilam transformers are removed to the proposed Yaldhurst zone substation (~2020), leaving Hawthornden as a 40MVA site.

The combined Hawthornden-Ilam load forecast (MVA) is as follows:

FY13	FY14	FY15	FY16	FY17	FY18	FY19
40.4	40.5	40.7	41.0	41.3	41.6	41.9

Hawthornden-Ilam load forecast (MVA)

Marshland zone substation (proposed for FY18) will provide capacity and security of supply for the Redwood, Marshlands, Ouruhia and north Burwood areas. This region is currently supplied from Grimseys-Winters switching station, and McFaddens and Dallington zone substations. Grimseys-Winters and McFaddens are at or near capacity (see load forecasts in Tables 3 and 4 below). In a Dallington outage, the 11kV network providing support from McFaddens into Marshland is already constrained. Marshland zone substation will relieve all these constraints and allow the transfer of load from Papanui when it becomes a 40MVA site.

Marshland and Waimakariri substations will be needed to provide contingency support for each other in Northwood, Belfast and north Marshland in the event of an outage at either site.

The Grimseys-Winters primary ring (firm capacity ~26MVA) load forecast is as follows:

FY13	FY14	FY15	FY16	FY17	FY18	FY19
21.8	22.8	23.8	24.1	24.8	25.4	26.0

Grimseys-Winters primary ring load forecast (MVA)

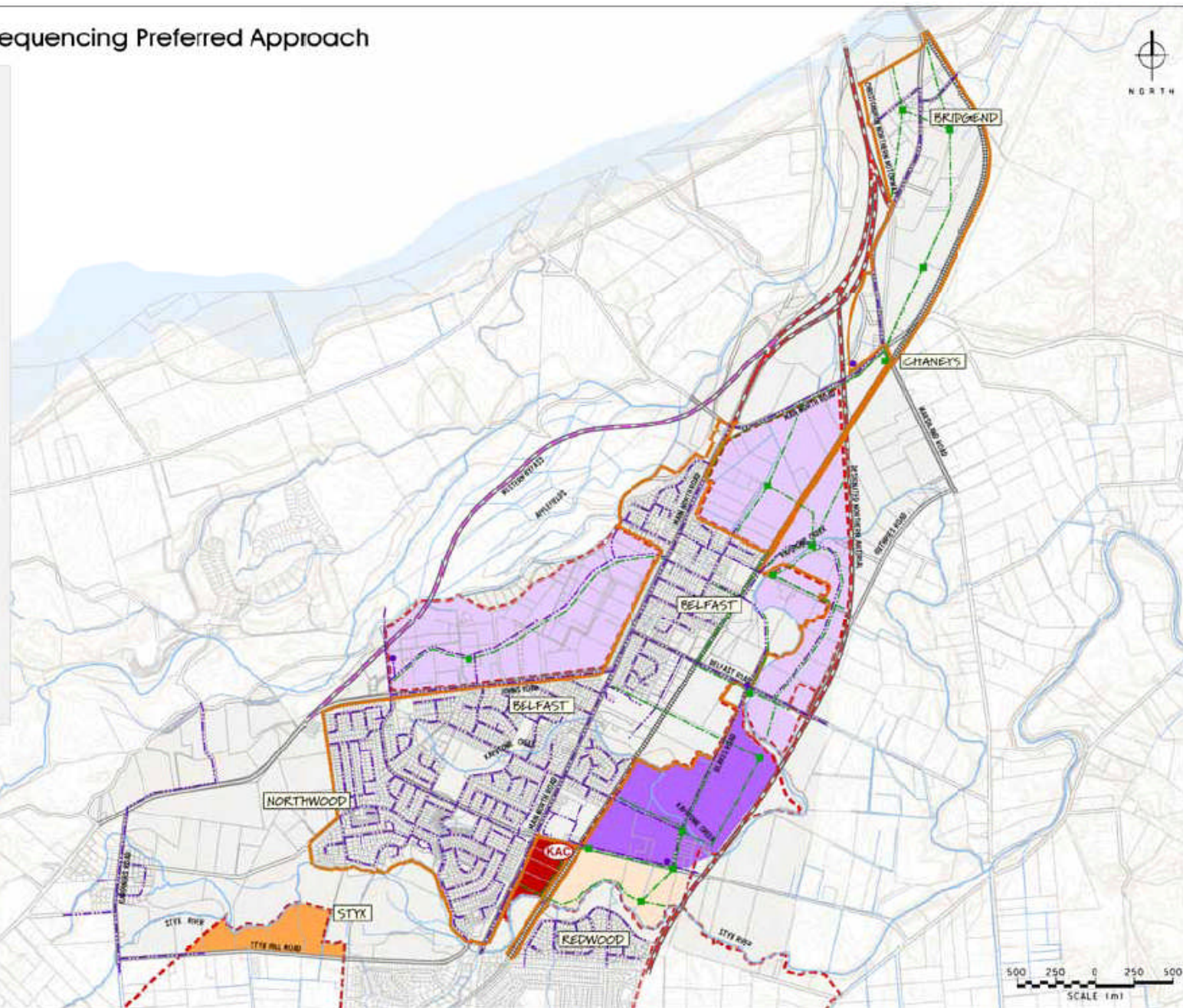
The McFaddens zone substation (firm capacity 40MVA) load forecast is as follows:

FY13	FY14	FY15	FY16	FY17	FY18	FY19
40.1	40.4	40.5	40.7	41.0	41.2	41.5

McFaddens zone substation load forecast (MVA)

Zoning maps from CCC's Belfast Area Plan, and subdevelopment plans for CIAL and Marshland illustrating planned land development, and hence demand growth, are included on the following pages.

Plan 15: Staging and Sequencing Preferred Approach



PRELIMINARY MASTER PLAN

Highfield Park, Christchurch

Draft 6 September 2011

Scale 1:8,000 at A3

1:4,000 at A1

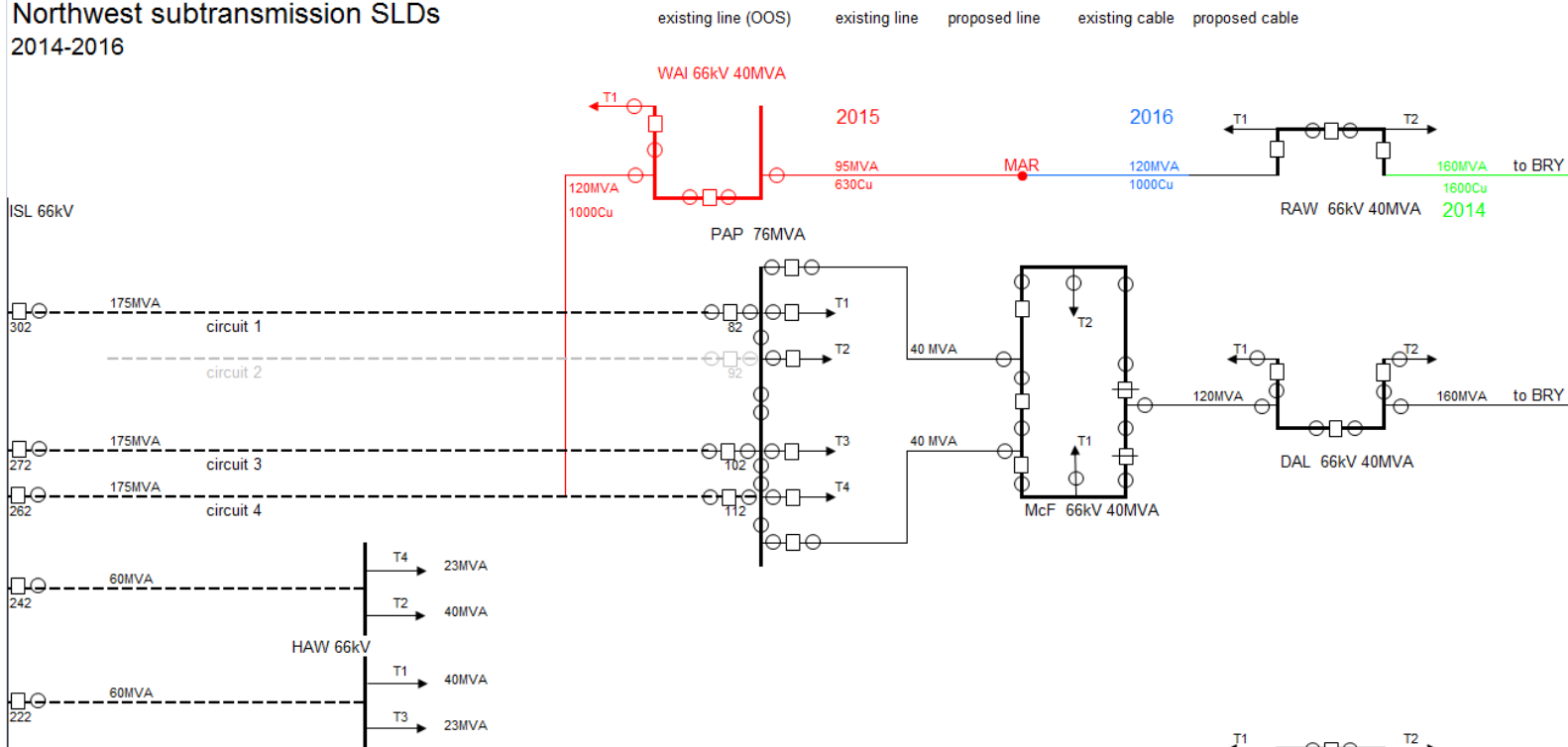


3.3 Network options

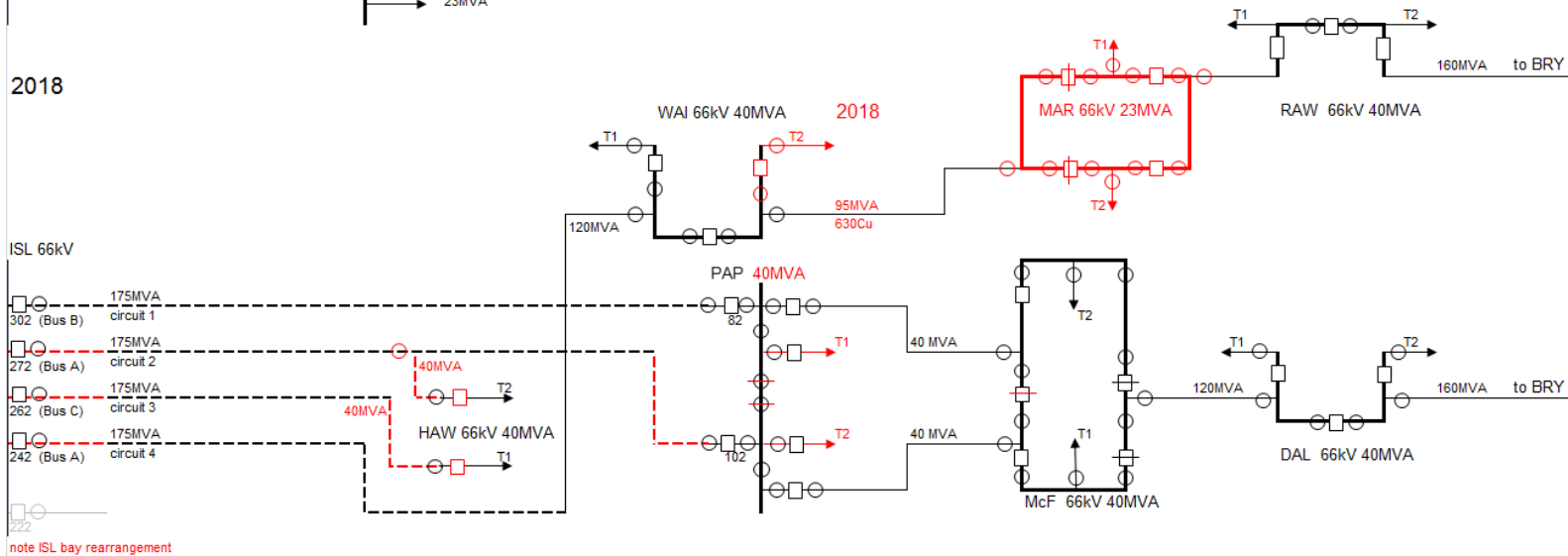
The subtransmission options are examined in depth in the Architecture Review and the Rawhiti 66kV options paper (Appendix A). See overleaf for single-line diagrams.

Northwest subtransmission SLDs

2014-2016



2018



3.4 Non network alternatives

Non-network solutions to capacity or security of supply constraints are considered in the following reports.

- NW70.60.10 Demand Side Management Stage 1 – Issues & Opportunities
- NW70.60.11 Demand Side Management Stage 2 – Potential Initiatives

Non network alternatives or demand side management solutions tend to provide solutions in the short term for deferral rather than replacement infrastructure investment.

The value of Demand Side Management (DSM) in the deferral of major projects is quantified in Section 5.6.12 of the 2012 AMP. In general, DSM tends to be cost effective in areas where the stepped investment in the network is high and rate of growth is slow. While the network investments in this project are large, the need to replace earthquake damaged assets and meet the significant growth in peak demand, means that a demand side management solution would need to be of a substantial size to be of any real benefit.

The timing of these projects is based on our load forecast process (and moderated by workflow considerations).

Alternative solutions to the replacement of the two earthquake-damaged Bromley-Brighton 66kV cables and provide N-1 security to Rawhiti zone substation will require sufficient scale to reduce peak Rawhiti demand from 35 to less than 15MVA (the SoSS threshold for N-1 security). Economic alternatives of this scale are not available, so there are no alternatives to laying two cables.

The Architecture Review and Rawhiti 66kV Options study identified a Bromley-Rawhiti cable (replacing the overhead line) and an Islington GXP supply from a northern circuit (via Waimakariri and Marshland) as the preferred options for the two Rawhiti feeds. Orion is installing these cables as quickly as feasible and non-network alternatives do not apply. They may play a role in the timing of future zone substations at Marshlands and Belfast.

For example, once the 2 x 2MVA diesel generators are no longer required at QEII for security of supply, they will be moved to Belfast, which is a district of considerable forecast growth quite distant from existing zone substations. A Belfast zone substation is planned for this site, first to prevent the erosion of supply security (redundant capacity) and then to provide new capacity as load continues to grow. This investment can be deferred by the generators which provide security of supply during network outages. The generators will similarly have value in deferring the Marshland substation.

4. Project description and forecast expenditure

4.1 Work to be undertaken

The CPP major project groups consist of a number of Orion AMP projects, each of which is contained in a single financial year. The list and timing of projects are summarised in the table in section 1.1.

Planned improvements/changes to previous practices within these projects can be identified within the Architecture Review, and also in the geotechnical considerations around cable routes and substation sites.

The Architecture Review is based on a number of assumptions that are the result of previous planning exercises and are set out in section 3. The report recommends the following planning criteria:

- N-1 topologies
- Meshed network (cable route diversity)
- GXP links/interconnection
- Loss of no more than one zone sub for an N-2 subtransmission event

These criteria significantly limit the options available. Within this set of criteria, options are considered and the least cost option selected.

Zone substations are major capital projects, involving the purchase of land and site establishment (civil works such as fencing, water and wastewater, underground earth grids, paving, grading and laying gravel, constructing 11kV and 66kV switchrooms etc.). Substantial assets such as transformers, 66kV and 11kV switchgear, protection and control systems, and communications infrastructure are included.

Each AMP project is summarised in the sections below.

FY13 and FY14 projects are committed; all others remain in planning. AMP project schedules are reviewed annually.

Cost estimates are constructed in line with Project Budget Forecasting Process policy NW70.60.13.

4.1.1 FY13 606 QEII Park diesel generators

The damage to the network from the 2010-11 earthquakes and the possibility of further aftershocks present a significant risk to electricity supply, particularly in the eastern suburbs. Two adjacent zone substations (Rawhiti and Dallington) are on temporary single feeds, meaning that an N-2 event (loss of both lines) will result in the loss of what would normally be 80MVA firm and 160MVA emergency capacity. In winter there is load that cannot be supplied in this scenario. The installation of 4MVA of diesel generation in Parklands and our mobile generation fleet will help ensure all load can be served after a major event (provided the 11kV and low voltage networks are not too heavily damaged). The generation also provides resiliency against other contingencies besides 66kV outages and is a key component of our post-earthquake plans to provide reliability and security of supply to east Christchurch.

Once security of subtransmission has been restored to Dallington and Rawhiti, the generators will be more useful elsewhere (see Section 4.1.8) and can be used to defer major capital investment.

Item ID (database)	Quantity (#, m)	Description	Forecast Budget (\$000)
135	1	Install new MSU and terminate (excl hardware)	14
274	2	Generators Purchase	2700
275	2	Generators Install	155
272	1	Design - building substation	18
29	1	Terminate cable to CB or MSU	2
143	1	MSU 2K1T	10
Total			2899

QEII Park diesel generators budget – committed FY13

4.1.2 FY14 619 Bromley to Rawhiti 66kV link

The existing Bromley-Brighton cables have been damaged beyond repair by the earthquakes. A temporary overhead line has been built from Bromley to the new Rawhiti zone substation (which replaced the damaged Brighton substation). A detailed study of permanent solutions was undertaken, and a corporate decision (see Appendix B) was made for an underground circuit along a route which minimised seismic risks. This project covers the cable installation and substation works at Rawhiti to allow for termination.

In the event that there is a cable failure in the period after this cable has been completed, but before the N-1 backup is completed in FY16 (the Marshland-Rawhiti cable) service can be restored in about two hours by 11kV switching from neighbouring zone substations. This is considered viable as the forecast peak demand for Rawhiti in 2016 is around 22MVA. Our diesel generation at QEII Park assists with this scenario and hence the acceptable relocation of the generation to Belfast in 2016 once the Marshland-Rawhiti link is completed.

If a major event causes Bromley GXP to fail or the Bromley to Dallington new cable to fail at the same time as the Rawhiti cable, support will need to come from the Papanui to McFaddens 66kV cables which have a steady state total group rating of 79MVA. However, these will need to support McFaddens, Dallington and Rawhiti whose load is expected to exceed the capability and hence another reason to complete the Rawhiti – Waimakiriri link.

Item ID	Category	Description	Quantity (#, m)	Forecast Budget (\$000)
207	Cable trench	66kV cable trenching+jointing	6800	4760
157	Cable material	66kV 1600Cu XPLE cable (160MVA)	6800	5943
249	Zone	termination, protection &	1	250
Total				10953

Bromley to Rawhiti 66kV link budget – committed 2014

4.1.3 FY14 521 Land acquisition for Marshland substation

The zone substation at Marshland (Project 488 below) requires a parcel of land. A site has been identified near the proposed 2,300-household Prestons subdivision which is ideal for both 66kV and 11kV networks. Some difficulty has been encountered in obtaining a suitable location therefore we will secure this strategic requirement early, rather than wait until construction.

Item ID (database)	Quantity (#, m)	Description	Forecast Budget (\$000)
248	1	Substation land acquisition	500

Land acquisition for Marshland substation budget – committed FY14

4.1.4 FY15 525 Waimakariri substation stage 1

Orion's upper network requires reinforcing in the northwest urban area, to provide for projected growth around Christchurch International Airport (CIAL) and further north. This project forms part of Orion's major urban subtransmission strategy outlined in the Architecture Review. A new zone substation will be built in two stages (see Project 542 below), along with 66kV feeders from Hawthornden (Project 641 below) and Rawhiti zone substations (Projects 650 and 651 below). Stage 1 involves the site development and 11kV switchroom, a single transformer and termination for the two 66kV cables.

Along with Marshland substation it will take load from the 76MVA capacity Papanui zone substation enabling it to become a standard Orion 40MVA site when the transformers are replaced at end-of-life. It will also allow for the removal of Bishopdale 11kV switching station instead of replacing this asset at end-of-life.

Item ID	Category	Description	Quantity (#, m)	Forecast Budget (\$000)
59	Zone	Design	1	484
236	Zone substation	Establish substation site + 11kV building, fencing	1	1,200
206	Cable material	11kV 185 mm ² Cu XLPE substation	300	60
75	Cable material	11kV 300Cu XLPE incomers	40	13
45	Cable trench	11kV feeder cables	100	10
226	Transformers	66/11 20/40 MVA transformer	1	1,071
298	Transformers	New pad and install 40MVA transformer	1	507
194	Ripple plant	Purchase 175Hz ripple plant	1	178
195	Ripple plant	Install and commission ripple plant	1	22
7	General	66kV protection+comms	1	150
224	Substation	construct 66kV bay, install breaker+relays	2	314
223	Substation	66kV breaker+relay+brick	2	420
61	Switchgear	CB install + commission	13	169
5	Switchgear	CB 630A + relay (11kV feeders + ripple	11	418
306	Switchgear	CB 2500A incomer +VT+relay+brick	1	134
305	Switchgear	CB 2500A (bus coupler)	1	94
178	Switchgear	KKTT purchase RMU	1	35
185	Switchgear	install and terminate RMU	1	15
135	Switchgear	Install new MSU and terminate (excl	1	14
182	Transformers	LS transformer installation	1	5
Total				5,312

Waimakariri substation stage 1 budget FY15

4.1.5 FY15 641 Hawthornden-Waimakariri 66kV link

This project provides the cable to feed the new Waimakariri zone substation (Project 525), and termination works at Hawthornden.

Item ID	Category	Description	Quantity (#, m)	Forecast Budget (\$000)
117	Cable material	66kV 1000Cu XPLE cable (120MVA)	5500	3,344
207	Cable trench	66kV cable trenching+jointing	5500	3,850
249	Zone substation	Tee-off tower lines, termination, protection & communications	1	300
Total				7,494

Hawthornden-Waimakariri 66kV link budget FY15

4.1.6 FY15 651 Marshland to Waimakariri 66kV link

The *Rawhiti Supply Options* study identified solutions to provide a momentary-break⁵ N-1 subtransmission to Rawhiti zone substation, consistent with the Architecture Review. A corporate decision was made for the Bromley-Rawhiti cable (Project 619 above) and for the second feed to consist of a cable from Waimakariri. This circuit comprises a Waimakariri-Marshland cable (this project), and a Marshland-Rawhiti cable (Project 650 below). These cables will also provide a momentary break N-1 supply to the Waimakariri and Marshland (when commissioned – see Project 488 below) zone substations. Termination bays are included in the substation projects.

Item ID	Category	Description	Quantity (#, m)	Forecast Budget (\$000)
106	Cable material	66kV 630Cu XPLE cable (95MVA)	9700	3938
207	Cable trench	66kV cable trenching+jointing	9700	6,790
Total				10,738

Marshland to Waimakariri 66kV link budget FY15

4.1.7 FY16 650 Rawhiti to Marshland 66kV link

See Project 651 above. It is not feasible to construct the Hawthornden-Waimakariri, Waimakariri-Marshland and Marshland-Rawhiti cables in one year, so this project is scheduled for FY16. Termination bays are included in the substation projects.

⁵ The construction of a 66kV link between Marshland and McFaddens at a later date will provide a true uninterrupted N-1 supply to Rawhiti, Marshlands and Dallington zone substations.

Item ID	Category	Description	Quantity (#, m)	Forecast Budget (\$000)
157	Cable material	66kV 1000Cu XPLE cable	8600	5,229
207	Cable trench	66kV cable trenching+jointing	8600	6,020
249	Cable install	Terminations	1	180
Total				11,429

Rawhiti to Marshland 66kV link budget FY16

4.1.8 FY16 634 Belfast Diesel Generation - Stage 1

The site of the future Belfast zone substation has been identified and purchased. As load develops in north Christchurch security of supply will erode to the point where planned and unplanned 66kV or 11kV outages result in unserved demand. Reinforcement is required before this point, but the major investment of a zone substation can be deferred by the installation of diesel generation. Diesels at this site have value in deferring both Marshland and Belfast substations. The two QEII units would be moved to Belfast. A new containerized 915kW movable unit would be purchased and would be normally operated at Belfast unless required elsewhere.

The business case for generation also includes peak demand lopping for reducing transmission charges. Consents have already been obtained for generation at this site. See Appendices C and D.

The generators at QEII Park are currently required to avoid unserved load after the loss of the BRY-RAW and BRY-DAL 66kV overhead lines. The timing of the move to Belfast is determined by the completion of a 2-cable 66kV supply to Rawhiti (Rawhiti-Marshland link) in FY16 which removes the need for contingent support around Rawhiti.

There is about 4MVA generation capacity at QEII and an extra 1MVA is expected to be added when (or after) they are shifted to Belfast. The extra 1MVA unit is to fill the gap between the larger 2MVA units and the smaller 550kVA units that Orion already has. This will prevent the transport of the larger units whilst still being useful at Belfast. The need for the generation at Belfast is driven by constraints in the 11kV network rather than subtransmission initially. The northern 11kV primary ring is forecast to reach capacity in FY16. Marshland zone substation would be needed to relieve this constraint if the generators were not available to cover outages of the primary ring or Grimseys-Winters switching substation.

In order to complete the Belfast substation we will need to do the following:

- Shift 2 x 2500 kVA 11 kV generators from QEII to Belfast.
- Purchase an additional 1 MW (915 kW) generator at the same time.
- Stack and bolt down 2 x 40ft Containers per generator to a concrete pad.
- QEII is located on an existing sealed surface. The site was fenced by Orion. At Belfast the site is undeveloped and will require excavation, backfill before the generator pads can be levelled and placed.

- A connection to the 11 kV network will need to be made to the cables that pass under the site.
- Kiosks will be used to house the switchgear.
- There are 4 diesel tanks which will be moved to Belfast.
- A local supply transformer will be required.
- A 19m exhaust stack, fuel pipes, interceptor, truck access, roadways and fencing will need to be installed.
- No external cooling will be required.

Item ID	Category	Description	Quantity (#, m)	Forecast Budget (\$000)
26	Cable material	185 mm ² Al XLPE cable (CB to RMU)	150	10
16	Cable material	95 mm Al XLPE 3c cable (generators to	80	4
15	Cable material	300 mm Al XLPE cable connection to	80	6
112	Cable	11kV throughjoint cable connection to	2	5
29	Cable	Terminate cable to CB or MSU	10	21
59	Substation	Design	1	127
275	Substation	Generator Install Exhaust Stack	1	120
275	Substation	Generator Install Fuel System	40	40
274	Substation	1MW Generator Purchase in container	1	650
239	Substation	11 kV Building - Control Room	1	100
201	Switchgear	KKKT purchase RMU	1	28
185	Switchgear	install and terminate RMU	1	15
61	Switchgear	11kV CB install + commission	3	39
5	Switchgear	11kV CB 630A + relay	3	114
		Total		1,279

Belfast Diesel Generation - Stage 1 budget FY16

4.1.9 FY18 541 Hawthornden tee-off

The termination of the Hawthornden-Waimakariri 66kV cable (Project 641) requires 66kV works at Hawthornden zone substation. Also load growth means that the loss of the two Islington-Hawthornden/Ilam overhead circuits will no longer be adequately covered by 11kV ties from adjacent substations. We intend to supply Hawthornden, Ilam and Waimakariri from the Islington-Papanui high capacity tower lines. 66kV bus works will provide for these connections and terminating the circuit from Waimakariri. We will then be able to decommission the lower capacity Islington-Hawthornden tower lines and utilise the fourth Islington-Papanui circuit which is currently out of service.

A New Investment Contract with Transpower will be needed to rearrange the Islington bays onto which our 66kV lines are connected (see SLD section 3.3).

Item ID	Category	Description	Quantity (#, m)	Forecast Budget (\$000)
255	Zone substation	protection & communications; reinstate ISL-PAP circuit 2	1	250
254	Zone substation	66kV overhead works at Hawthornden & Papanui	1	315
224	Switchgear	construct 66kV bay, install	2	314.3
223	Switchgear	66kV breaker+relay+brick	2	420.3
		Total		1,300

Hawthornden tee-off budget FY18

4.1.10 FY18 542 Waimakariri substation stage 2

See Project 525 above (Waimakariri substation stage 1). With the completion of the Waimakariri-Rawhiti link (Projects 650 and 651 above), two 66kV cables will feed Waimakariri zone substation and a second 66/11kV transformer will be installed to bring the site up to full N-1 security and meet the Security of Supply standard for load in excess of 15MVA. 66kV bays and an 11kV incomer circuit breaker (CB) are included.

Item ID	Category	Description	Quantity (#, m)	Forecast Budget (\$000)
75	Cable material	300Cu singles 3 phase set	20	6
59	Design & Extras	Zone substation	1	216
224	Substations	construct bay, install breaker+relays	1	157
223	Substations	66kV breaker+relay+brick	1	210
307	Switchgear	B95+ Bus Zone protection relay	1	63
61	Switchgear	11kV CB install + commission	1	134
6	Switchgear	11kV CB 1200A + relay	1	13
226	Transformers	New 66/11 20/40 MVA transformer	1	507
298	Transformers	New pad and install 40MVA transformer	1	1,071
		Total		2,377

Waimakariri substation stage 2 budget FY18

4.1.11 FY18 488 Marshlands zone substation

Forecast growth in the Marshland, Ouruhia and Chaney's areas will exceed network capacity. In particular two major residential subdivisions on Prestons Rd may contribute over 10MVA when fully developed. A new 23MVA zone substation will provide for this load and improve security of supply to the northeastern suburbs. It will connect to the already constructed Rawhiti-Marshland (Project 650 above) and Waimakariri-Marshland (Project 651 above) cables. Along with Waimakariri substation it will take load from 76MVA capacity Papanui zone substation enabling it to become a standard Orion 40MVA site when the transformers are replaced at end-of-life. It will also allow for the removal of Grimseys-Winters 11kV switching station instead of replacing this asset at end-of-life.

Item ID	Category	Description	Quantity (#, m)	Forecast Budget (\$000)
59	Zone	Design	1	411
206	Cable material	11kV 185 mm ² Cu XLPE substation	200	40
75	Cable material	11k 300Cu XLPE incomers	40	13
45	Cable trench &	11kV feeders	100	10
93	Transformers	New 66/11 11.5/23 MVA transformer	2	1,293
297	Transformers	New pad and install 23MVA	2	814
195	Ripple plant	Install and commission ripple plant	1	22
194	Ripple plant	Purchase 175Hz ripple plant	1	178
236	Substation	Establish substation site + 11kV	1	1,200
224	Substation	construct 66kV bay, install	4	629
223	Substation	66kV breaker+relay+brick	4	841
5	Switchgear	11kV CB 630A + relay	10	380
6	Switchgear	11kV CB 1200A + relay	3	174
61	Switchgear	11kV CB install + commission	13	169
178	Switchgear	KKTT purchase RMU	1	35
185	Switchgear	install and terminate RMU	1	15
135	Switchgear	Install new MSU and terminate	2	28
182	Transformers	LS transformer installation	1	5
		Total		6,255

Marshlands zone substation budget FY18

5. Dependencies

This suite of projects relates to the overall plan for urban subtransmission outlined in the Architecture Review. In particular it is closely connected with CPP2 Urban Dallington Subtransmission. However progress is independent of any other works.

6. Earthquake consequences

Direct earthquake effects include the need to replace the two damaged Bromley-Rawhiti 66kV cables, and the overhead line which provides a temporary supply. Other direct effects are on the cable routes and civil engineering solutions chosen for the Bromley-Rawhiti and Rawhiti-Marshland circuits, which take into account geotechnical learnings from the earthquakes (and are longer and more expensive than may otherwise have been the case).

Indirect earthquake effects include the changes in residential, business and industrial load distributions and forecasts, which influence the order and timing of projects (and the nature and location of associated 11kV reinforcement). As a general observation, the result is accelerated growth in the north and northwest which advances the need for Waimakariri and Marshland substations. The reduction in load in the far east does not lead to a corresponding deferral of any major projects as this area is served by an existing zone substation (Rawhiti), and providing security of supply to Rawhiti is an urgent priority.

The Architecture Review was initiated after the 2010-11 earthquakes. The experience of a High Impact Low Probability (HILP) event, and the need to rebuild infrastructure on top of what was about to be a decade of increased investment, prompted this review of our network topology and design principles. From this viewpoint all of our major project plans have been influenced by the earthquakes.

7. Expenditure plan

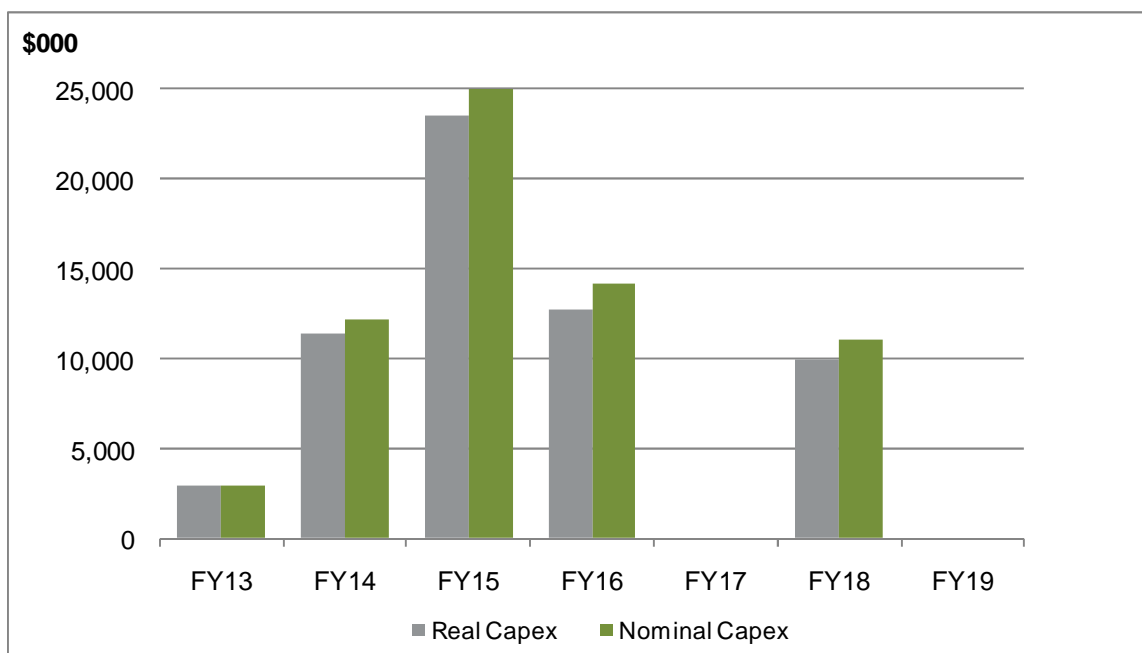
7.1 Expenditure summary

The following tables summarise the sub-project totals and overall project forecast budget. About 60% of the investment is in cable installations, 12% in generator installations, and the remainder in substation works.

	Orion project ID	Project title	Budget \$000
FY13	606	QEII Park diesel generators	2,899
FY14	521	Land acquisition for Marshland substation	500
FY14	619	Bromley to Rawhiti 66kV link	10,953
FY15	525	Waimakariri substation stage 1	5,312
FY15	641	Hawthornden-Waimakariri 66kV link	7,494
FY15	651	Marshland to Waimakariri 66kV link	10,738
FY16	634	Belfast Diesel Generation - Stage 1	1,285
FY16	650	Rawhiti to Marshland 66kV link	11,429
FY18	488	Marshlands zone substation	6,255
FY18	541	Hawthornden T-off	1,300
FY18	542	Waimakariri substation stage 2	2,377
Total			60,542

Urban North projects summary

The following chart shows our forecast expenditure in both real and nominal terms. The real terms have been escalated as per methodology outlined in the CPP proposal to ascertain the nominal terms.



The following tables summarise our forecast expenditure in both real and nominal terms (\$000).

Forecast expenditure (real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Sub-transmission network	-	11,453	21,554	11,680	-	6,246	-
Distribution lines and cables	2	-	83	47	-	69	-
Distribution substations including transformers	42	-	19	5	-	33	-
Switchgear (All voltages)	-	-	1,661	172	-	3,356	-
Low voltage distribution network	-	-	-	-	-	-	-
Supporting or secondary systems	2,855	-	228	810	-	228	-
Non system fixed assets	-	-	-	-	-	-	-
Total	2,899	11,453	23,544	12,714	-	9,932	-

Forecast expenditure (nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Sub-transmission network	-	12,133	23,532	13,072	-	7,068	-
Distribution lines and cables	2	-	103	61	-	103	-
Distribution substations including transformers	42	-	22	6	-	45	-
Switchgear (All voltages)	-	-	1,754	181	-	3,599	-
Low voltage distribution network	-	-	-	-	-	-	-
Supporting or secondary systems	2,855	-	246	916	-	275	-
Non system fixed assets	-	-	-	-	-	-	-
Total	2,899	12,133	25,656	14,236	-	11,091	-

7.2 Basis for expenditure forecast

The expenditure forecasts in this project are based on the need to deliver the works described in the previous sections of this report. The methodology for developing expenditure forecasts to undertake these works is described in NW70.60.13 *Project Budget Forecasting Process*.

Updated quotes for 66kV cable materials have been obtained in FY12. The QEII generator costs reflect actual expenditure.

All other categories involve infrastructure which Orion installs regularly and for which there is recent history.

Cost benefit analysis is undertaken in the Architecture Review.

These expenditure forecasts do not include any contingencies.

Any opex resulting from generators included in this programme and permanently attached to the network is included in the generators scheduled maintenance opex programme (CPP111). The opex resulting from any other generators is included in the infrastructure management opex programme (CPP167). We have historically found any revenue generated by these generators is offset by the metering cost. So we do not expect the opex to be offset by revenue at all.

Appendix A: Rawhiti 66kV Options Planning paper



Rawhiti zone substation 66 kV supply options

Prepared by: Crispin Maclean
Planning Engineer
Date: 10 August 2012

Approved for internal consultation: Glenn Coates
Strategic Planning Manager
Date: 10 August 2012

Approved for inclusion in draft AMP: _____

Date: _____

Appendix B: Rawhiti 66kV Options corporate decision

Meeting confirming 66kV cable supply for Rawhiti substation Monday 13 August 2012 @ 11.30AM

Decision:

A decision was made that a solution using underground cables (only) was appropriate for supply to Rawhiti substation and that the temporary overhead lines would be removed before the termination of Orion's temporary consent for those lines in 2014. This solution is to include the acceleration of cable installations to the North of Rawhiti for completion in 2014.

Background to decision:

The risk is not as great as it was for the February 22nd earthquake because of the following:

- The Brighton & Pages Rd substations have been replaced with a more secure Rawhiti substation
- There will be far less reliance on cable supply to the south of Dallington Zone substation

A decision was made to continue with replacement cable option for supply to Rawhiti substation for the following reasons:

- The city plan calls for cables for all new works within the city boundary
- Other relative risks and their impact need to be considered:
 - Earthquake 1/123, Snow 1/50, Wind 1/150
- Eastern city residents have made it very clear that they favour a cable solution and a drawn-out opposed consenting of permanent overhead lines would be costly and damaging to Orion's ability to operate in future.
- People in the east are still suffering the impact of the earthquakes and we wish to consider the pressure they are under
- The supply from Rawhiti is more secure than the previous Brighton supply due to the following:
 - Additional 11kV cabling from the north
 - Diesel generators installed at QE2
 - Minimal number of 11kV cables now crossing the Avon river (3)
 - A Rawhiti substation less susceptible to liquefaction damage compared to the Brighton substation (testing completed prior to construction)
 - A 66kV cable link planned from McFadden's to Dallington, from the north, will be in place
 - Reduction in local load due to the red zone exodus

Mitigation measures in addition to the above

- Our plan to plan approach
 - Will include fastest option to restore power & impact to the greatest number of people (generally by voltage level)
 - Control Centre to restore what power they can by switching the network
 - Switching between Dallington and Rawhiti 11kv should be a priority

Appendix C: Orion Board paper - diesel generation after earthquakes

Memorandum

Date: 15 February 2010⁶
To: Roger Sutton
From: Tas Scott
Subject: **Update report on short-term reinforcement action mitigate earthquake impact on city network**

Background

The 4 September, 7.1 earthquake centred 40kms west of Christchurch City caused significant liquefaction and in some cases lateral spread in land pockets in and around Christchurch City.

The areas most affected include Dallington, Avonside, Bexley and Brooklands. Significant damage to houses, sewers, water pipes and roading has occurred as a result.

Our electricity network has also been affected with over 30 high voltage cable faults and significant stretching of the Bromley - Dallington 66kV cables and also to the termination of the Bromley – Pages – Brighton 66kV cables.

Brighton and Pages zone substations show signs of sinking and tilting of foundations including the transformers at Brighton. These impacts have lead us to consider the impact of further earthquakes on an already fragile and stressed group of assets and this report updates our measures to mitigate further potential power supply interruptions in the future to suburbs of Brighton, Northshore, Dallington, Burwood and Bexley.

Network security of supply assessment

Taking into account the known damage to 66kV and 11kV cables in the areas supplied by the Dallington and Brighton zone substations, we are most concerned about failures of the 66kV cables to both of these sites. These cables pass right through the areas of the worst liquefaction and lateral spread caused by the earthquake and although no electrical failures have occurred yet, we have observed that significant mechanical stress has occurred which has lead us to de-rate these cables by 30% as a precautionary measure to avoid thermal stresses.

These two substations normally provide (N-2) backup supply to each other, so that a complete failure of one substation requires load transfers via the 11kV cable network. The 11kV network has also suffered multiple failures (mainly at joints) and there is the

⁶ This original memorandum date should have been February 2011 as it refers to the September 2010 earthquake

possibility of ongoing problems occurring over the next few years as water finds its way into small cracks in the outer sheaths of these older style cables.

We have therefore carried out modeling of the network and looked at how we can provide additional capacity into the North Brighton area.

In particular we have studied the ability of the existing (surrounding) network to be able to supply this area, assuming that the 66kV supply is not available. We have concluded that we would not be able to supply these areas during a significant period (up to 400 hours) of next winter 2011. Summer loads can be met.

The overall deficit in secure capacity is approximately 18MVA into areas such as Queenspark, QE2 pool, Northshore, Burwood and North Brighton – all areas north of the Avon river which otherwise depend on about eight 11kV river crossings in the area of greatest land instability. This amounts to about 25% of the total load currently supplied at peak time by Dallington and Brighton substations.

Short-term options to restore security levels

The idea of bringing forward the 66kV “northern ring” from Papanui through to Bromley via Dallington and Brighton substation is an excellent medium-term solution to supply security of the whole of the north-east sector of Christchurch. However, there is a big problem with long equipment supply lead times (e.g. 66kV cable – up to 12 months, 66kV switchgear and civil works, etc. – also 12 months). What is required is a short-term solution which can mitigate the immediate risk for the next two winters.

The only practicable solution involves the installation of 11kV cables from Belfast to Tumara Park (approved by the board in December 2010) together with 6MVA of peaking diesel generation at our consented site in Belfast (or alternatively 4MVA at QE2 Park). This combination is capable of supplying up to 18MVA of winter time peak capacity into North Brighton - Burwood area.

These new 11kV cables will form an important part of the future 11kV feeders associated with the proposed “Marshlands Road” zone substation when future growth occurs.

We have been considering diesel generator purchase to offset and delay the investment in the Belfast and Marshlands substations. This earthquake event is a reason to also consider bringing this investment forward.

Action plan - update

The installation of 11kV cables from Belfast to Tumara Park is largely complete and we expect full commissioning to be complete before peak winter demand occurs. The original cost estimate for this works was \$2.9m and at this stage we expect the project to be delivered to budget.

As far as generators are concerned, our early investigation prior to Xmas indicated that the 6 months available before winter 2011 was unlikely to be sufficient to enable a proper process to be undertaken including the development of a specification, tender, procurement, construction and commissioning at Belfast. Our proposed diesel implementation plan is as follows:

Description	Cost	Date
Winter of 2011		
Obtain consents for 4MVA of generation at QE2 – this	approx. \$60k	March 2011

work is largely complete with agreement from affected parties and our 10 year consent application ready to submit		
Put in place contractual arrangements with NZ Generator Hire and up to four major customers which will enable us to access their hire generators over the winter if our network incurs further damage	approx \$80k	March 2011
Install 11kV cabling, switchgear and purchase a diesel tank to enable fast connection of the above generators at QE2 if required	approx \$100k	April 2011
If required, relocate, connect and commission customer diesels at QE2 and operate as necessary to meet the shortfall in network supply	\$50k plus \$1600 per hour	Winter 2011
Winter of 2012		
Prepare diesel generation specification ready for tender	\$40k	February 2011
Call for tenders		March 2011
Evaluate tenders and seek board approval for purchase of generators and commitment to site and network modifications	\$3.5m	May 2011
Issue contract orders to various contractors for Belfast site and network modifications	\$1.5m	Oct 2011
Generators arrive		February 2012
Commission site, network and generators		March 2012

Depending on subdivision growth at Belfast, and the impact of collapsed chimneys on winter electricity heating demand and the extent to which our confidence in the network supply changes it may possible to scale back the generator purchase and utilise the 'winter 2011' approach again during the winter of 2012. We will explore this option in more detail before seeking board approval for generator purchase in May 2011.

Recommendations

1. That the board approves the expenditure of an estimated \$210k to put in place the necessary consents and contractual arrangements etc to 'make ready' the QE2 site for the connection of emergency diesel generation during the winter of 2011.
2. That the board continues to support calling for tenders to purchase of up to 6MVA of diesel standby generation to be located at Belfast such that it provides additional capacity into the North Brighton – Burwood area for an estimated cost of \$5.0m. Final approval of generator purchase to be subject to board approval.

T L Scott

GM Network Development

Approved for board submission

Roger Sutton

Chief Executive Officer

Appendix D: Orion paper - diesel generation options



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Diesel Generator Design Considerations

Prepared by: Simon Milmine
Network Development – Development Engineer
Date: May 2010
Revision: Draft 4

Appendix E: Geotech report on Bromley-Rawhiti cable route

4450
10 July

Orion NZ Ltd
PO Box 13896
Christchurch

Attn: Shane Watson



Dear Sir,

RE: Vulnerability Bromley to Rawhiti Cable Supply

DRAFT

1 Introduction

We understand it is proposed to lay an underground cable between the Bromley Substation and the Rawhiti Substation following the west and north side of the oxidation ponds, across the Avon River at Bridge Street and then parallel to the Brighton Beach up Estuary Road to Rawhiti Domain and the substation. It is anticipated that the present temporary overhead line will be dismantled, which would leave the single cable as the only supply to the Rawhiti Substation for a period of about five years until a second cable is installed from the north. You require some understanding of the risks in this situation.

2 Cable Route

There are a number of maps showing aspects of liquefaction. One compiled by Tonkin and Taylor from observations gained from EQC surveys, shows that the New Brighton area between the beach and the Avon River is largely a zone of very little to no liquefaction. Therefore the cable route from the Domain through to Bridge Street would be expected to be at very low risk of liquefaction or ground damage from seismic shaking.

The next section along Bridge Street traverses ground which was increasingly damaged as the river is approached from both liquefaction and lateral spread. The bridge itself was damaged with lateral spread at the abutments. This area is clearly at some risk should a strong earthquake occur that produces liquefaction again in the area. The major risk factor would be the potential for lateral spread stretching the cable and in particular the interface between the bridge structure and the abutments where differential settlement and lateral movement must be expected. This hazards can be minimized with appropriate engineering.

The open land to the west of the bridge is unmapped, as it is not within the housing areas, but the remainder of the route through to the substation is essentially zoned as minor to moderate liquefaction damage.


An alternatively map compiled by Misko Cubrinovski from the University of Canterbury as part of a research program to assist the City Council and their pipeline networks, has taken the damage observations, from both a university drive-through survey and the Tonkin and Taylor/EQC work, and normalized it for depth to water table and severity of shaking to produce a liquefaction resistance index.

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GEOLOGICAL & ENGINEERING SERVICES

Appendix F: RMA consent for Rawhiti zone substation and Bromley-Rawhiti temporary overheadline

Canterbury Earthquake (Resource Management Act Electricity Network Recovery) Order 2011	Christchurch City Council 
Report/Decision on a non-notified Resource Consent application for a Controlled Activity	

Application Number: RMA92017941

Applicant: National Controller (on behalf of Orion) initially and now Orion New Zealand Limited

Site address: Rawhiti Domain adjoining Keyes Road (100 Shaw Avenue in CCC records) and various properties and road reserve along the paths of 3 overhead lines shown in Annexure 1 of the application and now described generally as the Rawhiti line, the New Brighton line and the Dallington line

Legal Description: Refer the application

Activity Status: Controlled activity pursuant to Clause 6 of the Canterbury Earthquake (Resource Management Act Electricity Network Recovery) Order 2011

Description of Application: To construct and operate a permanent substation (Rawhiti Substation) on Rawhiti Domain adjoining Keyes Road (north western corner directly adjoining south western portion of the Rawhiti golf course).

To construct and operate a temporary power distribution network comprising three overhead lines of approximately 8.5 km length, and associated infrastructure as follows:

- Rawhiti line from the damaged New Brighton substation (Pages Road) to the new Rawhiti substation
- New Brighton line – from Bromley substation to the damaged New Brighton substation (Pages Road)
- Dallington line – from Bromley substation to Dallington substation

The power lines are proposed to be removed within three years of the date of the decision on this application.

Introduction

The purpose of this report is to make a recommendation to an Independent Commissioner on the land use consent application by Orion New Zealand Limited (Orion) to retrospectively allow the above activities under the Canterbury Earthquake (Resource Management Act Electricity Network Recovery) Order 2011 and to recommend any conditions appropriate to the grant of the consent.

The Canterbury Earthquake Recovery Act 2011

The Canterbury Earthquake Recovery Act 2011 was passed following a 6.3 magnitude earthquake on 22 February 2011 that caused severe damage to buildings, land and infrastructure, as well as significant loss of life. An earlier 7.1 magnitude earthquake struck the region on 4 September 2010. The purpose of the Act is to ensure that Christchurch recovers from the earthquakes in a focussed, timely and expedient manner and to restore the social, economic, cultural and environmental well-being of the greater Christchurch community.

Subsequent to the February 2011 earthquake Orion undertook emergency repairs which were approved by the National Controller of Civil Defence under the emergency works provisions of the Resource Management Act (RMA). Later, Orion made a request to the Ministry for the Environment for an Order in Council (OIC) to provide for retrospective assessment and approval of those electricity network recovery works.

The Canterbury Earthquake (Resource Management Act Electricity Network Recovery) Order 2011

The purpose of this order is to allow certain applications for resource consents, and certain works, to proceed with fewer restrictions and requirements than would normally apply under the Resource Management Act 1991.

URBAN MAJOR PROJECTS - DALLINGTON

CPP2

Project Summary

1 April 2013 – 31 March 2019

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1 Project Introduction

Project Name	<i>Urban Major Projects – Dallington (CPP2)</i>
Service Category	<i>Provide and operate network infrastructure</i>
Capex Category	<i>Major Projects</i>

1.1 Description

Plans to expand Orion's subtransmission network in northern and western Christchurch have been in preparation for some time. The 2010-11 earthquakes have altered these plans, due to asset damage in the east city and changes to load growth predictions. The existing and proposed urban upper network is shown in Figure 1 overleaf, with the projects in this group highlighted yellow. Works outside the customised price-quality path (CPP) period are shown in blue.

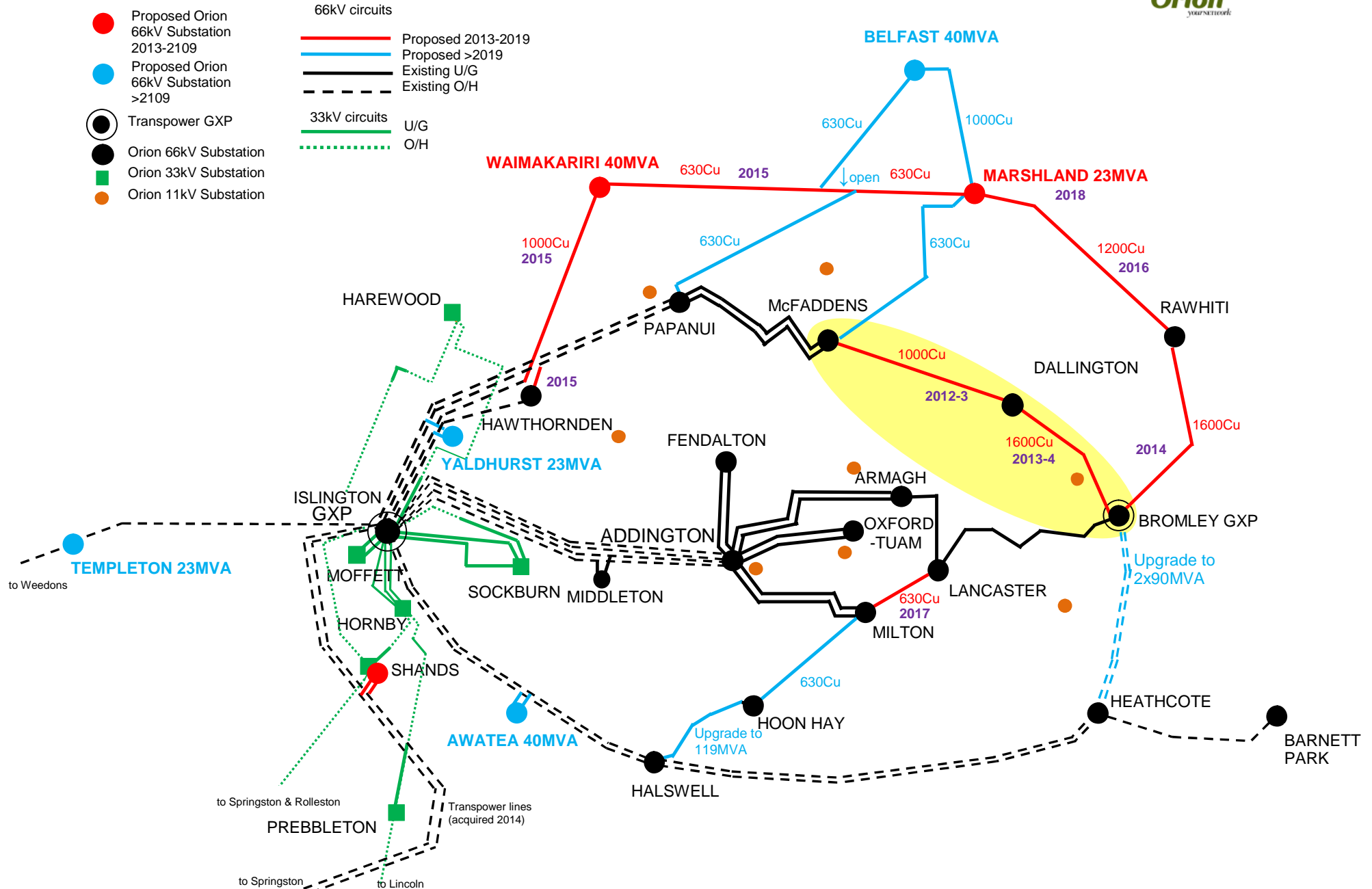
1.2 Assets Included

The projects in this Urban Dallington group (see table below, totalling \$17.04m) flow out of the 2012 *Network Architecture Review (Subtransmission)*. The subtransmission plan prior to the earthquakes involved a cable from Dallington to Marshland rather than to McFaddens. A high-capacity cable from Bromley to Dallington was planned to be laid when the capacity of the existing circuits was exceeded. The destruction of these cables necessitated a temporary overhead supply and the plan for a new Bromley-Dallington cable has been advanced to be built before the expiry of the consent for the overhead line. The McFaddens-Dallington cable is being built as soon as is practical to provide security of supply to the suburbs of Avondale, Shirley, Dallington, Aranui, Avonside and Wainoni.

Budget for projects in Urban Dallington group

FY	Orion Project ID	Project Title	Forecast Budget (\$000)
2013	490	Dallington to McFaddens 66kV link stage 2	8,364
2013	492	Bromley to Dallington 66kV link stage 1	1,620
2014	656	Bromley to Dallington 66kV link stage 2	9,644
Total			19,628

Urban subtransmission network



1.3 Aims and Objectives

The objectives of this suite of projects are to:

- to restore N-1 security of supply to Dallington zone substation, following the destruction of two Bromley-Dallington cables in the Christchurch earthquakes. This will be done in a way consistent with the network architecture proposed by the Architecture Review, i.e. a cable from Bromley and one from Islington via Papanui and McFaddens
- to reinforce security of supply to east and north Christchurch by completing one of four major cross-grid exit point (GXP) links between Islington and Bromley.

Two 66kV cable installations will be commissioned (McFaddens-Dallington and Dallington-Bromley), along with the necessary switchgear works for their termination. New 66kV switchroom buildings are necessary at both Dallington and McFaddens. The cables will complete one of four links between Islington and Bromley GXPs (in this case via Papanui, McFaddens and Dallington).

Although Orion's 66kV switchgear is all of the outdoor type, installing in a building allows equipment to be ceiling mounted and results in a smaller land footprint. Space is constrained at Dallington and McFaddens substations and the switchroom building enabled the necessary structures to be installed on the available footprint.

1.4 Drivers

The drivers for this suite of projects and their timing are meeting security of supply in a way that complies with the Architecture Review and our Security of Supply Standard (SoSS), which requires Dallington zone substation to have N-1 subtransmission,

The initiatives within this project and other surrounding projects would, in the long term, result in the Dallington area of Orion's Christchurch network achieving consistency with our security of supply criteria¹ (Class C2) for urban loads exceeding 15MW. Class C2 loads shall be supplied by an uninterrupted N-1 subtransmission network.

1.5 Obligations

There are no extraordinary obligations associated with this project. Our proposal is consistent with local authority plans and requirements and we are under no obligation to develop unique solutions.

Like all companies, we are subject to the general provisions of a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

¹ As published in Section 5.3.1 of our 2012 Asset Management Plan

- Electricity Act
- Energy Companies Act
- Electricity Industries Act
- Local Government Act
- Electricity Reform Act
- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act.

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a *"lifeline"* utility, Orion must comply with the Civil Defence Emergency Management (CDEM) Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand's communities. The Act requires us to:

- be able to function to the fullest possible extent during and after an emergency
- have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- help define the Crown's CDEM goals and objectives in a National CDEM Strategy
- participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- be capable of managing our own response to emergencies

- develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary NW70.00.14
- Asset Risk Management NW70.60.02.

2 Relevant Policies and Planning Standards

This project includes a large variety of work and the detailed design and construction will be in line with our design standards, technical specifications and policies as summarised in NW 70.50.03 – *Document Control*. In particular, this project will be implemented in compliance with the following sections:

- 9.2 Infrastructure
 - 9.2.1 Management
 - 9.2.3 Design Standards
 - 9.2.4 Technical Specifications
- 9.5 Contracts
 - 9.5.1 Management
- 9.7 Procurement & Stock Management
 - 9.7.2 Equipment Specifications.

There are some works associated with these projects that require bespoke design to reflect the particular needs and/or environment of each project. For example, the zone substation site civil works and 66kV cable works will require unique specification solutions while still complying with the necessary high level requirements such as the building code etc.

The relevant Technical Specifications include

- NW74.23.32 Cable - Subtransmission - 66kV - (Bromley to Dallington/Rawhiti)
- NW74.23.29 Cable - Subtransmission - 66kV - (McFaddens to Dallington)
- NW72.22.04 Cables - 66kV Civil Construction - McFaddens to Dallington
- NW72.22.05 Cables - 66kV Installation - McFaddens to Dallington
- NW74.23.31 Cable - Subtransmission - 66kV - 1600mm²Cu XLPE.

The principal studies that determine the architecture of the subtransmission build are summarised in:

- the *Urban Network Architecture Subtransmission Review* NW70.60.05
- the *Security of Supply Standard* 2007 (see 2.1 below).

Another relevant document is the *Urban 11kV Network Architecture Review* NW70.60.06.

The following sections provide a summary of the most relevant high level reports, policies, standards and specifications.

2.1 Security of Supply Standard

Our SoSS is published in Section 5.3.1 of our 2012 Asset Management Plan (AMP). Currently the Dallington area of our network does not comply with the SoSS.

The initiatives within this project are consistent with meeting our security of supply criteria² (Class C2) for urban loads exceeding 15MW. Class C2 loads shall be supplied by an uninterrupted N-1 subtransmission network.

This standard was originally introduced shortly after the 1998 Auckland CBD blackout and modified slightly following an urban architecture review in 2006. The structure of our SoSS is based on the UK P2/6 standard and the 2006 update included a national and international benchmarking component. Our 2006 process and recommendations were reviewed by SKM before consulting with Retailers, Canterbury Manufacturers Association, Major Electricity Users Group and Grey Power.

The Orion SoSS has a deterministic structure but the thresholds are based on probabilistic analysis utilising average probabilities of asset failure and the average Value of Lost Load (VoLL) to customers. As a precursor to determining the structure and thresholds of a SoSS it is necessary to consider many factors including:

- the different network architecture options (ring vs. radial)
- the construction options (overhead vs. underground)
- the different customer/load segment expectations (VoLL and Demand Side Management (DSM))

The key point is that how the desired level of security of supply is achieved is just as important as achieving it. The development of a SoSS is an iterative process. Changes in technology, customer expectations or the cost of assets can affect the optimum architecture of the network which in turn can affect the structure and thresholds in the SoSS. The architecture of our network is discussed in more detail below.

2.2 Architecture Review

To make sure that our network architecture and resulting SoSS is keeping pace with changes to our modelling inputs (VoLL, asset failure rates, new technologies, DSM, etc.), we have recently completed a review of our urban subtransmission and 11kV architecture³. This has also provided an opportunity to take account of the resiliency learnings during the Christchurch earthquakes. The review has largely supported our current SoSS and we do not expect any changes to the existing categories or thresholds although additional criteria to capture our planned resilience to GXP or zone sub 'site' contingencies will be required.

The review also concluded that a 66kV ring bus design over a more conventional single bus design provided a better balance of costs and benefits.

² As published in Section 5.3.1 of our 2012 Asset Management Plan.

³ See our Network Architecture Review: Subtransmission (NW70.60.05) and Urban 11kV Network Architecture Review (NW70.60.06).

During 2013, we intend to review the architecture of our low voltage urban network and also the rural subtransmission, 11kV and low voltage network. Our rural network is quite different from our urban network. For example, overhead is accepted by Selwyn District Council and peak demand is dominated in many parts by summer irrigation load. Historically, rural network security of supply has relied on demand side management (interrupting supply to irrigation pumps) during contingencies to maintain supply to other rural sector loads, including dairy milking connections. The shift away from deep well pumps to surface water irrigation may reduce the amount of demand side response available in an area that is seeing other loads growing. Whilst we are not expecting significant change, the rural architecture review will consider many other factors and until that work is complete, the current SoSS is considered appropriate.

We are expecting the rural 66kV architecture review to also conclude that a ring bus design is appropriate and, therefore, all (including this project) rural forecast budgets and designs assume this approach.

2.3 Prioritisation of Works

At a high level this project mainly requires the use of 66kV underground cable and zone substation contractors. This kind of resource is also required on a number of other projects to be completed in the ten year timeframe. More detail about how we prioritise projects is described in section 5.3.4 of our 2012 Asset Management Plan and expanded further in NW 70.60.14 – *Project Prioritisation and Deliverability Process*.

Orion has a successful history in managing a succession of multi-million dollar civil and electrical works which demonstrates a proven institutional ability to predict and manage contractor workstreams.

A dominant factor in prioritising this project is the requirement to remove the 66kV temporary overhead line from Bromley to Dallington by March 2014.

Replacement of end-of-life assets and coordination with Transpower works also influence the staging of these projects.

2.4 Tenure of substation Sites, Line Corridors and Cable Routes

Where possible we install our underground reticulation in the berm of a public road. This does not require specific permission. Although no easement is required we notify and/or seek approval of our design/offset from other utilities and local authorities including Christchurch City Council (CCC), Environment Canterbury (ECAN), Telecom/Chorus, etc. and also New Zealand Transport Agency (NZTA).

The large majority of the cable route for these projects is in public road reserve. There are small parts of the cable route where the use of other CCC reserves may be beneficial. We are currently negotiating the cable route in these cases with CCC. Any cable laid in a CCC reserve (excluding the road reserve) will be secured by easement.

No land acquisitions are required for these projects.

3 Network Constraints and Service Targets

3.1 Constraints and Timing

The objectives of this suite of projects are:

- to restore N-1 security of supply to Dallington zone substation, following the destruction of two Bromley-Dallington cables in the Christchurch earthquakes. This will be done in a way consistent with the network architecture proposed by the Architecture Review, i.e. a cable from Bromley and one from Islington via Papanui and McFaddens
- to reinforce security of supply to east and north Christchurch by completing one of four major cross-GXP links between Islington and Bromley.

The first objective requires the laying of cables from Bromley to Dallington and McFaddens to Dallington as soon as practical. The second is also satisfied when the first objective is met.

3.2 Security of Supply (66kV)

The most urgent constraint being addressed is that Dallington zone substation does not meet the security of supply standard for an urban site with more than 15MVA peak load, which is uninterrupted N-1.

In addition, the fact that both Rawhiti and Dallington are both at present on single 66kV feeds in areas susceptible to seismic damage, and that they are adjacent substations which normally back each other up in a contingency, and that Rawhiti is on the edge of the network with little other support, results in a particularly vulnerable supply to the damaged eastern suburbs. An N-2 event (concurrent loss of both lines) is a credible contingency which would result in unserved load in winter for the duration of repair time.

It is clear that restoring security of subtransmission to these substations is of the highest priority. Once Dallington has N-1 supply in 2014, an N-2 event will result in the loss of only one of the eastern zone substations. By 2016, both will be supplied by two cables each over diverse routes, from Bromley and Islington GXPs.

3.3 Capacity and Security of Supply (GXP)

The Islington 66kV GXP has a firm capacity of 400MVA (continuous rating but can deliver peak demand of 532MVA on 24hr cyclic basis), which is already exceeded in winter (approximately 420MVA including part of Mainpower). As demand grows we will transfer load to Bromley GXP which has spare capacity, rather than invest in Islington upgrades. The completion of the Bromley-Dallington-McFaddens links means that McFaddens substation can be supplied from Bromley rather than Islington. The future McFaddens-Marshland cable will allow Rawhiti, Marshland, McFaddens and Dallington to operate in a closed ring with uninterrupted N-1 subtransmission.

3.4 Asset Replacement

Transpower's asset replacement plan has the Bromley 66kV breakers to be replaced over 2012-2016, and other 66kV hardware out to 2019. This is another reason to complete the rearrangement of the circuits out of Bromley by 2016, so that two bays can be decommissioned and refurbishment costs can be avoided.

3.5 Forecast Load

The 66kV cable works in this plan are driven by the need to replace earthquake damaged assets and their timing is not triggered by load growth. The sizing of the cables is commensurate with achieving the objectives set by our 66kV architecture review.

3.6 Non Network Solutions

These projects are driven by the need to replace the two earthquake-damaged Bromley-Dallington 66kV cables and restore N-1 security to Dallington zone substation. Non-network solutions of a scale sufficient to reduce peak Dallington demand from 30 to less than 15MVA (the SoSS threshold for N-1 security) are not available, so there are no alternatives to laying two cables.

4 Project Description and Forecast Expenditure

4.1 Work to be Undertaken

The CPP major project groups consist of a number of Orion AMP projects, each of which is contained in a single financial year. The list and timing of projects is summarised in Table 1.

Planned improvements/changes to previous practices within these projects can be identified within the Architecture Review, and also in the geotechnical considerations around cable routes and substation sites.

About 80% of the investment is in cable installations and the remainder in substation works.

Single line diagrams of the current and proposed substation arrangement have been included in appendix A.

All work is committed.

4.1.1 2013 490 Dallington to McFaddens 66kV Link Stage 2

The existing Bromley-Dallington cables have been damaged beyond repair by the earthquakes. A temporary overhead line has been built from Bromley to Dallington, leaving the substation on a single circuit. The first of two permanent circuits to Dallington is a cable from McFaddens zone substation. These works are the second half of a two year project, covering the cable installation and substation works at Dallington to allow for termination. The first half in FY2012 involved the substation works at McFaddens.

Dallington to McFaddens 66kV link stage 2 budget

Item ID (database)	Quantity (#, m)	Description	Forecast Budget (\$000)
117	5000	66kV 1000Cu XPLE cable	3,040
207	5000	66kV cable trenching and jointing	3,500
59	1	Design and extras	94
1004	1	66kV Switchroom building	1,363
224	1	construct bay, install breaker and relays	157
223	1	66kV breaker, relay and brick	210
Total			8,364

4.1.2 2013 492 Bromley to Dallington 66kV Link Stage 1

The second of two permanent circuits to Dallington is a cable from Bromley GXP, replacing the temporary overhead line. These works are the first half of a two-year project, covering the substation works at Dallington to allow for terminating the cable. The second half is Project 656.

Bromley to Dallington 66kV link stage 1 budget

Item ID (database)	Quantity (#, m)	Description	Forecast Budget (\$000)
59	1	Design and extras	73
242	1	Zone substation works including protection & communications	812
224	2	construct bay, install breaker and relays	314
223	2	66kV breaker and relay and brick	420
Total			1,620

4.1.3 2014 656 Bromley to Dallington 66kV Link Stage 2

These works are the second half of a two-year project, covering the cable installation and substation works at Bromley to allow for termination.

Bromley to Dallington 66kV link stage 2 budget

Item ID (database)	Quantity (#, m)	Description	Forecast Budget (\$000)
157	5500	66kV 1600Cu XPLE cable	4,807
309	5500	66kV cable trenching and jointing	4,125
242	1	Cable termination at Bromley	100
87	40	66kV 300Cu XLPE cable (transformer incomers)	12
231	2	66kV transformer incomers, terminations	600
Total			9,644

5 Dependencies

This suite of projects relates to the overall plan for urban subtransmission outlined in the Architecture Review. In particular it is closely connected with Urban North Subtransmission (CPP1). However progress is independent of any other works.

6 Earthquake Consequences

Direct earthquake effects include the need to replace the two damaged Bromley-Dallington 66kV cables, and the overhead line which provides a temporary supply. Other direct effects are on the cable routes and civil engineering solutions chosen for the Dallington-McFaddens and Bromley-Dallington circuits, which take into account geotechnical learnings from the earthquakes (and particularly for the latter are longer and more expensive than may have been the case).

The Architecture Review was initiated after the 2010-11 earthquakes. The experience of a High Impact Low Probability (HILP) event, and the need to rebuild infrastructure on top of what was about to be a decade of increased investment, prompted this review of our network topology and design principles. From this viewpoint all of our major project plans have been influenced by the earthquakes.

7 Expenditure Plan

7.1 Expenditure Summary

The following tables summarise the sub-project totals and overall project forecast budget. About 78% of the investment is in cable installations and the remainder in substation works.

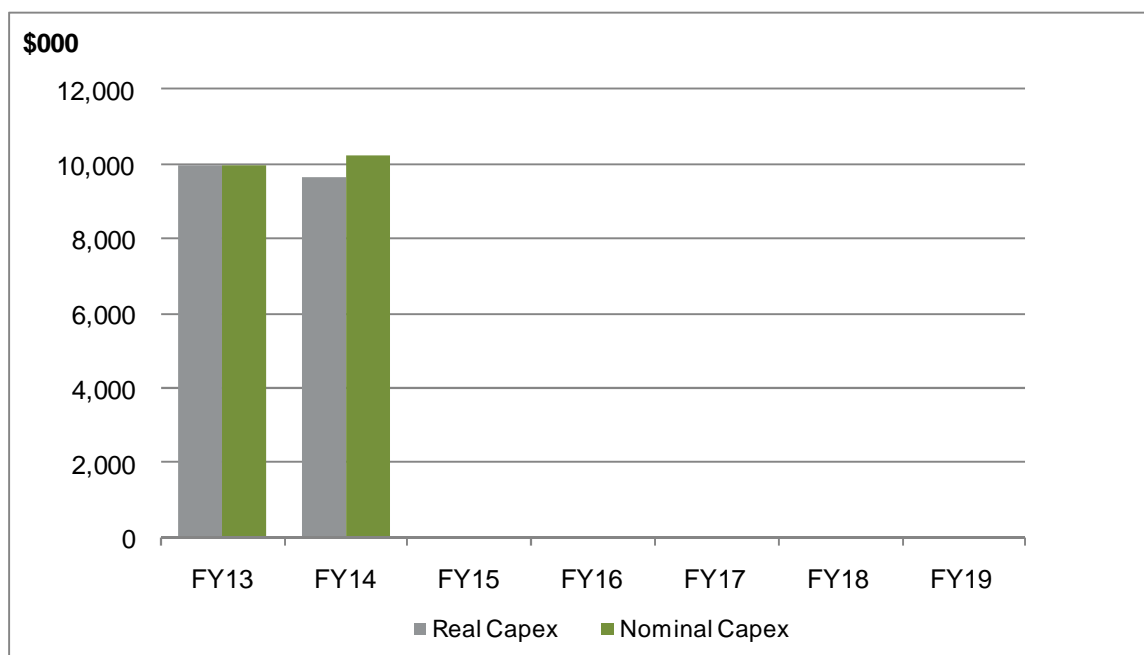
Urban Dallington projects summary

FY	Orion Project ID	Project Title	Forecast Budget (\$000)
2013	490	Dallington to McFaddens 66kV link stage 2	8,364
2013	492	Bromley to Dallington 66kV link stage 1	1,620
2014	656	Bromley to Dallington 66kV link stage 2	9,644
Total			19,628

The following chart shows our Dallington forecast capital expenditure in both real and nominal terms (\$000). The real terms have been escalated as per methodology outlined in the CPP proposal to ascertain the nominal terms.

These expenditure forecasts do not include any contingencies.

Forecast expenditure



The following tables summarise our total Dallington forecast capital expenditure in both real and nominal terms (\$000).

Forecast expenditure (Real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Sub-transmission network	8,850	9,644	-	-	-	-	-
Distribution lines and cables	-	-	-	-	-	-	-
Distribution substations including transformers	-	-	-	-	-	-	-
Switchgear (All voltages)	1,102	-	-	-	-	-	-
Low voltage distribution network	-	-	-	-	-	-	-
Supporting or secondary systems	32	-	-	-	-	-	-
Non system fixed assets	-	-	-	-	-	-	-
Total	9,984	9,644	-	-	-	-	-

Forecast expenditure (Nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Sub-transmission network	8,850	10,240	-	-	-	-	-
Distribution lines and cables	-	-	-	-	-	-	-
Distribution substations including transformers	-	-	-	-	-	-	-
Switchgear (All voltages)	1,102	-	-	-	-	-	-
Low voltage distribution network	-	-	-	-	-	-	-
Supporting or secondary systems	32	-	-	-	-	-	-
Non system fixed assets	-	-	-	-	-	-	-
Total	9,984	10,240	-	-	-	-	-

7.2 Basis for Expenditure Forecast

The expenditure forecasts in this project are based on the need to deliver the works described in the previous sections of this report. The methodology for developing expenditure forecasts to undertake these works is described in NW70.60.13 *Project Budget Forecasting Process*.

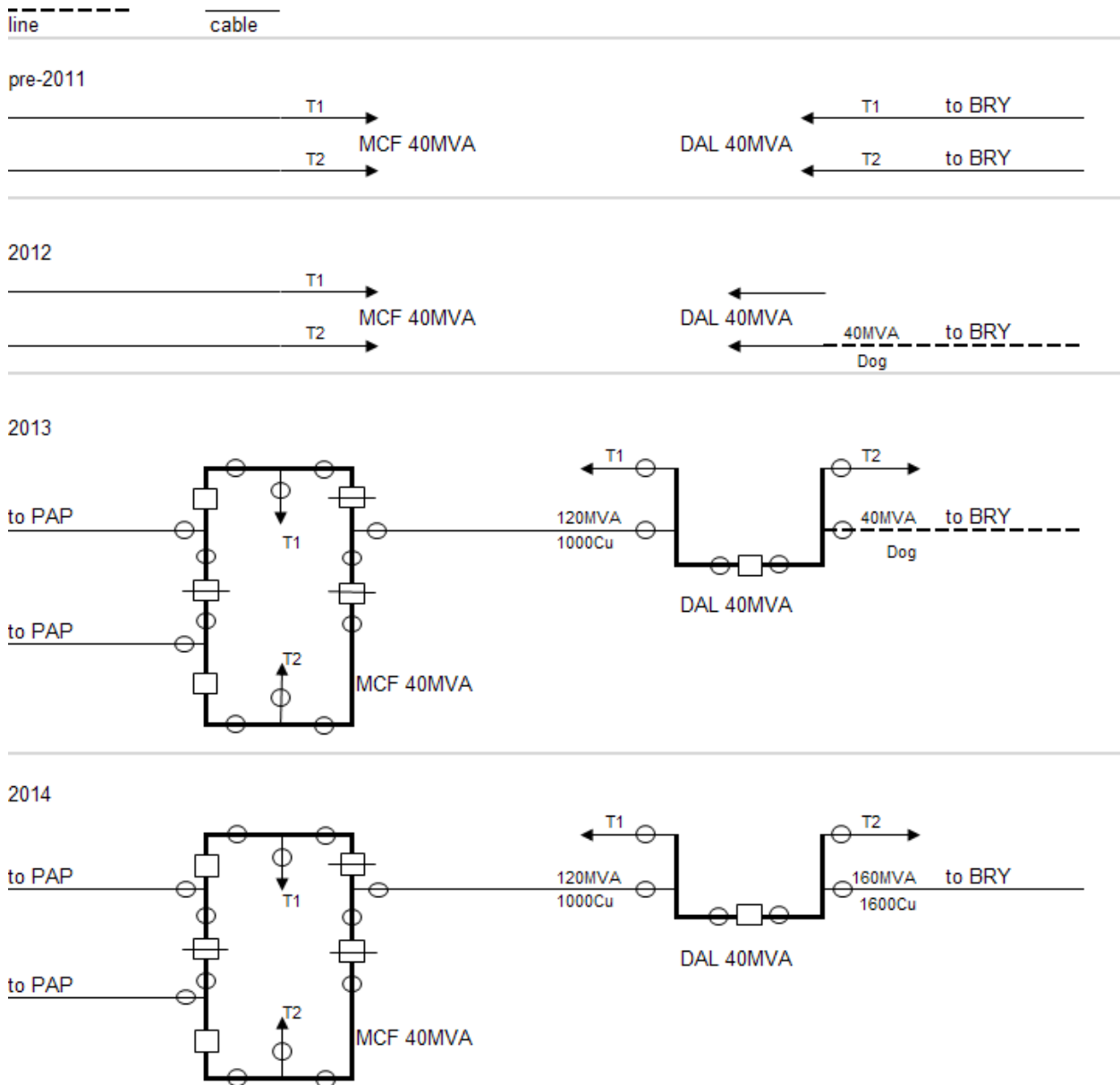
Updated quotes for 66kV cable materials have been obtained in 2012.

All other categories involve infrastructure which Orion installs regularly and for which there is recent history. Upward movements in the cost of civil works and skilled labour which have followed the earthquakes have been factored in.

Cost benefit analysis is undertaken in the Architecture Review.

Appendix A: Single line diagrams of current and proposed Dallington substation arrangement

Dallington subtransmission SLDs



RURAL MAJOR PROJECTS - ROLLESTON

CPP7

Project Summary

1 April 2012 – 31 March 2019

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1 Project Introduction

Project Name	<i>Rural Major Projects – Rolleston (CPP 7)</i>
Service Category	<i>Provide and Operate Network Infrastructure</i>
Capex Category	<i>Major Projects</i>

1.1 Description

This project is a series of nine Asset Management Plan (AMP) projects designed to meet strong residential and industrial growth in the Rolleston and wider Rolleston area. There has been significant growth in Rolleston over the last five years and the Greater Christchurch Urban Development Strategy (UDS)¹ is forecasting the number of Rolleston houses to more than double by 2041. Furthermore, the relatively low land cost and proximity to rail and state highways of the Izone Industrial Park has created significant industrial load growth. In the short term we are also expecting the development of a large milk processing plant at Rolleston for Westland Milk Limited.

1.2 Assets Included

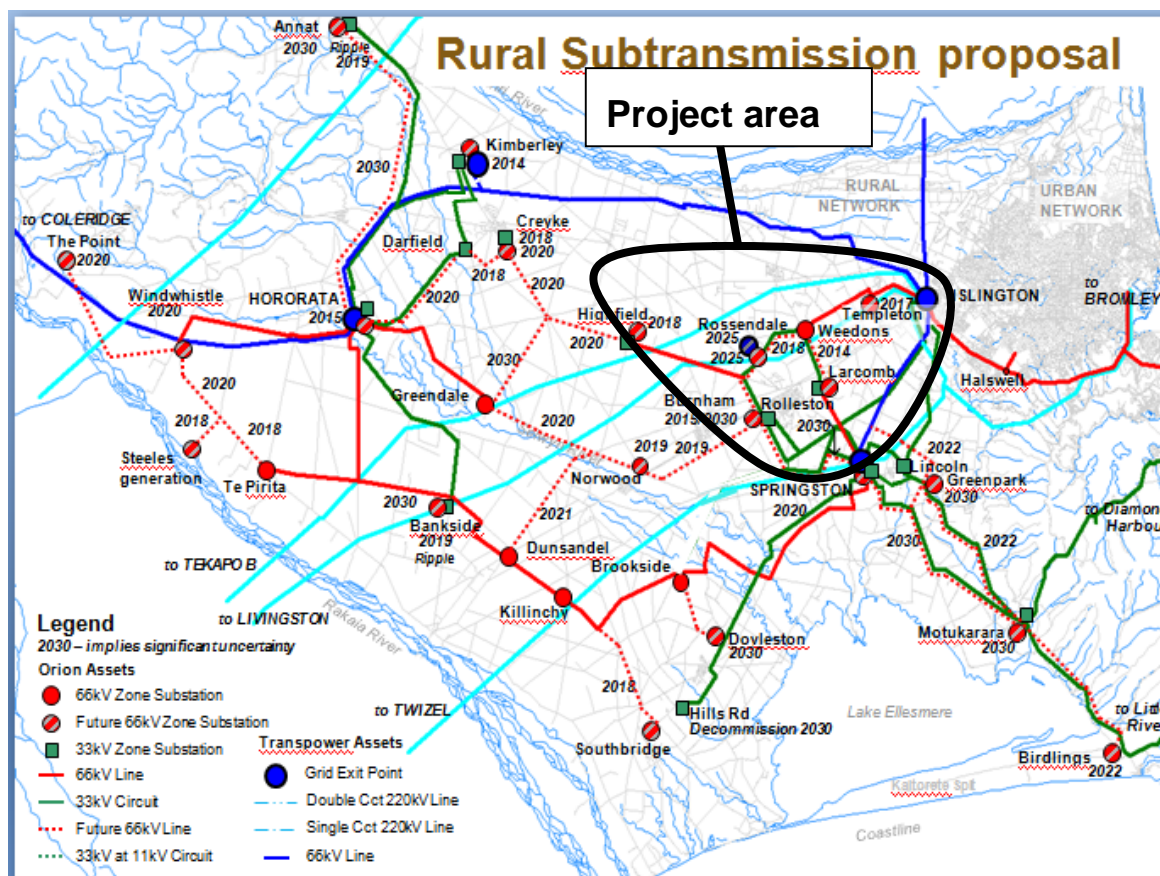
The assets to be modified or built from new include the following zone substations and associated 66kV subtransmission lines:

- Rolleston
- Burnham (replacement for Rolleston)
- Larcomb
- Weedons
- Highfield
- Springston
- Rossendale (proposed).

The following map highlights the project area and identifies the AMP projects and dates within this project and wider network area.

Apart from two small 11kV grid exit points (GXP) in the far west, Orion's rural network is supplied at 66 and 33kV from two GXPs, Hororata in the west and Springston in the inner plains. Springston GXP feeds the area covered by this suite of projects, although Weedons zone substation is now fed directly from Islington 66kV GXP.

¹ CCC, SDC, WDC and NZTA formed a UDS group to assess the impact of different locational growth scenarios on key infrastructure and then recommend a solution for inclusion in the ECAN Regional Policy Statement.



1.3 Aims and Objectives

The objective of this suite of projects is to provide capacity and reliability of supply to meet residential and industrial growth in the Rolleston and wider Rolleston area.

The AMP projects included in this customised price-quality path (CPP) project will continue with the development of an N-1 subtransmission network for Rolleston and also create greater flexibility for the development of a more interconnected subtransmission network for the wider rural area. The proposed transition to a 66kV subtransmission network will relieve capacity constraints on the 33kV network and will also relieve constraints on Transpower's Springston 66kV grid exit point². This project is also consistent with our strategy to exit 33kV subtransmission where technically and economically viable.

The projects already completed in this long-term strategic plan include 33kV zone substations at Weedons (1987), Highfield (2003) and Larcomb (2009) and their feeder lines. Weedons was converted to 66kV in 2012 and the others will follow as described in this report.

² Note that Orion proposes to purchase the Islington to Springston 66kV lines and Springston GXP assets in 2014. See Spur Asset Transfers (CPP54).

1.4 Drivers

The drivers for this suite of projects and their timing are meeting load growth in a way that complies with the Architecture Review and our Security of Supply Standard (SoSS), which specifies load thresholds for new investment.

Load forecasts produced by the Strategic Planning group (see 3.1 Forecast Load, below) forecast changes in residential, business and industrial load distributions in the wider Rolleston area.

This project is a capacity and reliability initiative. In particular, we are anticipating³ Westland Milk to formalise their request for a 9.4MVA, N-1 connection in Rolleston by spring 2014. This will set the timing for the early stages of this project. The Rolleston area is the hub⁴ of the Selwyn District Council (SDC) area and there is a council and community expectation that infrastructure in the area will develop to meet the needs of the types of industries locating there. Historically the load has been modest and our simple traditional rural 33kV subtransmission network design has reflected this. Going forward we need to recognise the transition from a small township to a major residential and industrial load centre.

The initiatives within this project are consistent with our security of supply criteria⁵ (Class D1) for rural loads exceeding 15MW. Class D1 loads shall be supplied by and N-1 subtransmission network.

1.5 Obligations

There are no extraordinary obligations associated with this project. Our proposal is consistent with local authority plans and requirements and we are under no obligation to develop unique solutions.

Like all companies, we are subject to the general provisions of a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

- Electricity Act
- Energy Companies Act
- Electricity Industries Act
- Local Government Act
- Electricity Reform Act

³ Over the last two years we have been discussing options with Westland Milk for the connection of milk driers at Rolleston and we are now expecting confirmation that they will be installing either one or two driers for spring 2014.

⁴ To a lesser extent, Lincoln can also be considered a significant township in the SDC area.

⁵ As published in Section 5.3.1 of our Asset Management Plan

- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act.

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a "lifeline" utility, Orion must comply with the Civil Defence Emergency Management (CDEM) Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand's communities. The Act requires us to:

- be able to function to the fullest possible extent during and after an emergency
- have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- help define the Crown's CDEM goals and objectives in a National CDEM Strategy
- participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- be capable of managing our own response to emergencies
- develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary NW70.00.14
- Asset Risk Management NW70.60.02.

2 Relevant Policies and Planning Standards

This project includes a large variety of work and the detailed design and construction will be in line with our design standards, technical specifications and policies as summarised in NW70.50.03 – *Document Control*. In particular, this project will be implemented in compliance with the following sections:

- 9.2 Infrastructure
 - 9.2.1 Management
 - 9.2.3 Design Standards
 - 9.2.4 Technical Specifications
- 9.5 Contracts
 - 9.5.1 Management
- 9.7 Procurement & Stock Management
 - 9.7.2 Equipment Specifications.

There are some works associated with these projects that require bespoke design to reflect the particular needs and/or environment of each project. For example, the zone substation site civil works and some specific 66kV line works will require unique specification solutions while still complying with the necessary high level requirements such as the building code or wind and snow loading criteria, etc.

The following sections provide a summary of the most relevant high level reports, policies, standards and specifications.

2.1 Security of Supply Standard

Our SoSS is published in Section 5.3.1 of our 2012 Asset Management Plan. The initiatives within this project are consistent with meeting our security of supply criteria⁶ (Class D1) for rural loads exceeding 15MW. Class D1 loads shall be supplied by an uninterrupted N-1 subtransmission network.

The peak demand in the wider Rolleston area due to both residential and commercial growth is expected to exceed 40MW over the next ten years (see 3.1 Forecast Load, below). The bulk of this load will be fed by Rolleston, Larcomb or Weedons zone substation. The peak load at Larcomb zone substation is forecast to exceed 15MW in 2015. Larcomb shall be supplied by an N-1 subtransmission network.

This standard was originally introduced shortly after the 1998 Auckland CBD blackout and modified slightly following an urban architecture review in 2006. The structure of our SoSS is based on the UK P2/6 standard and the 2006 update process included a national and international benchmarking component. Our 2006 review process and

⁶ As published in Section 5.3.1 of our Asset Management Plan

recommendations were reviewed by SKM before consulting with Retailers, Canterbury Manufacturers Association, Major Electricity Users Group and Grey Power.

The Orion SoSS has a deterministic structure but the thresholds are based on probabilistic analysis utilising average probabilities of asset failure and the average 'Value of Lost Load' (VoLL) to customers. As a precursor to determining the structure and thresholds in our SoSS it was necessary to consider many factors including:

- the different network architecture options (ring versus radial)
- the construction options (overhead versus underground)
- the different customer/load segment expectations (VoLL and Demand Side Management (DSM)).

The key point is that how you achieve the desired level of security of supply is just as important as achieving it. The development of a SoSS is an iterative process. Changes in technology, customer expectations or the cost of assets can affect the optimum architecture of the network which in turn can affect the structure and thresholds in the SoSS. The architecture of our network is discussed in more detail below.

2.2 Architecture Review

To make sure that our network architecture and resulting SoSS is keeping pace with changes to our modelling inputs (VoLL, asset failure rates, new technologies, DSM, etc.), we have recently completed a review of our urban subtransmission and 11kV architecture⁷. This has also provided an opportunity to take account of the resiliency learnings during the Christchurch earthquakes. The review has largely supported our current SoSS and we do not expect any changes to the existing categories or thresholds although additional criteria to capture our planned resilience to GXP or zone sub 'site' contingencies will be required.

The review also concluded that a 66kV ring bus design over a more conventional single bus design provided a better balance of costs and benefits.

During 2013, we intend to review the architecture of our low voltage urban network and also the rural subtransmission, 11kV and low voltage network. Our rural network is quite different from our urban network. For example, overhead is accepted by Selwyn District Council and peak demand is dominated in many parts by summer irrigation load. Historically, rural network security of supply has relied on demand side management (interrupting supply to irrigation pumps) during contingencies to maintain supply to other rural sector loads, including dairy milking connections. The shift away from deep well pumps to surface water irrigation may reduce the amount of demand side response available in an area that is seeing other loads growing. Whilst we are not expecting significant change, the rural architecture review will consider many other factors and until that work is complete, the current SoSS is considered appropriate.

⁷ See our Network Architecture Review: Subtransmission (NW70.60.05) and Urban 11kV Network Architecture Review (NW70.60.06).

We are expecting the rural 66kV architecture review to also conclude that a ring bus design is appropriate and, therefore, all (including this project) rural forecast budgets and designs assume this approach.

Within the context outlined above, this project is a hybrid of urban and rural architectures. The Rolleston 11kV distribution network and large parts of the 66KV subtransmission network are clearly in an urban environment and service urban type customers. However, the subtransmission network is part of an interconnected rural network.

2.3 Prioritisation of Works

At a high level, this project mainly requires the use of 66kV overhead line and zone substation contractors. This kind of resource is also required on a number of other projects to be completed in the ten year timeframe. More detail about how we prioritise projects is described in section 5.3.4 of our Asset Management Plan and expanded in more detail in NW70.60.14 – *Project Prioritisation and Deliverability Process*.

Orion has a successful history in managing a succession of multi-million dollar civil and electrical works, which demonstrates a proven institutional ability to predict and manage contractor workstreams.

A dominant factor in prioritising this project is the anticipated 9.4MVA N-1 Westland Milk connection in spring 2014, which will set the timing for the early stages of this project. There is a series of AMP projects with mainly 66kV overhead line and zone substation construction and the timing of these and other Orion projects needs to be managed so that there are no peaks or troughs in overall works. The Westland Milk connection contract will take priority over other more flexible work.

2.4 Tenure of Substation Sites, Line Corridors and Cable Routes

We secure the tenure of our zone substation sites by 'Title'. Where possible we install our underground and overhead reticulation in the berm of a public road (either formed or a paper road).

For overhead lines, where possible we are transitioning the location of our poles to the road boundary/fence line. This reduces the number of car versus pole incidents leading to better safety and reliability outcomes. A pole placed on the road/lot boundary leads to an overhang of the crossarm and line (including wind blowout) onto private property. Implementation of this arrangement only occurs where a boundary easement for the line route can be secured from the land owner. In recent times we have been very successful in achieving this outcome on the rural network.

From time to time we also need to cross a Kiwi Rail strip of land for railway lines. Kiwi Rail has a standard process for this and we apply for a Deed of Grant for both underground cable and overhead line crossings. This project requires new or modified crossings of Kiwi Rail land in three places.

Although no easement is required for a cable or line that is installed in a public road, we notify and/or seek approval of our design/offset from other utilities and local authorities including Christchurch City Council (CCC), SDC, Environment Canterbury (ECAN), Telecom/Chorus, etc. and also New Zealand Transport Agency (NZTA).

The timing of land purchases for zone substation sites is made by judgement taking account of:

- current or future zoning of the land
- land availability – multiple options or not
- what plant screening might be required in advance of construction
- strategic nature of project and whether other comparable alternatives exist
- confidence that the project will be implemented
- a preference to work with land owners rather than use our ‘requiring authority’ status.

This project requires the acquisition of land for two new zone substation sites – Burnham and Rossendale. We have started discussions with a land owner in Burnham and propose to purchase the Burnham site one year before it is required for development in 2015. Rossendale is potentially a large site of crucial strategic importance and (pending the outcome of the Transpower paper outlining the options for a new rural 220kV GXP) we therefore propose to secure this site in 2014, well in advance of construction.

This project does not propose any 66kV overhead lines routes across private land. The procurement of easements for the placement of poles on the boundary line will be done during the detailed design phase when assessing which side of the road and what use of existing poles (when converting from 33kV to 66kV) etc. can be achieved.

3 Network Constraints and Service Targets

3.1 Forecast Load

Our load forecasting methodology is described in NW70.60.12 *Long Term Load Forecasting Methodology for Subtransmission and Zone Substations*.

The following load forecasts have been used to identify network constraints and assist with the development of solutions to meet short and long term customer requirements.

Location (capacity)	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Springston loop¹ (55/110MVA)²	59.8	66.7	77.4	78.3	80	83.5	84.5	85.5	86.5	87.5
Larcomb (15/23MVA)³	5.9	10.4	19.7	19.9	21	24.1	24.3	24.5	24.7	24.9
Rolleston (10/20MVA)	11.4	11.8	12.1	12.3	12.6	13	13.3	13.7	14.1	14.5
Weedons (15/23MVA)	5.8	10.1	10.1	10.2	10.3	10.3	10.4	10.4	10.5	10.5

(1) includes Springston GXP and Weedons which will combine in 2014

(2) it is proposed to increase this to approximately 110/165MVA in 2014

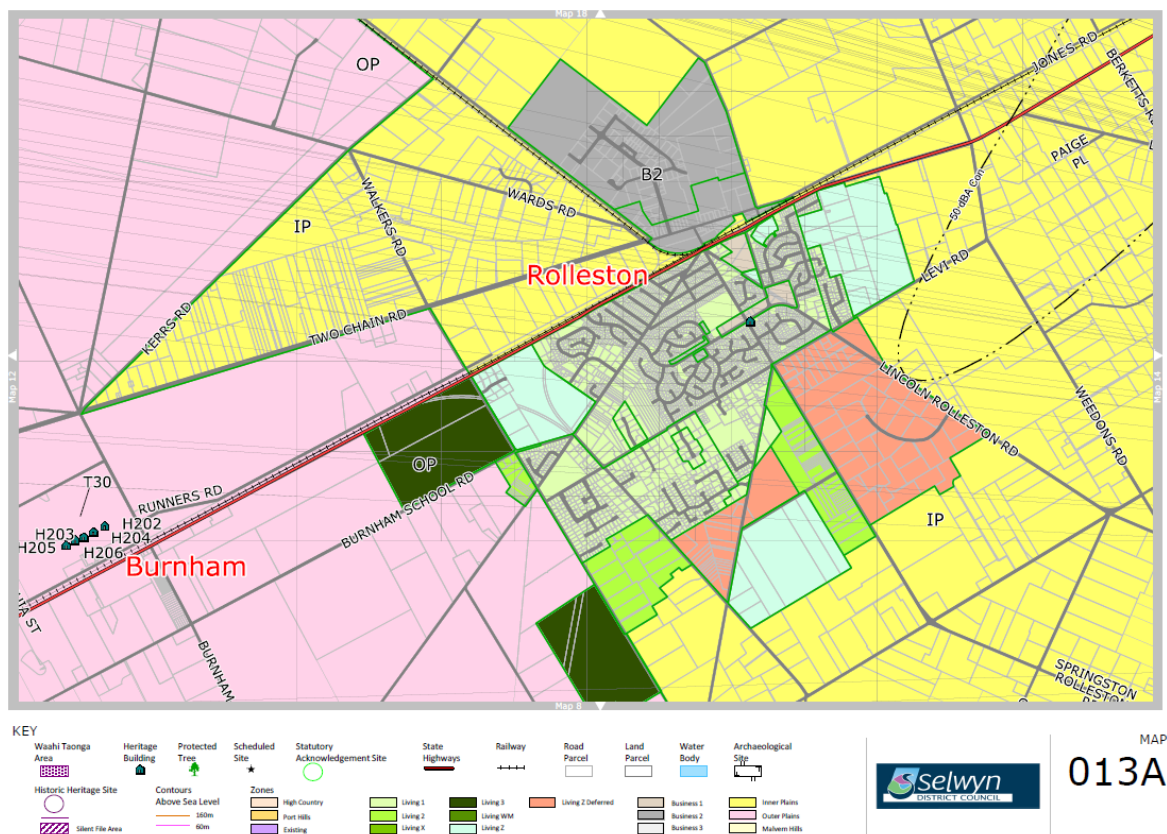
(3) it is proposed to upgrade Larcomb to 23/46MVA in 2014

The capacities indicated include an N-1 limit (or security of supply standard limit) and an N security limit.

Recent history for these load groups is given in the following table.

Location (capacity)	2006	2007	2008	2009	2010	2011
Springston loop	43	43	47.2	44.2	57.4	56.7
Larcomb	-	-	-	3	3.6	4.8
Rolleston	9.5	10.8	11	9.9	9.9	11.3
Weedons	4.6	4.6	5.6	6.2	5	5.6

The Selwyn District Council zoning plan for Rolleston is shown below.



3.2 Constraints and Timing

There are four main network/service constraints associated with this project:

- The N-1 capacity of Islington to Springston 66kV lines
- The limited 10MVA N-1 transformer capacity of Rolleston zone substation
- Reliability improvement required in Rolleston
- Provision of a 9.4MVA connection for Westland Milk.

More detail is provided about these constraints in the sections that follow.

3.3 Islington to Springston 66kV Line Constraint

There are two Islington to Springston 66kV lines on a single tower corridor. Each line is rated at 55.13MVA and 60.74MVA, summer and winter respectively – see Appendix C for Transpower line rating report. The peak load on Springston GXP in the last 12 months was approximately 53MVA and 45MVA, summer and winter respectively. It can be seen from the timing of these peak demands that despite the township loads at Rolleston and Lincoln, the summer irrigation component still dominates. This is expected to change over time as the townships grow and the irrigation growth slows down. Of course, township growth adds to the summer demand as well, and therefore it will be some time before the transition occurs.

During the FYE March 2012, Weedons substation was converted from 33kV to 66kV with a new 54MVA (20°C ambient) 66kV line from Islington 66kV GXP. This transferred approximately 6MVA of load from Springston GXP to Islington GXP. If this work had been delayed, the N-1 capability of the Islington to Springston 66kV lines would have been exceeded. At our request, Transpower has fitted a special protection thermal overload feeder tripping scheme at Springston to ensure that either line is not permanently damaged and/or causes a complete Springston GXP outage following single circuit line contingencies.

With continued growth at Springston GXP, including Rolleston and Larcomb substations, further load will need to be transferred onto the new Weedons line.

3.4 Rolleston Zone Substation Constraint

Rolleston zone substation shares two 20MVA 33kV lines with Highfield zone substation (6MVA peak demand on a single 7.5MVA transformer) and has two 10MVA 33/11kV transformers providing an N-1 capacity of 10MVA. Peak demand at Rolleston zone substation in the last 12 months was approximately 11MVA. There is good peak demand diversity between Rolleston and Highfield which peak in the winter and summer respectively but it is apparent that the zone substation transformers are well utilised and future load growth must be either transferred to neighbouring zone substations or an upgrade is required.

3.5 Rolleston Reliability Improvement

The table below summarises the results of a 2009 reliability review for Rolleston in comparison with other distribution networks and different locations within the Orion network. These results were before Rolleston zone substation was operating with N-1 on the 33kV subtransmission network. As mentioned above, future load growth on Rolleston zone substation will need to be transferred to neighbouring substations (Weedons and Larcomb) but these sites are not connected to an N-1 subtransmission network yet.

It can be seen that the 2007 Rolleston reliability falls short of typical reliability performance and this trend will continue if the Rolleston load growth is connected to Larcomb and Weedons without a subtransmission upgrade. The forecast Rolleston 2014 numbers clearly indicate that the introduction of an N-1 subtransmission network would provide a significant step toward achieving a more appropriate level of reliability of supply for a significant load centre.

Data was obtained from latest available public information disclosures in 2006.

Company - location	SAIDI (minutes)	SAIFI (number)
Orion – urban average	20	0.5
Orion - Hornby	55	0.75
Orion – Rolleston 2007 (5 yr avg ending 2007)	240	5
Orion – Rolleston in 2014 with N-1 66kV	120	2
Vector - Auckland	83	1.25
Tasman - Nelson	51	0.9
New Zealand average	190	2.35
Energex - Queensland	154	1.7
Energy Australia – Sydney CBD and north	112	1.3
United Kingdom average (> 3 minutes)	68	0.72

3.6 Provision of a 9.4MVA connection for Westland Milk

Westland Milk has established a warehouse and milk concentrating facility in the Izone Industrial Park at Rolleston. The site has sufficient space for three driers (4.7MVA each). Westland Milk delayed the installation of the first drier but is now intending to proceed with the installation of two driers for spring 2014.

3.7 Network Options

During 2006, it became apparent that customer interest in the Izone Industrial Park at Rolleston was growing. Irrigation growth was strong and the potential for a Springston GXP constraint was emerging. It was clear that the introduction of new 66kV capacity would be required soon.

Three high level options were explored for increasing 66kV capacity at Springston:

- Transfer load to Hororata GXP by increasing the number of Orion 66kV links between Springston and Hororata GXPs – this was eliminated because Hororata GXP was also becoming constrained and upgrading Hororata was going to be more challenging than Springston.
- Approach Transpower and request a new 220/66kV GXP – this was eliminated because the cost significantly exceeded the following alternative.
- Make use of spare 66kV capacity at Islington by building a new 66kV line into the Rolleston area.

Having decided on the high level solution, a more detailed study on how this could be implemented was undertaken. When considering the practical constraints of building a double circuit 66kV line in a public road (or demonstrating the need for compulsory acquisition of a line route on private land) and the limited 66kV capacity available at Islington (without serious upgrade costs) a single circuit 64MVA⁸ 66kV line to create a ring with the existing Islington to Springston circuits was clearly the best option.

This would introduce an 110MVA N-1 66kV ring to a wider network area. When load exceeds 110MVA in the area, the Islington 66kV GXP is likely to be constrained and the economics and increased network resiliency of a new 220/66kV GXP become attractive and viable.

The next phase of solution development required giving consideration to the location of the existing 33kV line routes, the likely location of any new zone substations (Larcomb), a preference (to reduce cost) for all rural subtransmission to remain overhead and management of the transition from 33k to 66kV. Three options were explored in 2006 and the economics analysis of each option is provided in Appendix A. Option two was chosen with a slight variation involving the Brookside 33kV line to further reduce cost.

That plan has been progressed over the last six years and this CPP project is the completion of that proposal.

This project also extends that work to resolve the constraint at Rolleston zone substation and make an N-1 solution available for Westland Milk and the wider Rolleston area. This is achieved by completing the 66kV ring from Weedons – Larcomb – Springston in 2013 (not operational until 2014) and converting Larcomb to 66kV with two 23MVA transformers in 2014.

Building a new 66kV line and new zone substation in Railway Road for Westland Milk was also considered but the Rossendale site was considered better in the long term and a staged 11kV solution provided an economic short term alternative.

The quantity of existing load and forecast load growth that can be transferred to Larcomb and Weedons from Rolleston is limited without extensive 11kV reinforcement. A more efficient approach in the medium term is to stage an upgrade of the Rolleston site. The diversity of load between Highfield and Rolleston zone substations means that there is approximately 7MVA of spare capacity available on the 33kV subtransmission network. Rather than invest in larger 33kV transformers which will later become redundant when Rolleston is converted to 66kV it is proposed to develop Burnham substation (across the road) with a staged 66kV switchyard, operating at 33kV, with a surplus 7.5MVA 33/11kV transformer becoming available from Hororata.

⁸ The line would cross through CCC zone with a maximum conductor diameter of 20mm (unless consented). The final line design reduced this rating to 54MVA through the Fulton Hogan quarry.

3.8 Non Network Alternatives

Non-network solutions to capacity or security of supply constraints are considered in the following reports:

- NW70.60.10 Demand Side Management Stage 1 – Issues and Opportunities
- NW70.60.11 Demand Side Management Stage 2 – Potential Initiatives.

These typically defer rather than replace infrastructure investment. The timing of these projects is based on our load forecast process (and moderated by workflow considerations).

The value of Demand Side Management (DSM) in the deferral of major projects is quantified in Section 5.6.12 of the AMP. In general, DSM tends to be cost effective in areas where the stepped investment in the network is high and rate of growth is slow.

Whilst the network investments in this project are relatively large, the growth in peak demand is also relatively high and a demand side management solution would need to be of a substantial size to be of any real benefit.

Early upgrades are driven by the Westland Milk connection and continued growth in the Izone Industrial Park. An opportunity exists to install co-gen on the Westland driers but our attempts to encourage this at the Synlait and Fonterra connections have been unsuccessful due to a poor business case and we expect the same conclusion with Westland. Synlait also considered the option of super capacitors and storage flywheels coupled with diesel generation as alternative to an N-1 supply (N security only) but the network solution was more cost effective.

The potential DSM initiatives in the reports outlined above are not considered to be large enough or economically comparable with the traditional network solutions outlined in this project.

4 Project Description and Forecast Expenditure

4.1 Work to be Undertaken

This project spans over a number of years with nine AMP projects:

2013: 413 - Larcomb to Weedons 66kV line conversion

2014: 414 - Convert Larcomb sub from 33/11kV to 66/11kV

429 - Springston 66kV bay for Larcomb substation

500 - Land acquisition for Burnham 66kV substation

528 - Land acquisition for Rossendale substation

637 - Railway Rd substation (Westland Milk)

2015: 639 - Burnham substation stage 1

2018: 114 - Convert Highfield zone substation to 66/11kV

415 - Weedons to Highfield tee 66kV line conversion

Each AMP project is summarised in the sections below.

2013 and 2104 projects are committed; all others are planned. AMP project schedules are reviewed annually.

Cost estimates are in mid-FY13 terms and were constructed in line with Project Budget Forecasting Process Policy (NW70.60.13).

4.1.1 AMP Project 413 - Larcomb to Weedons 66kV Line Conversion (2013)

This AMP project is the last section of overhead line in the proposed 66kV ring (Islington–Weedons–Larcomb–Springston–Islington) to be converted to 66kV. Some use of the existing 33kV poles will occur with the crossarms removed and replaced with triangular configuration 66kV extensions. The conductor will be upgraded from Dog to Jaguar to ensure that Islington to Springston line contingencies do not overload this section of line. The line will not operate at 66kV until the following year (2014) when Larcomb substation is converted to 66kV. This project is committed. The following table summarises the main construction components at forecast costs.

Item ID	Quantity (#, m)	Description	Forecast Budget (\$000)
273	1	Design	77
110	1	66kV bus alterations (Weedons)	50
261	3200	66kV Jaguar over 11kV Dog Line Installation	190
260	3200	66kV Jaguar over 11kV Dog Line Materials	190
Total			507

4.1.2 AMP Project 414 – Convert Larcomb Substation from 33/11kV to 66/11kV (2014)

Larcomb zone substation was initially installed as a single transformer 33/11kV substation in 2009. Peak demand at the site is around 5MVA. Forecast load growth from Izone industrial customers including Westland Milk and their request for an N-1 supply leads to the requirement for an upgrade. Upon completion of the 66kV ring supply in 2013, this AMP project converts Larcomb to 66kV with two 23MVA transformers. The Larcomb switchyard was originally constructed using 66kV clearances and switchgear but the addition of a new 66kV bay is required for the connection of the additional transformer. The conversion to 66kV requires the installation of an 11kV ripple plant (33kV sites have wider area 33kV ripple plants). A new 11kV incomer for the transformer and four new 11kV feeder circuit breakers are required for the anticipated new 11kV load and ripple plant.

This project is committed.

The following table summarises the main construction components at forecast costs.

Item ID	Quantity (#, m)	Description	Forecast Budget (\$000)
59	1	Design - zone sub	418
110	30	Reconfigure 66kV line at Springston	30
195	1	Install and commission ripple plant	22
38	1	Purchase 317Hz ripple plant	130
224	1	construct 66kV bay, install breaker and relays	157
223	1	66kV breaker, relay and brick	210
197	1	KKT purchase RMU	23
185	1	install and terminate RMU	15
61	5	CB install and commission	65
6	1	CB 1200A and relay (incomer)	58
5	4	CB 630A and relay (ripple breaker and 3 feeders)	152
297	2	Install 66/11 11.5/23 MVA transformer	814
294	2	66/11 11.5/23 MVA transformer	1,136
Total			3,230

4.1.3 AMP Project 429 – Springston 66kV Bay for Larcomb Substation (2014)

Assuming the Springston spur asset purchase occurs in August 2013, we propose to install a new 66kV bay at Springston for the connection of our Larcomb 66kV line. The line was previously converted to 66kV when the conductor was upgraded to Jaguar recently. If the Springston assets are not purchased we will request Transpower (through a Customer Investment Contract) to provide the bay instead.

This project is committed.

The following table summarises the main construction components at forecast costs.

Item ID	Quantity (#, m)	Description	Forecast Budget (\$000)
224	1	Construct 66kV bay, install breaker and relays	157
223	1	66kV breaker, relay and brick	210
Total			367

4.1.4 AMP Project 500 – Land Acquisition for Burnham 66kV Substation (2014)

The timing of this project is of a 'planned' status and would become 'committed' once successful negotiations have taken place with the current land owner/s. It is important that a Burnham substation site is secured in the short term so that our long term exit from 33kV at Rolleston can be achieved.

Item ID	Quantity (#, m)	Description	Forecast Budget (\$000)
248	1	Substation land acquisition	250

4.1.5 AMP Project 528 – Land Acquisition for Rossendale Substation (2014)

We propose to coordinate with Transpower to purchase land adjacent to a new 220/66kV GXP in northwest Rolleston near the existing Islington – Livingston 220kV line. This will enable an Orion zone substation to be established at the site. The strategic nature of this site requires early purchase.

The timing of this project is of a 'planned' status and is dependent on the outcome of Transpower's studies to confirm the suitability/appropriateness of a new 220kV core grid connection in northwest Rolleston. The project would become 'committed' once successful negotiations have taken place with the current land owner/s.

Item ID	Quantity (#, m)	Description	Forecast Budget (\$000)
248	1	Substation land acquisition	250

4.1.6 AMP Project 637 – Railway Rd Substation (Westland Milk) (2014)

This project is to establish an 11kV 9.4MVA N-1 connection in Railway Road for the proposed Westland Milk processing plant. Whilst trenches are open for 11kV cables it is proposed to also upgrade the existing 11kV network in the area. The Railway Rd substation will be configured so that the Westland Milk load will be normally supplied from the upgraded Larcomb substation. An 11kV changeover scheme is proposed so that during an 11kV cable contingency, load can be quickly transferred to Rolleston substation. Significant 11kV cable capacity is required between Larcomb zone substation, Westland Milk and Rolleston zone substation.

The timing of this project is of a 'planned' status and would become 'committed' once a connection contract is secured with Westland Milk.

The following table summarises the main construction components at forecast costs.

Item ID	Quantity (#, m)	Description	Forecast Budget (\$000)
15	1	300 mm Al XLPE 3c cable	1,432
19	3	11kV CB 630A relay	114
26	515	185 mm ² Al XLPE 3c cable	33
29	3	Terminate cable to CB or MSU	6
45	6140	Trench (rural berm)	927
47	100	Trench (urban)	16
59	1	Design	309
61	3	11kV CB install and commission	39
112	7	11kV cable throughjoint	18
135	2	Install new MSU and terminate	28
185	2	install and terminate RMU	30
202	2	RMU purchase	83
230	1	Road and rail crossing	17
237	2	Kiosk Meter	12
239	1	11 kV Building (customer premises)	80
Total			3,144

4.1.7 AMP Project 639 – Burnham Substation Stage 1 (2015)

This project involves setting up a new 66kV zone substation in Burnham. It will be constructed with 66KV clearances and switchgear and will include three 66kV bays as part of a future ring bus. The Highfield line will be turned into the site and the substation will connect to the two Rolleston 33kV lines. An existing⁹ 7.5MVA 33/11KV transformer will be installed on a pad suitable for a future 23MVA 66/11kV transformer.

⁹ A 7.5MVA transformer will become available following the conversion of Hororata zone substation from 33kV to 66kV

An 11kV switchgear and protection building will be constructed to house four 11kV circuit breakers (incomer and three feeders), 66kV and 11kV protection and communications. Lower priority feeders connected to Rolleston substation will be transferred to the N security (for transformer faults) Burnham substation. Higher priority loads will remain on the 10MVA N-1 Rolleston substation.

The timing of this project is of a 'planned' status and would become 'committed' when growth in Rolleston zone substation peak demand can no longer be economically transferred to Larcomb/Weedons via 11kV reinforcement.

Item ID	Quantity (#, m)	Description	Forecast Budget (\$000)
15	1730	300 mm Al XLPE 3c feeder cables	137
45	1730	install 11kV feeder cables	173
59	1	\$1 000 amounts (should be 10% of job build)	330
155	1	Install and commission GFN unit	162
154	1	Purchase GFN unit	133
259	324	11kV Dog Line rearrangements	14
224	3	construct 66kV bay, install breaker and relays	471
223	3	66kV breaker, relay and brick	630
33	1	Establish substation site and 11kV building, fencing	830
135	1	Install new MSU and terminate (excl hardware)	14
61	5	CB install and commission	65
20	3	CB 630A and relay	114
6	2	CB 1200A and relay	116
182	1	local service transformer installation	5
158	1	New pad and install 7.5/10MVA transformer	357
Total			3,552

4.1.8 AMP Project 415 – Weedons to Highfield Tee 66kV Line Conversion (2017)

This AMP project allows for the conversion of the existing 33kV line (Dog conductor) to a 66kV (Jaguar conductor) line and the installation of two 66kV bays at Weedons to complete the ring bus and provide a bay to connect this line. This AMP project is directly linked to the Highfield conversion project below. Single line diagrams showing the current

and proposed 66kV and 33kV subtransmission networks have been included in Appendix E and F.

We do not currently have a standard cost for the conversion of an existing Dog 33/11kV line to a Jaguar 66kV and Dog 11kV line. The cost to do this can vary and our approach is to apply a 'reduction factor' (in this case 70%) to the build cost of a new 66kV over 11kV line.

The detailed design for this work will not be done until immediately prior to the construction works so this is an estimate only. The solution will involve a mixture of pole replacements and pole extensions to existing concrete poles. Most of our 33kV lines are built with a crossarm with conductors in flat formation. Our 66kV design creates separation by a 'tri' configuration with standoff insulators as opposed to a wider crossarm. The extensions also ensure that we can operate to 70 degrees conductor temperature without violating clearance with the 11kV underneath.

The timing of this project is of a 'planned' status and would become 'committed' when either of the following drivers become binding:

- the requirement to install Norwood substation
- a 66kV interconnection to Dunsandel or Greendale is required (Coleridge generation canal or increased load on southern 66kV link between Springston and Hororata may drive this)
- Rolleston zone substation peak demand is strong and Burnham needs to be converted to 66kV.

We predict that the most likely driver to bind first is the requirement for a new zone substation in Norwood in 2019. The Norwood site is in between two growth customers (Meadow Mushrooms and Malvern Abbotoirs have both indicated intentions to upgrade) and is also ideally located to provide relief for Brookside and Rolleston zone substations. A 66kV subtransmission connection will be required. Hororata GXP has limited capacity available (it already falls short of N-1 during low Coleridge generation and it is not desirable to add further load) so a 66kV subtransmission connection is sought from Islington GXP (Springston GXP to be transferred as a zone sub to Orion in 2014). There are two main ways of doing this:

- Convert one of the Springston to Rolleston 33kV lines to 66kV and extend to Norwood. Whilst this is simple and cost comparative to the preferred option it has the disadvantage that the Rolleston 33kV zone sub loses its N-1 capability and it shifts new load onto the ISL-SPN lines rather than the Islington to Weedons line (becomes important for ISL-SPN line contingencies).
- Convert the Weedons to Rolleston 33kV line to 66kV as per the CPP project plan. This overcomes the disadvantages above and also frees up the Highfield transformer for installation at Creyke and thereby prevents the need to buy a new 33/11kV transformer that would not be required in the medium/longer term as we exit 33kV. Furthermore, the conversion of Highfield to 66kV frees up 33kV capacity to be used at Burnham before it is converted to 66kV later. The 33kV lines are thermally limited to 20MVA, so to achieve N-1 on the two Rolleston lines requires the sum of Rolleston, Burnham and Highfield to be less than 20MVA.

Clearly, converting Highfield to 66kV frees up 33kV capacity to be used at Rolleston and Burnham.

Item ID	Quantity (#, m)	Description	Forecast Budget (\$000)
223	2	66kV breaker, relay and brick	420
261	6000	66kV Jaguar over 11kV Dog Line installation	357
224	2	construct 66kV bay, install breaker and relays	314
273	1	Design	100
260	6000	66kV Jaguar over 11kV Dog Line materials	357
Total			1,548

4.1.9 AMP Project 114 – Convert Highfield Zone Substation to 66/11kV (2018)

Highfield zone substation is a relatively new substation built with a 66kV circuit breaker but operating at 33kV with a 7.MVA 33/11kV transformer. This project allows for the installation of a 10MVA 66/11kV transformer from Dunsandel zone substation (which is to be upgraded to 23MVA). An 11kV ripple plant and associated switchgear is also required.

The timing of this project is of a 'planned' status and would become 'committed' when either of the following drivers become binding:

- the requirement to install Norwood substation
- a 66kV interconnection to Dunsandel or Greendale is required (Coleridge generation canal or increased load on southern 66kV link between Springston and Hororata may drive this)
- Rolleston zone substation peak demand is strong and Burnham needs to be converted to 66kV.

Item ID	Quantity (#, m)	Description	Forecast Budget (\$000)
195	1	Install and commission ripple plant	22
38	1	Purchase 317Hz ripple plant	130
252	1	66kV switchgear alterations	150
235	1	Relocate transformer on existing pad	357
282	1	11kV 630A CB purchase	30
61	1	11kV CB installation	13
Total			702

4.2 Timing

As discussed previously the timing of this series of projects is dominated by the anticipated 9.4MVA N-1 Westland Milk connection in spring 2014. There is a series of AMP projects with mainly 66kV overhead line and zone substation construction and the timing of these and other Orion projects needs to be managed so that there are no peaks or troughs in overall works. The Westland Milk connection contract will take priority over other more flexible work.

At a high level this project mainly requires the use of 66kV overhead line and zone substation contractors. This kind of resource is also required on a number of other projects to be completed in the ten year timeframe. More detail about how we prioritise projects is described in section 5.3.4 of our Asset Management Plan and expanded in more detail in *Project Prioritisation and Deliverability Process* (NW70.60.14).

5 Dependencies

The AMP project to install a new 66kV bay at Springston in 2014 is dependent on Springston GXP ownership being transferred to Orion in 2014. In the unlikely event that this does not happen, Orion will contract with Transpower to provide the 66kV bay for Orion to connect to.

There are other projects that are dependent on this CPP project being completed. For example, the installation of Norwood substation in 2019 cannot occur in its current form if this project is not completed.

Completion of this project will provide an 110MVA N-1 66kV ring (Islington – Weedons – Larcomb – Springston – Islington) to the rural network. Peak load is currently in the order of 60MVA and we anticipate that this ring will provide for at least 10 years of growth in the area. We have requested a Transpower report on the options for a new rural 220kV GXP at Springston and/or Rossendale. This report will give us confidence that this project will be compatible with a new GXP in the future. The location of the Rossendale land purchase will be heavily influenced by a location that is suitable for a future Transpower GXP.

6 Earthquake Consequences

The wider Rolleston area has not been materially affected by the Canterbury/Christchurch earthquakes. The good location and geotechnical characteristics of the Rolleston area is expected to accelerate growth in the area as people and businesses relocate from red zone areas in Christchurch city. It is difficult to quantify this accelerated growth at this stage but it is prudent to assume that Rolleston growth has not stalled following the earthquakes. As described in our load forecasting methodology¹⁰ we will be using revised Urban Development Strategy numbers for household growth.

¹⁰ NW70.60.12 – Long Term Load Forecasting Methodology for Subtransmission and Zone Substations.

7 Expenditure Plan

7.1 Expenditure Summary

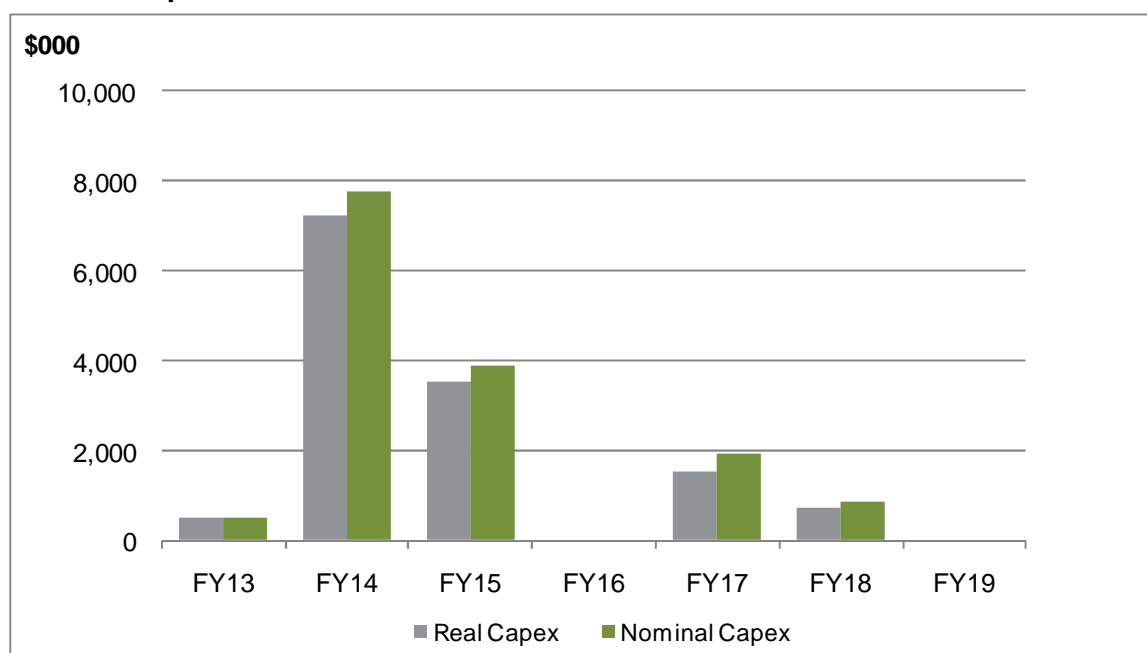
The following table summarises the sub project totals and overall project forecast budget. It can be seen that the large majority of work is zone substation installation or conversion to 66kV.

FY	AMP ID	Description	Forecast Budget (\$'000)
2013	413	Larcomb to Weedons 66kV line conversion	508
2014	414	Convert Larcomb sub from 33/11kV to 66/11kV	3,230
2014	429	Springston 66kV bay for Larcomb substation	367
2014	500	Land acquisition for Burnham 66kV substation	250
2014	528	Land acquisition for Rossendale substation	250
2014	637	Railway Rd substation (Westland Milk)	3,143
2015	639	Burnham substation stage 1	3,552
2017	415	Weedons to Highfield tee 66kV line conversion	1,548
2018	114	Convert Highfield zone substation to 66/11kV	710
Total			13,558

The following chart shows our Rolleston forecast capital expenditure in both real and nominal terms (\$'000). The real terms have been escalated as per methodology outlined in the CPP proposal to ascertain the nominal terms.

These expenditure forecasts do not include any contingencies.

Forecast expenditure



The following tables summarise our total Rolleston forecast capital expenditure in both real and nominal terms (\$000).

Forecast expenditure (Real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Sub-transmission network	458	3,266	1,844	-	864	365	-
Distribution lines and cables	-	2,450	324	-	-	-	-
Distribution substations including transformers	-	91	19	-	-	-	-
Switchgear (All voltages)	50	1,270	1,337	-	685	193	-
Low voltage distribution network	-	-	-	-	-	-	-
Supporting or secondary systems	-	164	28	-	-	152	-
Non system fixed assets	-	-	-	-	-	-	-
Total	508	7,241	3,552	-	1,549	710	-

Forecast expenditure (Nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Sub-transmission network	458	3,436	2,017	-	1,190	498	-
Distribution lines and cables	-	2,739	388	-	-	-	-
Distribution substations including transformers	-	98	22	-	-	-	-
Switchgear (All voltages)	50	1,339	1,414	-	758	177	-
Low voltage distribution network	-	-	-	-	-	-	-
Supporting or secondary systems	-	170	31	-	-	183	-
Non system fixed assets	-	-	-	-	-	-	-
Total	508	7,782	3,872	-	1,947	858	-

7.2 Basis for Expenditure Forecast

The expenditure forecasts in this project are based on the need to deliver the works described in the previous sections of this report. The methodology for developing expenditure forecasts to undertake these works is described in *Project Budget Forecasting Process* (NW70.60.13).

These projects involve infrastructure which Orion installs regularly and for which there is recent history. Upward movements in the cost of civil works and skilled labour which have followed the earthquakes have been factored in.

Cost benefit analysis is undertaken in the Architecture Review.

Appendix A: Economic Analysis of Subtransmission Options

The following economic analysis was undertaken in 2006 prior to committing to a wider Rolleston solution. A slight variant on option 2 was chosen and this CPP project is a completion of those works.

Inputs		
Discount rate		0.08
33kV cable		250
convert 33kV to 66kV and reconductor in Jaguar		120
new 66kV Jaguar line		150
66/11kV Rolleston East substation 23MVA single (2 bays)		2700000
33/11kV Rolleston East substation 23MVA single (3 bays)		3050000
Convert Weedons from 33kV to 66kV (2 bays)		1500000
Convert Rolleston East from 33kV to 66kV		1100000
Credit for 23MVA 33/11kV xformer at Rolleston East		-800000
Install 30MVA 66/33kV transformer at Rolleston East		1300000
Credit for 30MVA 66/33kV transformer at Rolleston East		-1000000
66kV bay		350000
30MVA suggested size to be useful for future use at Motukarara		

Year		Quantity / Length (m)	Cost	NPV
Option 1: Rolleston East 66kV and underground 33kV to Weedons				
2008	33kV cable from Springston to Selwyn Road	4000	\$1,000,000	\$1,000,000
2008	33kV cable - Weedons Ross Road to past Rolleston East	4500	\$1,125,000	\$1,125,000
2008	Springston 66kV bay	1	\$350,000	\$350,000
2009	convert 33kV line to 66kV in Weedons Ross Road	7500	\$900,000	\$833,333
2009	Install 66/11kV Rolleston East substation (2 bays)	1	\$2,700,000	\$2,500,000
2012	Islington 66kV bay	1	\$350,000	\$257,260
2012	66kV line from Islington to Weedons	12000	\$1,800,000	\$1,323,054
2012	Convert Weedons from 33/11kV to 66/11kV (2 bays)	1	\$1,500,000	\$1,102,545
2012	Extra Weedons 66kV bay	1	\$350,000	\$257,260
2012	Extra Rolleston East 66kV bay	1	\$350,000	\$257,260
2012	Convert remainder of 33kV line to 66kV in Weedons Ross Road	3000	\$360,000	\$264,611
2012	33kV cable from in Selwyn Road to east Maddisons Road	1500	\$375,000	\$275,636
Total			\$11,160,000	\$9,545,960
Advantages				
* Does not rely on SPN 33kV bus for security of supply				
* implements 66kV line in Weedons Ross early which may minimise longer term public opposition				
Disadvantages				
* 33kV cable laid in Weedons Ross Road has no future use				
* more expensive				

Year		Quantity / Length (m)	Cost	NPV
Option 2: Rolleston East 33kV initially				
2008	33kV cable from Springston to East Maddisons Rd	5500	\$1,375,000	\$1,375,000
2009	Install Rolleston East substation at 33kV (3 bays)	1	\$3,050,000	\$2,824,074
2011	66kV line from Islington to Weedons	12000	\$1,800,000	\$1,428,898
2011	Islington 66kV bay	1	\$350,000	\$277,841
2011	Convert Weedons from 33/11kV to 66/11kV (2 bays)	1	\$1,500,000	\$1,190,748
2012	Springston 66kV bay	1	\$350,000	\$257,260
2012	Extra Weedons 66kV bay	1	\$350,000	\$257,260
2012	Convert 33kV line to 66kV in Weedons Ross Road	10500	\$1,260,000	\$926,138
2012	Convert Rolleston East from 33/11kV to 66/11kV	1	\$1,100,000	\$808,533
2012	Credit for 23MVA 33/11kV xformer at Rolleston East	1	-\$800,000	-\$588,024
Total			\$10,335,000	\$8,757,729
Advantages				
* Introduces new Islington 66kV capacity early				
* 33kV cable laid in useful position for future				
* low cost				
Disadvantages				
* Pushes 33kV network to maximum limit				
* Dependent on security of supply of SPN 33kV bus				
* cost is dependent on future use of 23MVA 33/11kV transformer				

Year		Quantity / Length (m)	Cost	NPV
Option 3: Rolleston East 66kV with 66/33kV step down transformer				
2008	Springston 66kV bay	1	\$350,000	\$350,000
2009	convert 33kV line to 66kV in Weedons Ross Road	7500	\$900,000	\$833,333
2009	Install 66/11kV Rolleston East substation (2 bays)	1	\$2,700,000	\$2,500,000
2009	Extra Rolleston East 66kV bay	1	\$350,000	\$324,074
2009	Install 30MVA 66/33kV transformer at Rolleston East	1	\$1,300,000	\$1,203,704
2012	Islington 66kV bay	1	\$350,000	\$257,260
2012	66kV line from Islington to Weedons	12000	\$1,800,000	\$1,323,054
2012	Convert Weedons from 33/11kV to 66/11kV (2 bays)	1	\$1,500,000	\$1,102,545
2012	Extra Weedons 66kV bay	1	\$350,000	\$257,260
2012	Credit for 30MVA 66/33kV transformer at Rolleston East	1	-\$1,000,000	-\$735,030
2012	Convert remainder of 33kV line to 66kV in Weedons Ross Road	3000	\$360,000	\$264,611
2012	33kV cable from Springston to East Maddisons Rd	5500	\$1,375,000	\$1,010,666
Total			\$10,335,000	\$8,691,477
Advantages				
* Does not rely on SPN 33kV bus for security of supply				
* Implements 66kV line in Weedons Ross early which may minimise longer term public opposition				
* low cost				
Disadvantages				
* introduces a 66/33kV transformer for which we have no spares				
* cost is dependent on a use for the 66/33kV transformer in 2012 (too early for Motukarara)				

Appendix B: Economic Analysis of Timing of 66kV Ring

- Wider area customer cost benefit analysis indicates timing of ring should be 2019 (green highlight)
- Security standard breached in 2014 (red highlight)
- Westland Milk requesting N-1 in 2014

Project															
			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
	Larcomb to Weedons 66kV conversion		\$875	\$875	\$875	\$875	\$875	\$875	\$875	\$875	\$875	\$875	\$875		
	Convert Larcomb to 66kV		\$1,300	\$1,300	\$1,300	\$1,300	\$1,300	\$1,300	\$1,300	\$1,300	\$1,300	\$1,300	\$1,300		
	Springston 66kV bay		\$367	\$367	\$367	\$367	\$367	\$367	\$367	\$367	\$367	\$367	\$367		
	Total		\$2,542	\$2,542	\$2,542	\$2,542	\$2,542	\$2,542	\$2,542	\$2,542	\$2,542	\$2,542	\$2,542		
	Annual revenue requirement		\$279,620	\$279,620	\$279,620	\$279,620	\$279,620	\$279,620	\$279,620	\$279,620	\$279,620	\$279,620	\$279,620		
	VOLL sensitivity factor for Izone industrial park	1													
	VOLL sensitivity factor for SPN (mainly farm feeders on intertrip)	1													
	Annual revenue requirement on capex	11.00%													
	CPI for capex	0.00%													
	CPI for VOLL and VOI	0.00%													
	VOI (\$/kW)	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00		
	VOLL energy (\$/kWh)	\$16.00	\$16.00	\$16.00	\$16.00	\$16.00	\$16.00	\$16.00	\$16.00	\$16.00	\$16.00	\$16.00	\$16.00		
	Growth factor for Izone only	1.5													
	Growth rate per annum at Rolleston	600													
	Growth rate per annum at Larcomb	600													
	Growth rate per annum at Weedons	800													
	Growth rate on other SPN GXP load	1000													
	km of line from SPN to Larcomb	7													
	km of line from ISL to Weedons	11.5													
	Length of Springston lines (each)	12.5													
	Fault rate on 66kV line (or 33kV at 66kV) p.a per km	0.02													
	Average time to restore load for Larcomb (hrs)	2													
	Average time to restore load for Weedons (hrs)	2													
	Average time to restore load for Springston		0.5	0.5	0.5	2	2	2	2	2	2	2	2		
LF	FYE March	2009	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
0.65	Peak annual load at Rolleston (kW)	11800	11800	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	
0.65	Peak annual load at Larcomb (kW)	0	0	3600	5400	7200	9000	20200	22000	23800	25600	27400	29200	31000	
0.65	Peak annual load at Weedons (kW)	6000	6000	7200	8400	9600	10800	12000	13200	14400	15600	16800	18000	19200	
	Total	17800	17800	20800	23800	26800	29800	42200	45200	48200	51200	54200	57200	60200	
	VOLL improvement for Larcomb with ring completion			\$12,776	\$19,165	\$25,553	\$31,941	\$71,690	\$78,078	\$84,466	\$90,854	\$97,243	\$103,631	\$110,019	
	VOLL improvement for Weedons with ring completion			\$41,980	\$48,976	\$55,973	\$62,969	\$69,966	\$76,963	\$83,959	\$90,956	\$97,952	\$104,949	\$111,946	
	N-1 transformer capacity for Izone (kVA)			27,500	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	
	Springston peak load above line capability			8518	11618	14718	17818	20918	24018	27118	30218	33318	36418	39518	
	Percentage of time load above SPN N-1 capability*			3%	9%	16%	22%	31%	41%	53%	63%	76%	89%	96%	
	Load factor of load above SPN N-1 capability*			0.21	0.23	0.27	0.31	0.31	0.32	0.32	0.33	0.34	0.34	0.37	
	VOLL improvement for Springston with ring completion			\$227	\$913	\$2,346	\$11,871	\$19,882	\$30,761	\$44,893	\$62,415	\$83,428	\$108,532	\$136,721	
	Total VOLL improvement			\$54,983	\$69,054	\$83,872	\$106,781	\$161,537	\$185,801	\$213,318	\$244,226	\$278,623	\$317,112	\$358,685	
	Customer (Cost)/Benefit			-\$224,637	-\$210,566	-\$195,748	-\$172,839	-\$118,083	-\$93,819	-\$66,302	-\$35,394	-\$997	\$37,492	\$79,065	
	SPN peak load annual increment	3,100 kW													
	ISL-SPN N-1 line capacity (input)	55130 kVA													
	SPN 66kV N-1 load limit (estimated)	51100 kW													
*These are calculated from the load duration curve (data on SPN data sheet). To model increases in load, the load increase is subtracted from the line capacity. This gives the same result as adding an increment to each point of the load curve.															

Appendix C: Transpower Islington to Springston 66kV Line Capacity



TRANSPOWER

Transmission Line Branch Rating Report

As at : 15/11/2011 17:37

Branch		Branch Type		HV Voltage			
ISL-SPN-1		Single Bus Transmission Line		66 kV			
Branch Overall Limits							
		Winter		Shoulder		Summer	
Forward Rating		531 A	60.74 MVA	507 A	58.01 MVA	482 A	55.13 MVA
Reverse Rating		531 A	60.74 MVA	507 A	58.01 MVA	482 A	55.13 MVA
Summary of Component Limits							
Conductor Thermal Limit		Winter	531 A	Shoulder	507 A	Summer	482 A
Conductor Type		Wolf ACSR-GZ					
Equipment Limit		Limiting Component	SPN-DS-334	Limit	1600 A		
Protection Limit		Forward Limit	703 A(prim)	Reverse Limit	684 A(prim)		
		Forward Limit Site	Islington	Reverse Limit Site	Springston		
Conductor Thermal Rating							
Length (km)	Bundle Count	Conductor Type	Circuit Type	Sag Temp	Winter Rating	Shoulder Rating	Summer Rating
13 km	1	Wolf ACSR-GZ	Double Circuit	75 C	531 A	507 A	482 A
0 km	1	Wolf ACSR-GZ	Single Circuit	75 C	531 A	507 A	482 A
Cable Detail							
Length (km)	# per Phase	Dielectric	Area (mm2)	Winter Rating	Shoulder Rating	Summer Rating	
Equipment Rating							
Device Position		Ident	Device Type	Continuous	24 Hours Post Contingency Limit		Operating Voltage
ISL-CB-112		MMS:10255708	Current Transformer	2000 A	2000 A		66 kV
ISL-CB-112		MMS:828323	Circuit Breaker	2000 A	2000 A		66 kV
ISL-DS-116		MMS:828326	Disconnecter	2400 A	2400 A		66 kV
SPN-CB-332		MMS:10277579	Circuit Breaker	2000 A	2000 A		66 kV
SPN-CB-332		MMS:10277601	Current Transformer	2000 A	2000 A		66 kV
SPN-DS-334		MMS:10278330	Disconnecter	1600 A	1600 A		66 kV
SPN-DS-336		MMS:10278336	Disconnecter	1600 A	1600 A		66 kV

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Requestor: Haran Sivathasan
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Appendix D: Orion Standard Overhead Line Ratings

APPENDIX A LIST OF STANDARD CONDUCTORS

A1 GENERAL

All conductors intended for use in Orion's network are to have been manufactured in accordance with the requirements of Orion's Equipment Specification NW74.23.17 – Overhead Conductors.

Conductor ratings are based on the requirements in Section 11 of this specification.

A2 STANDARD CONDUCTORS FOR 66KV LINES [NEW AND EXISTING]

Conductor Details	Conductor Size (mm ²)	Overall Bare Diameter (mm)	Conductor Type Stranding and Wire Dia. (inch)	Conductor Type Stranding and Wire Dia. (mm)	Conductor Breaking Load (kN)	Current Rating (Amps)
ACSR						
Jaguar	200	19.30	18 / 0.152	18 / 3.86	46.6	559
Wolf	150	18.13	30 / 0.102	30 / 2.59	69.2	474
Dog	100	14.15	6 / 0.186	6 / 4.72	32.7	355

A3 STANDARD CONDUCTORS FOR 33KV LINES [EXISTING]

Conductor Details	Conductor Size (mm ²)	Overall Bare Diameter (mm)	Conductor Type Stranding and Wire Dia. (inch)	Conductor Type Stranding and Wire Dia. (mm)	Conductor Breaking Load (kN)	Current Rating (Amps)
COPPER (Hard Drawn)						
19/1.63 [19/16]	38.7	8.13	19 / 0.064	19 / 1.63	15.5	227
19/2.11 [19/14]	65.1	10.54	19 / 0.083	19 / 2.11	25.8	325
19/2.39		11.90	19 / 0.094	19 / 2.39	33.1	373
19/2.57	96.4	12.80	19 / 0.101	19 / 2.57	37.6	424
ACSR						
Dog	100	14.15	6/0.186	6/4.72	32.7	355

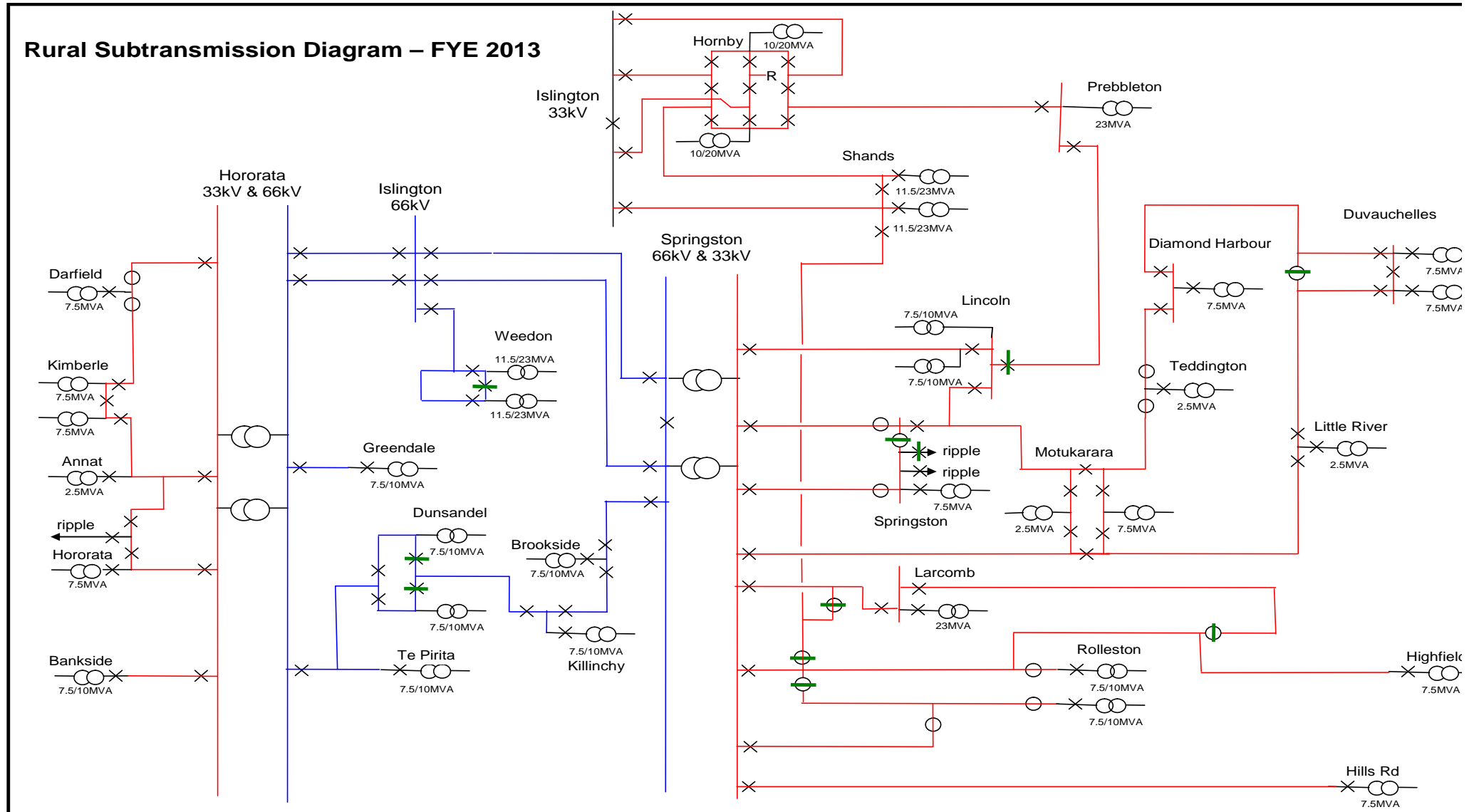
A4 STANDARD CONDUCTORS FOR 11KV LINES [NEW]

Conductor Details	Conductor Size (mm ²)	Overall Bare Diameter (mm)	Conductor Type Stranding and Wire Dia. (inch)	Conductor Type Stranding and Wire Dia. (mm)	Conductor Breaking Load (kN)	Current Rating (Amps)
ACSR						
Jaguar	200	19.30	18 / 0.152	18 / 3.86	46.6	559
Wolf	150	18.13	30 / 0.102	30 / 2.59	69.2	474
Dog	100	14.15	6 / 0.186	6 / 4.72	32.7	355
Flounder	20	6.70	0.264	6.70	16.4	121

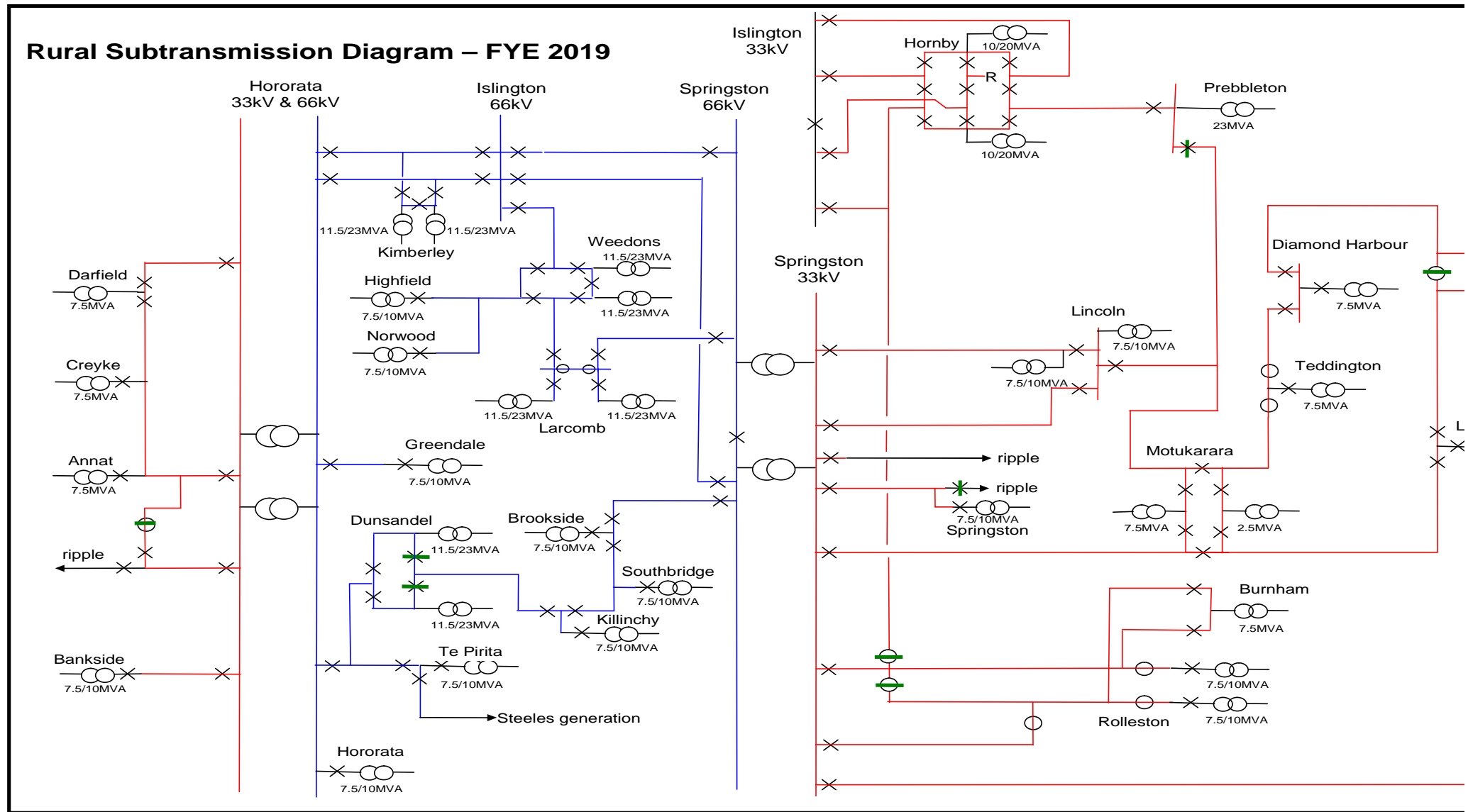
A5 STANDARD CONDUCTORS FOR 11KV LINES [EXISTING]

Conductor Details	Conductor Size (mm ²)	Overall Bare Diameter (mm)	Conductor Type Stranding and Wire Dia. (inch)	Conductor Type Stranding and Wire Dia. (mm)	Conductor Breaking Load (kN)	Current Rating (Amps)
COPPER (Hard Drawn)						
7/1.63 [7/16]	14.5	4.88	7 / 0.064	7 / 1.63	5.8	113
7/2.11 [7/14]	24.1	6.32	7 / 0.083	7 / 2.11	9.7	161
19/1.63 [19/16]	38.7	8.13	19 / 0.064	19 / 1.63	15.5	227
7/3.45 [Ex MED]	65.0	10.4	7 / 0.136	7 / 3.45	26.2	318
19/2.11 [19/14]	65.1	10.54	19 / 0.083	19 / 2.11	25.8	325
19/2.34	81.71	11.68	19 / 0.092	19 / 2.34	33.1	373
19/2.57	96.4	12.8	19 / 0.101	19 / 2.57	37.6	424

Appendix E: Rural Subtransmission Diagram FY13



Appendix F: Rural Subtransmission Diagram FY19



PILOTS AND PROTECTION REPLACEMENT

CPP33

Programme Summary

1 April 2013 – 31 March 2019

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1 Programme Introduction

Programme Name	<i>Pilots and Protection (CPP33)</i>
Service Category	<i>Provide and operate network infrastructure</i>
Capex Category	<i>Replacement</i>

1.1 Description

The work undertaken in this programme involves replacement of Orion's 'communication cables and terminations' and protection systems. The programme is expected to continue in perpetuity.

1.2 Assets Included

The assets that are in this programme are communication cables and protection systems. These include:

Communication cables

- Communication cables and terminations
- Distribution cabinets

Protection systems

- Protection relays
 - Electro-mechanical relays
 - Analogue electronic relays
 - Digital electronic relays
 - Merging units (Bricks)
- Communication platforms
 - Cable communications
 - Fibre optic cable communications
- Ground fault neutralisers
- Neutral earthing resistors
- Current transformer
 - 66kV
 - 33kV
 - 11kV incomer
 - 11kV bus coupler
 - 11kV feeder
- Voltage transformer
 - 66kV
 - 33kV
 - 11kV.

1.3 Aims and Objectives

The main objectives of the programme are to:

- Ensure the safety of the public our personnel and contractors around our assets.
- Replace on an periodic basis ‘communication cables and terminations’ and protection systems for which it has been determined that replacement is the cost effective way to ensure reliability of electricity supply and meeting service level targets (including safety). The project also includes Firmware upgrades and setting updates.

1.4 Drivers

The main drivers for undertaking the programme are:

- That assets are replaced in a timely and cost effective manner to ensure the condition and performance of our assets are such that they:
- Meet acceptable target levels of safety to people and property
- Provide acceptable levels of network reliability
- The prudent cost effective management of our assets and associated risks

2 Key assumption

The project relies on the following key assumptions

2.1 Unit costs

MEA Code	Asset Type	Cost FY13 \$000
MEA 340	66kV Unit Protection (with intertrip)	65
MEA 345	Transformer Diff Protection & Control	75
MEA 350	Transformer Diff Protection & Control (+intertrip)	125
MEA 355	11/33kV Feeder Protection (with OC & EF)	25
MEA 360	11/33kV Unit Protection	12
MEA 365	11/33kV Unit Protection (with OC)	17
MEA 370	11kV Protection (with OC & EF)I	10
MEA 375	Bus Bar Protection Relay	56
MEA1250	Directional Overcurrent Relay (with CB fail)	16
MEA1255	11kV Protection (with OC, EF, reclose & CB fail)	20

The costs for this capex programme were initially developed and used as part of our valuation of our electricity distribution assets as at 31 March 2007 which was prepared in accordance with New Zealand International Financial Reporting Standards (NZ IFRS), specifically International Accounting Standard NZ IAS 16 - *Property, Plant and Equipment*.

Section 4 of this valuation report indicates that:

The valuation established an Optimised Depreciated Replacement Cost (ODRC) based on the least-cost modern equivalent replacements for our assets, with each asset depreciated to reflect its remaining life.

This unit costs reflect fully installed costs (excluding GST) in Orion's network environment.

- *Based on a large scale of construction, to reflect the costs faced by the hypothetical new entrant that replaces or replicates our network. In practice, this means lines are assessed for works covering several kilometres, and cables are assessed for works of more than one kilometre. For other assets we make only minimal allowance for travel and vehicle costs, on the basis that any large scale of construction would allow many assets to be installed at the same time. For most assets, this also implies that bulk purchasing terms are available and no one-off or customisation premium is applied.*
- *Using a "brownfields" approach, assessing the cost to install assets around all other publicly and privately owned infrastructure.*
- *Based on recent contracts, quotes or estimates. Wherever possible, we have based replacement costs on recent contracts that have been tendered through a competitive process. In cases where this information is not available, we have sought quotes or estimates from one or more of our competing contracting service providers.*
- *Indexed to the date of valuation. In cases where valuation information is accurate but out-of-date, we have indexed the result to reflect costs at the valuation date by considering the cost movement of similar assets. Where information for this indexing is not available, we have indexed results in line with the movement in CPI (all groups index published by Statistics New Zealand).*
- *Based on our current design standards.*
- *Allowing for design work, business administration, project management, commissioning testing and compliance costs.*
- *Using other sources of information. In situations where we have been unable to source our own values (particularly for older, low value assets with minimal turn-over), we have considered unit values provided in the ODV handbook. We have also considered information provided by our valuer's technical adviser, SKM.*

It should be noted that for protection relays the brownfield replacement cost is on the basis of a like for like relay function (not relay type) using modern electronic relays. These 2007 valuation cost have been used in forecasts we prepared up to 2012 and for the 2013 forecasts they have in most cases been inflated by approximately 8%, however MEA 340 has been inflated by approximately 14%. These have been projected forward consistent with our cost estimation approach which is described in section 9.26 of our CPP.

2.2 Labour escalators

We estimate that 40% of the project cost is labour related and we have determined that it is not appropriate to use the standard New Zealand wide LCI in relation to this project.

We note that Statistics NZ has recently started to monitor construction costs in Canterbury due to the local pressures on construction resources as a result of the Christchurch rebuild, however their data and time series is currently limited and unsuitable.

As local labour cost pressure is evident in our most recent contract tenders we have determined a proposed cost escalation index which we refer to as the Canterbury construction labour index based on estimates of labour.

We have sought external advice cost from two quantity surveyor firms on what we may expect in the market over the remainder of the CPP period in this respect. There is considerable uncertainty, however this CPP process requires us to make appropriate estimates. The resulting labour escalators that we propose are:

Index	FY14	FY15	FY16	FY17	FY18	FY19
Canterbury construction labour	7.5%	7.5%	7.5%	5%	5%	5%

For further information on our derivation see section 9.26.4 to 9.26.6 of the CPP proposal.

2.3 Material escalators

We estimate that 60% of the project costs are material related. We have used two different materials escalators in this project (ie one for cables and another for protection). In order to create input cost escalators we have considered the most relevant input components for this project. These are considered to be for communications cable Aluminium and Copper. We have used World Bank commodity price forecasts in conjunction with the NZIER NZD/USD exchange rate forecast to convert the World Bank prices into NZD. The prices are weighted based on an estimate of the quantities of the relevant materials used in this case 95% aluminium and 5% copper. The resulting material escalator for communication cables are:

Index	FY14	FY15	FY16	FY17	FY18	FY19
Materials underground	14.75%	9.18%	12.06%	7.03%	1.42%	0.95%

For the protection component of this project we have used PPI as our best approximation.

Index materials	FY14	FY15	FY16	FY17	FY18	FY19
PPI	3.04%	3.32%	3.65%	3.20%	3.20%	3.20%

For further information on our derivation see section 9.26.4 of the CPP proposal.

2.4 Age of the assets

The age of an asset is considered as a factor in assessing whether an asset has reached the end of its economic life.

2.5 When capex should be undertaken

We do not have a specific policy that determines when an asset should be replaced. Our asset management policy NW70.00.46 outlines at a high level our approach to asset management and our objective which is to optimise the lifecycle costs for each network asset group (including creation, operation, maintenance, renewal and disposal) to meet agreed service levels and future demand. The asset management policy lists a large range of other documents that inform the asset management process.

Generally assets are not replaced on age alone, but are kept in service until their continued maintenance is uneconomic or until they pose a safety, environmental or reliability risk. While various techniques and software packages such as CBRM can assist with this process ultimately it relies on engineering judgement.

2.6 Basis for expenditure forecast

The expenditure process is basically a bottom up process which relies on the forecast of units to be replaced which are set out below. These quantities together with the appropriate unit cost and material and labour escalators give rise to the forecast costs set out below.

We use a mixture of practices to determine which assets need to be replaced and when this replacement should occur. No single method provides the ultimate solution from an asset management perspective but by using a combination of approaches we can tailor our replacement programme to be the most effective. As can be seen from the attached asset management reports YE 2012 NW70.00.22 and NW70.00.28 relating to protection systems and communications cables respectively, we have a wide range of equipment that is covered by this project, with a wide age profile.

The process used to forecast our replacement expenditure for protection relays has historically been directly linked to the replacement of switchgear. Historically, both asset groups were installed at the same time and had similar lifecycles. With the introduction of the electronic relays (both analogue and digital) synchronisation of the lifecycles with switchgear is being lost. In addition, on some occasions a protection system will be upgraded due to the performance requirements of the network.

In some cases, a number of relays less than 15 years old (and even less than 10 years old) may be scheduled for replacement even though the associated switchgear is not due to be replaced. In these cases the whole substations protection scheme is being upgraded to use fibre and merging units. We no longer replace like for like when doing a substation upgrades. Any units that haven't yet reached the end of their economic life will be reused elsewhere in the network or kept as spares.

The project also includes amounts for upgrading the protection systems for Transpower spur assets that we intent to acquire. There is also a small nominal allowance for additional items such as firmware upgrades and setting upgrades.

Protection systems with known performance issues are given a higher priority for replacement. The attached Asset Management report YE 2012 for Protection Systems identifies a number of different types of “problematic relays”. Problematic relays are those which demonstrate spurious trippings, are difficult to maintain, have no manufacturer support, that we are unable to test or that do not have the right functionality ie: fail to meet current clearance time requirements.

Orion’s own condition based replacement analysis, reliability based replacement and more recently the CBRM model developed for Orion by EA Technology which is based on type – past performance, obsolescence and age in conjunction, also inform our replacement programme decisions.

These inputs together with engineering judgement lead to the forecast replacement programme.

The engineering judgement required takes into account other factors that may be occurring in the network, and the importance of the assets to the operation of the network. Equipment which may have a better health index and/or Orion ranking, may be assigned a higher priority in the replacement list than another asset.

The objective is to maintain asset health profiles consistent with current levels.

Failure to maintain asset health profiles consistent with current levels will over time lead to a gradual reduction in reliability, increase the risk of catastrophic equipment failure, and increased safety risks. It may also make maintaining the viability of the contractor base more difficult leading to peaks and troughs in workload and costs.

The CBRM model is discussed in our asset management policy NW70.00.46. It is a relatively recent addition to our forecasting approach and builds on the information and asset records that have been established from the Orion in-house model. Creating a CBRM model for protection relays is a world first for EA Technology. Orion’s knowledge of these assets and good relay data made it possible to build a model that gives an accurate reflection of its relay population.

Ongoing development work regarding the application of the CBRM has been disrupted as a result of staff having to deal with earthquake related response.

The forecast expenditure for communication cables and termination boxes is based on a nominal \$0.2m to allow for replacement of yet to be identified faulty cables and termination boxes. The amount is estimated to allow for approximately 1000m and associated termination boxes, ie less than 1% of the existing cable network.

2.7 Non network alternatives

We have not considered any non-network alternatives in relation to this project.

2.8 Cost benefit analysis

We have not undertaken any cost benefit analysis in relation to this project.

2.9 Links with other projects

The programme is closely related to a number of Maintenance Programmes outlined in the Asset Management report

For further information about our expenditure forecasts process see Asset Management YE2012 Lifecycle Budget Forecasting Process (NW70.60.15).

2.10 Obligations

Like all companies we are subject to the general provisions of a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

- Electricity Act
- Energy Companies Act
- Electricity Industry Act
- Local Government Act
- Electricity Reform Act
- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act.

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a "lifeline" utility, Orion must comply with the Civil Defence Emergency Management (CDEM) Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand's communities. The Act requires us to:

- Be able to function to the fullest possible extent during and after an emergency
- Have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- Help define the Crown's CDEM goals and objectives in a National CDEM Strategy
- Participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- Provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- Plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- Be capable of managing our own response to emergencies
- Develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- Establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary (NW70.00.14)
- Asset Risk Management (NW70.60.02).

3 Relevant Policies and Planning Standards

Asset management policy (NW70.00.46)

- We have used Orion's condition based risk management (CBRM) models to forecast asset renewal.

Procurement policy (OR00.00.19) and Contract management (NW73.00.03)

- We follow our procurement and contract management policies to achieve value for money by competitively tendering our work with a value over \$20,000.

Delegations of authority policy (OR00.00.11)

- The overall budgeted expenditure for this programme is approved by the Board as part of the overall Asset management Plan. As and when the expenditure is incurred then approval for the actual expenditure is made in compliance with the delegations of authority policy.

Authorised contractors (NW73.10.15)

- We ensure only authorised contractors are allowed access to our network (such access may be subject to limits that can be specific to each contractor).

Health and Safety policy (OR00.00.01)

- We follow our health and safety requirements to ensure the safety of the public and our personnel and contractors around our assets.

Environmental Sustainability Policy (OR00.00.03)

- We work towards environmental sustainability in our operations.

Asset Management Lifecycle Budget Forecasting Process (NW70.60.15)

- This policy sets out our budgeting approach for our maintenance and replacement programmes in more detail.

Orion zone substation maintenance (NW72.23.07), Orion network substation maintenance (NW72.23.06), Orion 11kV unit protection maintenance tests (NW72.27.01) and Testing and Commissioning of Secondary Equipment (NW72.27.04)

- These policies detail the substation maintenance procedures which includes the testing of the protection systems.

Cables – Installation and Maintenance (NW72.22.01)

- The purpose of this specification is to set out standards for the installation and maintenance of all cable groups including communications.

Cables – Testing (NW72.23.24)

- The purpose of this specification is to set out standards for the testing requirements of all cable groups including communications.

11kV Unit Protection Maintenance Tests – (NW72.27.01)

- The purpose of this specification is to set out standards for the testing requirements of unit protection which utilises the communication cable network.

Draughting and Records (NW70.50.02)

- The purpose of this standard is to set out how we record our communication cable installation and connections.

Communication Cables – asset management report YE 2012 (NW70.00.28) and Protection Systems – asset management report YE 2012 (NW70.00.22)

- These asset management reports set out the assets included and processes followed in this programme in more detail.

4 Programme Description

4.1 Work to be Undertaken

The work to be undertaken in this programme involves the replacement of communication cables and protection systems that have reached the end of their economic lives as a result of a number of factors such as their condition, age, obsolescence, lack of spares, lack of support.

Communication cables were not included as part of the CBRM spreadsheet model as we were undertaking a review of our asset management practices for communication and control systems. The earthquakes have further delayed this review, however it is envisioned that we will develop CBRM models for these assets in the near future.

Historically the condition of the communication cables has only been tested during installation and commissioning of other works. Aside from deficiencies identified during this testing, all maintenance/replacement was only done once a fault was identified.

Following the earthquakes a new testing programme was developed due to the increased risk of damage to the communication cables. The cables in the eastern suburbs of Christchurch will be tested using this new programme to see if there has been any effect to their useful life. A nominal \$0.2m was used to allow for replacement of yet to be identified faulty cables and termination boxes. The amount is estimated to allow for approximately 1000m and associated termination boxes ie less than 1% of the existing cable network.

For more detail on the programme, see the attached Asset Management reports for 'Communication Cables' and for 'Protection Systems'. More detailed asset condition information for protection systems is contained within the CBRM spreadsheet model.

4.2 Forecast number of Assets to be replaced

The following table provides a summary of the number of units and type of protection relays to be replaced a detailed list is appended. The detailed list shows that we will be replacing relays in at least one zone substation and in some cases two zone substations on an annual basis.

As can be seen the average age of assets being replaced generally exceeds the IM standard life.

MEA Code	FY14	FY15	FY16	FY17	FY18	FY19	Total No.	Avg Age (yrs)	IM Standard Life Digital/ Electromechanical
MEA 340	4	0	2	2	2	3	13	41	20/40
MEA 345	2	2	1	1	1	1	8	23	20/40
MEA 350	0	0	0	0	0	1	1	11	20/40
MEA 355	0	1	1	0	1	2	5	22	20/40
MEA 360	35	42	37	37	47	16	214	37	20/40
MEA 365	14	13	36	28	34	46	171	32	20/40
MEA 370	27	39	46	49	64	34	259	32	20/40
MEA 375	4	2	2	6	0	3	17	20	20/40
MEA1250	0	0	0	5	2	6	13	16	20/40
MEA1255	7	7	7	0	4	12	37	25	20/40

4.3 Network Constraints and Service Targets

There are no constraints expected due to forecast load.

Assets must be replaced in a timely manner. These assets are replaced to ensure they provide the required level of performance. This programme contributes to meeting Orion's overall service targets and safety by ensuring that assets are replaced as and when required by the programme and asset management policy.

4.4 Dependencies

The programme is closely related to the communication cables and protection systems scheduled maintenance programme (CPP107), network assets non-scheduled maintenance programme (CPP114) and network assets emergency maintenance programme (CPP119).

The testing of the protection systems is carried out as part of the substation maintenance regime. As such, this programme is also related to the buildings, grounds and substations scheduled maintenance programme (CPP109).

Orion's network architecture review may lead to a different configuration of assets being installed at the time replacements are needed.

4.5 Programme Deliverability

The ongoing replacement programme can be carried out within normal contracting arrangements. The scheduling of the work is altered to some extent to take into account resource constraints and network loadings.

4.6 Prioritisation

Prioritisation is based on a number of factors including:

Safety to the public, our personnel and contractors

Replacement of assets as a result of immediate safety issues will be dealt with under our emergency works contracts.

Satisfying individual or collective consumer expectations:

We consider satisfying consumers reasonable expectations as a very influential prioritisation factor. We give priority to the constraints that are most likely to impact consumer supply through extended or frequent outages, or compromised power quality. This is in the context of the overall level of quality that we believe is reasonable to provide.

Managing contractor resource constraints:

We aim to maintain a steady work flow to contractors. The contractors have a diversity of skill sets covering different aspects of our assets and we seek to ensure that our mix of projects, in any given year broadly aligns with that diversity. This ensures that contractor personnel and equipment levels match our replacement programme year-on-year at a consistent level, reducing the risk of our contractors being over or under resourced.

Coordination with Transpower:

We endeavour to coordinate any major network structural changes adjacent to a grid exit point with Transpower's planned asset replacement programmes, and also provide direction to Transpower to ensure consistency with our sub-transmission upgrade plans.

Our asset replacement programme:

We determine our replacement priorities by following the general principle that the assets supplying the greatest number of consumers receive the highest priority. We extensively review areas of the network where scheduled asset replacement programmes occur to ensure the most efficient and cost-effective solution is sought to fit in with the current and long-term network development structure, for example replacement of switchgear in substations.

The risk with any type of replacement programme is that network switching or alternative supplies (generators) will be required to off-load the assets which are to be replaced. This leads to reduced reliability levels and increased risk of outages. We try to mitigate this by

co-ordinating replacements with other work and where possible carry out the work at periods of lower network loading.

5 Earthquake Consequences

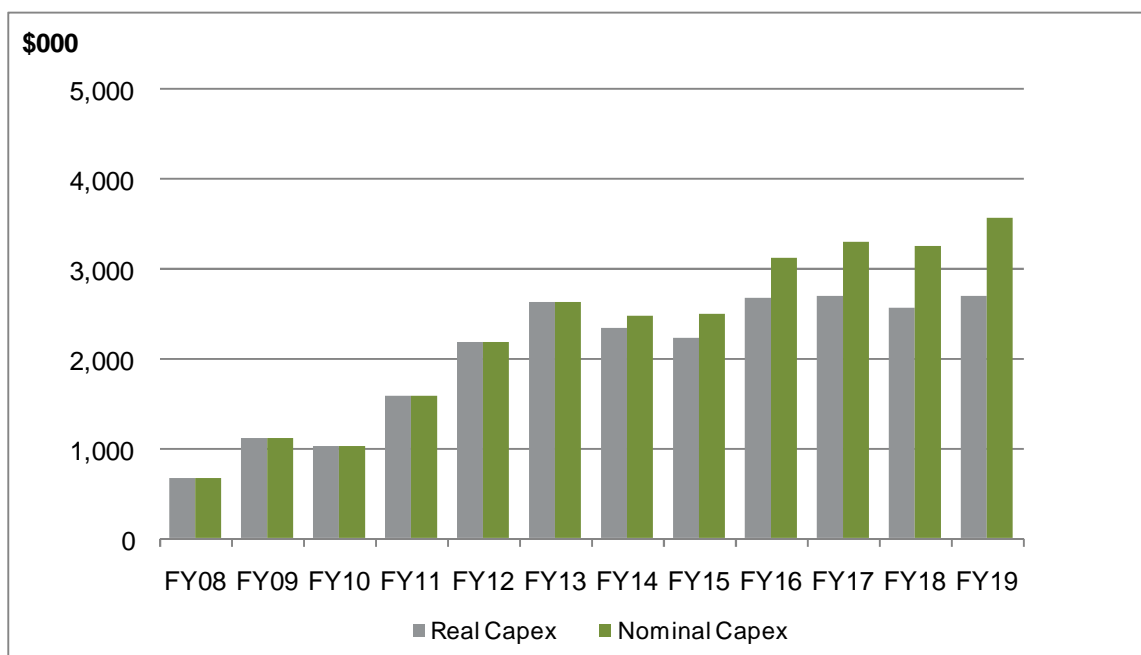
Our resources were constrained following the earthquakes as staff and contractors were diverted to deal with the immediate aftermath of the events. This resulted in a reduction in the planned replacement programme for those years.

The September 2010 and February 2011 earthquakes caused a number of communication cable faults. They were mainly confined to areas subjected to large lateral movement of the ground in Brighton, Dallington and Avondale.

We anticipate cables that have been subjected to earthquake stress will have higher failure rates over the next few years as faults develop in sheaths and insulation. To mitigate this we will test the cables in identified areas over the next few years to determine whether maintenance or replacement is required.

6 Expenditure Plan

The following chart shows our communication cables and protection systems historical and forecast replacement expenditure in both real and nominal terms (\$000). The real terms have been escalated as per methodology outlined in the CPP proposal to ascertain the nominal terms. This shows that, following the increase in FY12 and FY13, capital expenditure is expected to remain relatively constant.



These expenditure forecasts do not include any contingencies.

The following tables summarise our communications cables and protections systems forecast and historical replacement expenditure in both real and nominal terms (\$000).

Historical Expenditure

	Nominal \$000				
	FY08	FY09	FY10	FY11	FY12
Pilot / Communications Circuits	125	0	91	-	43
Protection (digital)	544	1,121	943	1,586	2,145
Total	669	1,122	1,034	1,586	2,187

Forecast Expenditure (Real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Pilot / Communications Circuits	210	210	210	210	210	210	210
Protection (digital)	2,430	2,142	2,034	2,463	2,496	2,354	2,493
Total	2,640	2,352	2,244	2,673	2,706	2,564	2,703

Forecast Expenditure (Nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Pilot / Communications Circuits	210	235	255	281	299	307	315
Protection (digital)	2,430	2,245	2,239	2,855	3,008	2,950	3,249
Total	2,640	2,480	2,494	3,136	3,307	3,257	3,563

As mentioned above, the communication cables forecast has been based on a nominal \$0.2M to allow for replacement of yet to be identified faulty cables and termination boxes. The amount is estimated to allow for approximately 1000m and associated termination boxes, ie less than 1% of the existing cable network. This is a change from historical costs as the need for this replacement was caused by the earthquakes. In the past there has been no replacement programme for these cables and they have been replaced on an as-needed basis.

The expenditure for protection systems has increased since FY11 due to the electro-magnetic relays and analogue digital relays reaching the end of their lifecycles.

In addition, from FY13 – FY17 there has been an increase in forecast expenditure as we prepare to acquire equipment as part of the spur asset purchases from Transpower. The spur assets include protection system assets which Orion expects will need to be replaced on acquisition.

For further information about our expenditure forecasts process see Asset Management YE2012 Lifecycle Budget Forecasting Process (NW70.60.15).

7 References

Documents that should be read in conjunction with this project summary are:

- Communication Cables – asset management report YE 2012 (NW70.00.28)
- Protection Systems – asset management report YE 2012 (NW70.00.22).

Slot Name	Relay ID	Relay Type	Manfu Year	Cost \$,000	Project Year	Health Index	Orion Ranking	Age
BATH ST NO.23 (Unit 12)	GEC054590R	RLYM	1984	10	2014	2	60	30
BATH ST NO.23 (Unit 13)	REY182199	RLYM	1986	12	2014	2	94	28
BATH ST NO.23 (Unit 14)	GEC054581R	RLYM	1984	10	2014	2	60	30
DURHAM ST NO.191 (Unit 1)	REYG2U746	RLYM	1965	12	2014	5	94	49
DURHAM ST NO.191 (Unit 2)	AEI2991351	RLYM	1965	10	2014	5	39	49
DURHAM ST NO.191 (Unit 3)	REYH2Y751	RLYM	1967	12	2014	4	94	47
DURHAM ST NO.191 (Unit 4)	AEI2991357	RLYM	1965	10	2014	5	39	49
DURHAM ST NO.191 (Unit 5)	REY182210	RLYM	1986	12	2014	2	94	28
ESTUARY RD NO.299 (Unit 11)	AEI2991354	RLYM	1965	10	2014	5	39	49
ESTUARY RD NO.299 (Unit 12)	REY06237002-02	RLYM	1960	10	2014	6	51	54
ESTUARY RD NO.299 (Unit 13)	REYG2T16	RLYM	1965	12	2014	5	94	49
ESTUARY RD NO.299 (Unit 14)	REYD3F1633	RLYM	1977	12	2014	3	94	37
ESTUARY RD NO.299 (Unit 15)	AEI3012328	RLYM	1965	10	2014	5	39	49
FITZGERALD AV NO.211 (Unit 13)	REYD3H64	RLYM	1978	12	2014	3	94	36
FITZGERALD AV NO.211 (Unit 14)	VAT538401-21	RLYM	2002	12	2014	1	94	12
GASSON ST S (Unit 12)	REY121106	RLYM	1980	12	2014	2	94	34
GASSON ST S (Unit 13)	REY121107	RLYM	1980	12	2014	2	94	34
HALSWELL ZONE SUB (Unit 132)	ASEAE1161	RLYE	1989	65	2014	5	39	25
HALSWELL ZONE SUB (Unit 132)	REYC3F661	RLYM	1975	0	2014	5	39	39
HALSWELL ZONE SUB (Unit 132)	REYA3F34	RLYM	1980	0	2014	5	39	34
HALSWELL ZONE SUB (Unit 132)	ASEG1-135	RLYE	1989	0	2014	5	35	25
HALSWELL ZONE SUB (Unit 192)	ASEAE1167	RLYE	1989	65	2014	5	39	25
HALSWELL ZONE SUB (Unit 192)	ASEG1-140	RLYE	1989	0	2014	5	35	25
HALSWELL ZONE SUB (Unit 192)	REYA3F35	RLYM	1980	0	2014	5	39	34
HALSWELL ZONE SUB (Unit 192)	REYC3F662	RLYM	1975	0	2014	5	39	39
HOON HAY ZONE SUB (Bus 1)	AEI3350971	RLYM	1980	56	2014	2	42	34
ISLINGTON GXP (Unit 122)	ASEG1-141	RLYE	1989	65	2014	5	35	25
ISLINGTON GXP (Unit 142)	ASEG1-142	RLYE	1989	65	2014	5	35	25
KILMARNOCK ST NO.44 (Unit 34)	GEC054603R	RLYM	1984	10	2014	2	60	30
KILMARNOCK ST NO.44 (Unit 35)	VAT263602-13	RLYM	2001	12	2014	1	94	13
KILMARNOCK ST NO.44 (Unit 36)	ALS1405848	RLYE	2005	10	2014	1	97	9

KILMARNOCK ST NO.44 (Unit 37)	GEC054604R	RLYM	1984	10	2014	2	60	30
MACKENZIE AV NO.117 (Unit 12)	GEC536712C	RLYM	1991	10	2014	1	60	23
MACKENZIE AV NO.117 (Unit 13)	VAT100420102-5	RLYM	2004	12	2014	1	94	10
MACKENZIE AV NO.117 (Unit 14)	REYH2Y796	RLYM	1967	12	2014	4	94	47
MACKENZIE AV NO.117 (Unit 15)	REYE2Y127	RLYM	1966	12	2014	5	94	48
MONTREAL ZONE SUB (Bus 1)	AEI2886991	RLYM	1968	56	2014	4	45	46
MONTREAL ZONE SUB (Unit 1)	GEC59972	RLYM	1983	17	2014	2	61	31
MONTREAL ZONE SUB (Unit 1)	REYG2W932	RLYM	1966	0	2014	2	94	48
MONTREAL ZONE SUB (Unit 10)	REYH2S563	RLYM	1965	17	2014	2	94	49
MONTREAL ZONE SUB (Unit 10)	GEC59979	RLYM	1983	0	2014	2	61	31
MONTREAL ZONE SUB (Unit 11)	GEC59980	RLYM	1983	10	2014	2	61	31
MONTREAL ZONE SUB (Unit 12)	GEC59981	RLYM	1983	17	2014	2	61	31
MONTREAL ZONE SUB (Unit 12)	REYG2W526	RLYM	1966	0	2014	2	94	48
MONTREAL ZONE SUB (Unit 14)	ALS31225857	RLYE	2010	10	2014	1	97	4
MONTREAL ZONE SUB (Unit 15)	REYH2S565	RLYM	1965	17	2014	2	94	49
MONTREAL ZONE SUB (Unit 15)	GEC59983	RLYM	1983	0	2014	2	61	31
MONTREAL ZONE SUB (Unit 16)	REYA3A770	RLYM	1971	17	2014	1	94	43
MONTREAL ZONE SUB (Unit 16)	ALS0607862	RLYE	2007	0	2014	1	97	7
MONTREAL ZONE SUB (Unit 17)	EEC196702C	RLYM	1970	17	2014	2	60	44
MONTREAL ZONE SUB (Unit 17)	REYF2T131	RLYM	1965	0	2014	2	94	49
MONTREAL ZONE SUB (Unit 18)	REYG2W934	RLYM	1966	17	2014	2	94	48
MONTREAL ZONE SUB (Unit 18)	GEC59986	RLYM	1983	0	2014	2	61	31
MONTREAL ZONE SUB (Unit 2)	GEC59973	RLYM	1983	17	2014	2	61	31
MONTREAL ZONE SUB (Unit 2)	REYF2T122	RLYM	1965	0	2014	2	94	49
MONTREAL ZONE SUB (Unit 3)	REYE2Y133	RLYM	1966	17	2014	1	94	48
MONTREAL ZONE SUB (Unit 3)	ALS30028978	RLYE	2009	0	2014	1	97	5
MONTREAL ZONE SUB (Unit 4)	REYH2S561	RLYM	1965	17	2014	2	94	49
MONTREAL ZONE SUB (Unit 4)	GEC59975	RLYM	1983	0	2014	2	61	31
MONTREAL ZONE SUB (Unit 5)	REYF2T124	RLYM	1965	17	2014	1	94	49
MONTREAL ZONE SUB (Unit 5)	GEC59976	RLYM	1983	0	2014	1	61	31
MONTREAL ZONE SUB (Unit 5)	ALS0607859	RLYE	2010	0	2014	1	97	4
MONTREAL ZONE SUB (Unit 7)	REYF2W1042	RLYM	1965	17	2014	2	94	49
MONTREAL ZONE SUB (Unit 7)	GEC59977	RLYM	1983	0	2014	2	61	31
MONTREAL ZONE SUB (Unit 8)	REYF2T127	RLYM	1965	17	2014	2	94	49

MONTREAL ZONE SUB (Unit 8)	GEC59978	RLYM	1983	0	2014	2	61	31
RANDOLPH ST NO.55 (Unit 16)	GEC050357L	RLYM	1980	10	2014	2	60	34
RANDOLPH ST NO.55 (Unit 17)	REYE2Y134	RLYM	1966	12	2014	5	94	48
RANDOLPH ST NO.55 (Unit 18)	REYG2T1127	RLYM	1964	12	2014	5	94	50
SEDDON ST (Unit 14)	REYH2Y801	RLYM	1967	12	2014	4	94	47
SEDDON ST (Unit 15)	REYE2Y146	RLYM	1966	12	2014	5	94	48
SEDDON ST (Unit 36)	REYE2Y161	RLYM	1966	12	2014	5	94	48
SHAKESPEARE RD NO.6 (Unit 15)	AEI2991359	RLYM	1965	10	2014	5	39	49
SHAKESPEARE RD NO.6 (Unit 16)	REY121108	RLYM	1980	12	2014	2	94	34
SHAKESPEARE RD NO.6 (Unit 17)	REY121109	RLYM	1980	12	2014	2	94	34
SHANDS RD ZONE SUB (Bus 1)	ASEC133	RLYE	1993	56	2014	3	40	21
SHANDS RD ZONE SUB (Bus 1)	ASEQ105	RLYE	1986	0	2014	3	37	28
SHANDS RD ZONE SUB (Bus 1)	ASET117	RLYM	1993	0	2014	3	35	21
SHANDS RD ZONE SUB (Bus 2)	ASEQ106	RLYE	1986	56	2014	3	37	28
SHANDS RD ZONE SUB (Bus 2)	ASET118	RLYM	1993	0	2014	3	35	21
SHANDS RD ZONE SUB (Bus 2)	ASEC134	RLYE	1993	0	2014	3	40	21
SHANDS RD ZONE SUB (Unit 111)	ALS1406742	RLYE	2005	10	2014	1	97	9
SHANDS RD ZONE SUB (Unit 112)	ASEG5-141	RLYE	1984	17	2014	5	35	30
SHANDS RD ZONE SUB (Unit 112)	ASEAE1123	RLYE	1989	0	2014	5	39	25
SHANDS RD ZONE SUB (Unit 113)	ASEAE1124	RLYE	1989	20	2014	5	39	25
SHANDS RD ZONE SUB (Unit 114)	ASEAE1130	RLYE	1989	20	2014	5	39	25
SHANDS RD ZONE SUB (Unit 115)	ASEAE1126	RLYE	1989	20	2014	5	39	25
SHANDS RD ZONE SUB (Unit 121)	ASEG5-142	RLYE	1984	20	2014	5	35	30
SHANDS RD ZONE SUB (Unit 121)	ASEAE1127	RLYE	1989	0	2014	5	39	25
SHANDS RD ZONE SUB (Unit 122)	ASEAE1128	RLYE	1989	20	2014	5	39	25
SHANDS RD ZONE SUB (Unit 123)	ASEAE1129	RLYE	1989	20	2014	5	39	25
SHANDS RD ZONE SUB (Unit 124)	ASEAE1116	RLYE	1987	20	2014	6	39	27
SHANDS RD ZONE SUB (Unit 402)	ASEK155	RLYE	1993	75	2014	6	38	21
SHANDS RD ZONE SUB (Unit 402)	ASEBC162	RLYE	1984	0	2014	6	38	30
SHANDS RD ZONE SUB (Unit 402)	ASEK156	RLYE	1993	0	2014	6	38	21
SHANDS RD ZONE SUB (Unit 402)	ASEK154	RLYE	1993	0	2014	6	38	21
SHANDS RD ZONE SUB (Unit 402)	ASEBC163	RLYE	1984	0	2014	6	38	30
SHANDS RD ZONE SUB (Unit 402)	ASEJ117	RLYE	1988	0	2014	6	30	26
SHANDS RD ZONE SUB (Unit 412)	ASEK159	RLYE	1993	75	2014	6	38	21

SHANDS RD ZONE SUB (Unit 412)	ASEJ118	RLYE	1988	0	2014	6	30	26
SHANDS RD ZONE SUB (Unit 412)	ASEK158	RLYE	1993	0	2014	6	38	21
SHANDS RD ZONE SUB (Unit 412)	ASEK157	RLYE	1993	0	2014	6	38	21
SHANDS RD ZONE SUB (Unit 412)	ASEBC165	RLYE	1984	0	2014	6	38	30
SHANDS RD ZONE SUB (Unit 412)	ASEBC164	RLYE	1984	0	2014	6	38	30
WATTS RD NO.41 (Unit 33)	ASEBC109	RLYE	1982	10	2014	6	38	32
WATTS RD NO.41 (Unit 33)	ASEAE164	RLYE	1984	0	2014	6	38	30
WATTS RD NO.41 (Unit 34)	ASEBC108	RLYE	1981	10	2014	6	38	33
WATTS RD NO.41 (Unit 34)	ASEAE163	RLYE	1984	0	2014	6	38	30
WATTS RD NO.41 (Unit 35)	VAT101332102-5	RLYM	2007	12	2014	1	94	7
WATTS RD NO.41 (Unit 36)	ASEG5-135	RLYE	1985	12	2014	6	35	29
WATTS RD NO.41 (Unit 37)	ASEBC107	RLYE	1981	10	2014	6	38	33
WATTS RD NO.41 (Unit 37)	ASEAE162	RLYE	1984	0	2014	6	38	30
WILSONS RD NO.284 (Unit 1)	REYG2Z38	RLYM	1968	12	2014	4	94	46
WILSONS RD NO.284 (Unit 2)	GEC050359L	RLYM	1980	10	2014	2	60	34
WILSONS RD NO.284 (Unit 3)	REYG2T30	RLYM	1965	12	2014	5	94	49
WINCHESTER ST S (Unit 32)	GEC054610R	RLYM	1984	10	2014	2	60	30
WINCHESTER ST S (Unit 33)	EEC270165C	RLYM	1973	10	2014	3	60	41
WINCHESTER ST S (Unit 34)	REYH2Y790	RLYM	1967	12	2014	4	94	47
WINCHESTER ST S (Unit 35)	REYH2Y791	RLYM	1967	12	2014	4	94	47
WOODHAM RD NO.271 (Unit 12)	REYG2Z29	RLYM	1968	12	2014	4	94	46
WOODHAM RD NO.271 (Unit 13)	REYH2Y813	RLYM	1967	12	2014	4	94	47
WOODHAM RD NO.271 (Unit 32)	REYH2Y812	RLYM	1967	12	2014	4	94	47
WOODHAM RD NO.271 (Unit 33)	GEC059942N	RLYM	1982	10	2014	2	60	32
WOODHAM RD NO.271 (Unit 34)	GEC041614H	RLYM	1968	10	2014	4	60	46
WORDSWORTH ST NO.125 (Unit 2)	REYG2U782	RLYM	1965	12	2014	5	94	49
WORDSWORTH ST NO.125 (Unit 3)	REYF2W1029	RLYM	1965	12	2014	5	94	49
WORDSWORTH ST NO.125 (Unit 4)	AEI3012301	RLYM	1965	10	2014	5	39	49
WORDSWORTH ST NO.125 (Unit 5)	AEI3012305	RLYM	1965	10	2014	5	39	49
WORDSWORTH ST NO.49 (Unit 11)	AEI3012293	RLYM	1965	10	2014	5	39	49
WORDSWORTH ST NO.49 (Unit 12)	REYF2W1017	RLYM	1965	12	2014	5	94	49
WORDSWORTH ST NO.49 (Unit 13)	REYF2W1019	RLYM	1965	12	2014	5	94	49
WORDSWORTH ST NO.49 (Unit 14)	REY121102	RLYM	1980	12	2014	2	94	34
ADDINGTON GXP (Unit 10)	REYH2S560	RLYM	1965	12	2015	5	94	50

ADDINGTON GXP (Unit 11)	REYG2W939	RLYM	1966	12	2015	5	94	49
ADDINGTON GXP (Unit 2662)	VAT100277401-5	RLYM	2003	12	2015	1	94	12
ADDINGTON GXP (Unit 2702)	VAT100277401-7	RLYM	2003	12	2015	1	94	12
ADDINGTON GXP (Unit 2722)	VAT100277401-2	RLYM	2003	12	2015	1	94	12
ADDINGTON GXP (Unit 2802)	VAT100277401-4	RLYM	2003	12	2015	1	94	12
ADDINGTON GXP (Unit 3)	REYG2W940	RLYM	1966	12	2015	5	94	49
BRANSTON ST NO.76 (Unit 33)	ALS2803999	RLYE	2004	10	2015	1	97	11
BRANSTON ST NO.76 (Unit 34)	ASEBC203	RLYE	1990	10	2015	4	38	25
BRANSTON ST NO.76 (Unit 34)	ASEAE251	RLYE	1990	0	2015	4	38	25
BRANSTON ST NO.76 (Unit 35)	VAT263602-14	RLYM	2001	12	2015	1	94	14
BRANSTON ST NO.76 (Unit 36)	ASEBC204	RLYE	1989	10	2015	5	38	26
BRANSTON ST NO.76 (Unit 36)	ASEAE103	RLYE	1989	0	2015	5	38	26
BRANSTON ST NO.76 (Unit 37)	ASEBC205	RLYE	1989	10	2015	5	38	26
BRANSTON ST NO.76 (Unit 38)	ASEAE254	RLYE	1989	10	2015	5	38	26
BRANSTON ST NO.76 (Unit 38)	ASEBC206	RLYE	1989	0	2015	5	38	26
BRANSTON ST NO.76 (Unit 39)	VAT263602-11	RLYM	2001	12	2015	2	94	14
BREEZES RD N (Unit 12)	REYG2Z14	RLYM	1968	12	2015	4	94	47
BREEZES RD N (Unit 13)	REYG2Z26	RLYM	1968	12	2015	4	94	47
BREEZES RD N (Unit 14)	REY232601	RLYM	1986	12	2015	2	94	29
BREEZES RD N (Unit 15)	EEC270151C	RLYM	1973	10	2015	3	60	42
BREEZES RD N (Unit 33)	REYE2Z1380	RLYM	1967	12	2015	4	94	48
CLYDE RD NO.146 (Unit 11)	GEC059946N	RLYM	1982	10	2015	2	60	33
CLYDE RD NO.146 (Unit 12)	REYG2U777	RLYM	1965	12	2015	5	94	50
CLYDE RD NO.146 (Unit 13)	REYG2U778	RLYM	1965	12	2015	5	94	50
CLYDE RD NO.146 (Unit 14)	GEC065640P	RLYM	1984	10	2015	2	60	31
CURLETTS RD NO.59 (Unit 31)	ASEAE257	RLYE	1988	10	2015	5	38	27
CURLETTS RD NO.59 (Unit 31)	ASEBC209	RLYE	1989	0	2015	5	38	26
CURLETTS RD NO.59 (Unit 32)	VAT101332102-2	RLYM	2007	12	2015	1	94	8
CURLETTS RD NO.59 (Unit 33)	VAT101332102-4	RLYM	2007	12	2015	1	94	8
CURLETTS RD NO.59 (Unit 34)	ASEG5-136	RLYE	1988	12	2015	5	35	27
CURLETTS RD NO.59 (Unit 35)	ASEAE256	RLYE	1988	10	2015	5	38	27
CURLETTS RD NO.59 (Unit 35)	ASEBC208	RLYE	1989	0	2015	5	38	26
CURLETTS RD NO.59 (Unit 36)	ASEBC207	RLYE	1988	10	2015	5	38	27
CURLETTS RD NO.59 (Unit 36)	ASEAE255	RLYE	1988	0	2015	5	38	27

DICKENS ST (Unit 31)	AEI3250750	RLYM	1967	10	2015	4	39	48
DICKENS ST (Unit 32)	AEI3294015	RLYM	1964	10	2015	5	39	51
DICKENS ST (Unit 33)	REYE2Y135	RLYM	1966	12	2015	5	94	49
FERRY RD NO.331 (Unit 10)	EEC270160C	RLYM	1973	10	2015	3	60	42
FERRY RD NO.331 (Unit 8)	VAT263602-1	RLYM	2001	12	2015	1	94	14
FERRY RD NO.331 (Unit 9)	REY232590	RLYM	1986	12	2015	2	94	29
HAREWOOD ZONE SUB (Unit 111)	ASEG5-131	RLYE	1984	10	2015	6	35	31
HAREWOOD ZONE SUB (Unit 111)	ASEAE1118	RLYE	1987	0	2015	6	39	28
HAREWOOD ZONE SUB (Unit 112)	ASEAE1119	RLYE	1987	17	2015	6	39	28
HAREWOOD ZONE SUB (Unit 112)	ASEG5-132	RLYE	1984	0	2015	6	35	31
HAREWOOD ZONE SUB (Unit 121)	AEI2958579B	RLYM	1965	10	2015	4	39	50
HAREWOOD ZONE SUB (Unit 121)	AEI2958579	RLYM	1968	0	2015	4	45	47
HAREWOOD ZONE SUB (Unit 121)	AEI2958540	RLYM	1967	0	2015	4	45	48
HAREWOOD ZONE SUB (Unit 122)	ALS1103758	RLYE	2002	10	2015	2	97	13
HAREWOOD ZONE SUB (Unit 123)	ALS31154968	RLYE	2011	10	2015	6	97	4
HAREWOOD ZONE SUB (Unit 123)	VAT10124702-3	RLYM	2011	0	2015	6	94	4
HAREWOOD ZONE SUB (Unit 124)	ALS4203037	RLYE	2001	10	2015	2	97	14
HORATIO ST (Unit 3)	GEC060016M	RLYM	1982	10	2015	2	60	33
HORATIO ST (Unit 4)	REYG2Z5	RLYM	1968	12	2015	4	94	47
HORATIO ST (Unit 5)	REYG2Z6	RLYM	1968	12	2015	4	94	47
HORATIO ST (Unit 6)	GEC060017M	RLYM	1982	10	2015	2	60	33
HORORATA ZONE SUB (Unit 902)	GEMD3310329	RLYE	2001	75	2015	2	84	14
JUBILEE ST (Unit 1)	REYA3A776	RLYM	1971	12	2015	4	94	44
JUBILEE ST (Unit 2)	ASEG5-107	RLYE	1980	12	2015	6	35	35
JUBILEE ST (Unit 3)	GEC054551R	RLYM	1984	10	2015	2	60	31
JUBILEE ST (Unit 4)	GEC054552R	RLYM	1984	10	2015	2	60	31
JUBILEE ST (Unit 5)	GEC068567N	RLYM	1986	10	2015	2	60	29
KINGSLEY ST NO.61 (Unit 2)	REYG2W253	RLYM	1966	12	2015	5	94	49
KINGSLEY ST NO.61 (Unit 3)	REYE2Y123	RLYM	1966	12	2015	5	94	49
KINGSLEY ST NO.61 (Unit 4)	AEI3012316	RLYM	1965	10	2015	5	39	50
KNOX ZONE SUB (Bus 1)	AEI3350972	RLYM	1980	56	2015	2	42	35
LUNNS RD NO.50 (Unit 32)	ASEAE207	RLYE	1986	10	2015	6	38	29
LUNNS RD NO.50 (Unit 32)	ASEBC197	RLYE	1986	0	2015	6	38	29
LUNNS RD NO.50 (Unit 33)	REYH2Z233	RLYM	1970	12	2015	4	94	45

LUNNS RD NO.50 (Unit 34)	ASEBC199	RLYE	1986	10	2015	6	38	29
LUNNS RD NO.50 (Unit 34)	ASEAE205	RLYE	1986	0	2015	6	38	29
LUNNS RD NO.50 (Unit 35)	ASEAE204	RLYE	1986	10	2015	6	38	29
LUNNS RD NO.50 (Unit 35)	ASEBC200	RLYE	1986	0	2015	6	38	29
LUNNS RD NO.50 (Unit 36)	ASEAE139	RLYE	1983	10	2015	6	38	32
LUNNS RD NO.50 (Unit 36)	ASEBC102	RLYE	1986	0	2015	6	38	29
MACES RD NO.120 (Unit 14)	ASEG1-100	RLYE	1980	12	2015	6	35	35
MACES RD NO.120 (Unit 15)	REYH2Y805	RLYM	1967	12	2015	4	94	48
MACES RD NO.120 (Unit 16)	EEC270155C	RLYM	1973	10	2015	3	60	42
MACES RD NO.180 (Unit 3)	GEC054545R	RLYM	1984	10	2015	2	60	31
MACES RD NO.180 (Unit 4)	GEC054546R	RLYM	1984	10	2015	2	60	31
MACES RD NO.180 (Unit 5)	REYA3A780	RLYM	1971	12	2015	4	94	44
MANCHESTER ST NO.176 (Unit 19)	GEC270136C	RLYM	1973	10	2015	3	60	42
MANCHESTER ST NO.176 (Unit 20)	AEI3012310	RLYM	1965	10	2015	5	39	50
MANCHESTER ST NO.176 (Unit 21)	VAT538401-11	RLYM	2002	12	2015	1	94	13
MANCHESTER ST NO.176 (Unit 22)	VAT538401-22	RLYM	2002	12	2015	1	94	13
MATSONS AV (Unit 11)	REYD3H67	RLYM	1978	12	2015	3	94	37
PORTMAN ZONE SUB (Bus 11kV)	ASEQ111	RLYE	1986	56	2015	6	37	29
PORTMAN ZONE SUB (Unit 1)	ASEAE141	RLYE	1984	17	2015	6	38	31
PORTMAN ZONE SUB (Unit 1)	ASEG1-116	RLYE	1984	0	2015	6	35	31
PORTMAN ZONE SUB (Unit 10)	ASEB106	RLYM	1987	17	2015	6	36	28
PORTMAN ZONE SUB (Unit 10)	ASEG1-130	RLYE	1984	0	2015	6	35	31
PORTMAN ZONE SUB (Unit 10)	ASEAE155	RLYE	1984	0	2015	6	38	31
PORTMAN ZONE SUB (Unit 11)	ASEG1-123	RLYE	1984	17	2015	6	35	31
PORTMAN ZONE SUB (Unit 11)	ASEAE148	RLYE	1984	0	2015	6	38	31
PORTMAN ZONE SUB (Unit 13)	ASEAE149	RLYE	1984	17	2015	6	38	31
PORTMAN ZONE SUB (Unit 13)	ASEG1-124	RLYE	1984	0	2015	6	35	31
PORTMAN ZONE SUB (Unit 14)	ALS2504303	RLYE	2002	17	2015	6	97	13
PORTMAN ZONE SUB (Unit 14)	VAT101450301-5	RLYM	2007	0	2015	6	94	8
PORTMAN ZONE SUB (Unit 15)	VAT100869802-3	RLYM	2006	17	2015	6	94	9
PORTMAN ZONE SUB (Unit 15)	ALS2504318	RLYE	2002	0	2015	6	97	13
PORTMAN ZONE SUB (Unit 16)	ASEG1-126	RLYE	1984	17	2015	6	35	31
PORTMAN ZONE SUB (Unit 16)	ASEAE151	RLYE	1984	0	2015	6	38	31
PORTMAN ZONE SUB (Unit 17)	ASEAE152	RLYE	1984	17	2015	6	38	31

PORTMAN ZONE SUB (Unit 17)	ASEG1-127	RLYE	1984	0	2015	6	35	31
PORTMAN ZONE SUB (Unit 2)	ALS1103755	RLYE	2002	10	2015	2	97	13
PORTMAN ZONE SUB (Unit 3)	ASEG1-117	RLYE	1984	17	2015	6	35	31
PORTMAN ZONE SUB (Unit 3)	ASEAE142	RLYE	1984	0	2015	6	38	31
PORTMAN ZONE SUB (Unit 4)	ASEG1-118	RLYE	1984	17	2015	6	35	31
PORTMAN ZONE SUB (Unit 4)	ASEAE156	RLYE	1984	0	2015	6	38	31
PORTMAN ZONE SUB (Unit 5)	ALS31225856	RLYE	2010	10	2015	6	97	5
PORTMAN ZONE SUB (Unit 7)	ALS3006416	RLYE	2007	10	2015	1	97	8
PORTMAN ZONE SUB (Unit 8)	ALS2504316	RLYE	2002	17	2015	6	97	13
PORTMAN ZONE SUB (Unit 8)	VAT102975101-15	RLYM	2012	0	2015	6	94	3
PORTMAN ZONE SUB (Unit 9)	ASEAE147	RLYE	1984	17	2015	6	38	31
PORTMAN ZONE SUB (Unit 9)	ASEG1-122	RLYE	1984	0	2015	6	35	31
RANDOLPH ST S (Unit 17)	REYG2Z89	RLYM	1970	12	2015	4	94	45
RANDOLPH ST S (Unit 18)	ASEG5-108	RLYE	1980	12	2015	6	35	35
RANDOLPH ST S (Unit 30)	ASEG5-116	RLYE	1984	12	2015	6	35	31
RANDOLPH ST S (Unit 31)	REYE2Y122	RLYM	1966	12	2015	5	94	49
RANDOLPH ST S (Unit 32)	REY232591	RLYM	1986	12	2015	2	94	29
SPRINGSTON ZONE SUB (Unit 111)	E-E293693	RLYM	1974	20	2015	3	54	41
SPRINGSTON ZONE SUB (Unit 111)	E-E293684	RLYM	1975	0	2015	3	61	40
SPRINGSTON ZONE SUB (Unit 112)	E-E293685	RLYM	1975	20	2015	3	61	40
SPRINGSTON ZONE SUB (Unit 112)	E-E293690	RLYM	1974	0	2015	3	54	41
SPRINGSTON ZONE SUB (Unit 113)	E-E293692	RLYM	1974	20	2015	3	54	41
SPRINGSTON ZONE SUB (Unit 113)	E-E293683	RLYM	1975	0	2015	3	61	40
SPRINGSTON ZONE SUB (Unit 114)	E-E293682	RLYM	1975	20	2015	3	61	40
SPRINGSTON ZONE SUB (Unit 114)	E-E293691	RLYM	1974	0	2015	3	54	41
SPRINGSTON ZONE SUB (Unit 115)	E-E436180	RLYM	1976	20	2015	3	61	39
SPRINGSTON ZONE SUB (Unit 115)	E-E855706	RLYM	1977	0	2015	3	54	38
SPRINGSTON ZONE SUB (Unit 3502)	SCH2003105096	RLYE	2003	75	2015	3	59	12
SPRINGSTON ZONE SUB (Unit 3502)	GEC302211	RLYM	1982	0	2015	3	51	33
SPRINGSTON ZONE SUB (Unit 3502)	E-E302213	RLYM	1974	0	2015	3	54	41
SPRINGSTON ZONE SUB (Unit 3512)	ASEBC171	RLYE	1986	20	2015	6	38	29
SPRINGSTON ZONE SUB (Unit 3512)	ASET102B	RLYM	1987	0	2015	6	35	28
SPRINGSTON ZONE SUB (Unit 3512)	ASED341	RLYM	1990	0	2015	6	40	25
SPRINGSTON ZONE SUB (Unit 3512)	ASEAE224	RLYE	1986	0	2015	6	38	29

SPRINGSTON ZONE SUB (Unit 3522)	ASEAE225	RLYE	1986	20	2015	6	38	29
SPRINGSTON ZONE SUB (Unit 3522)	ASED344	RLYM	1990	0	2015	6	40	25
SPRINGSTON ZONE SUB (Unit 3522)	ASET103	RLYM	1987	0	2015	6	35	28
SPRINGSTON ZONE SUB (Unit 3522)	ASEBC172	RLYE	1986	0	2015	6	38	29
SPRINGSTON ZONE SUB (Unit 3532)	GEMAAZC07000781	RLYE	2008	25	2015	1	100	7
ST ASAPH ST NO.455 (Unit 4)	REYE2Z1351	RLYM	1967	12	2015	4	94	48
ST ASAPH ST NO.455 (Unit 5)	VAT100566602-1	RLYM	2005	12	2015	1	94	10
ST ASAPH ST NO.455 (Unit 6)	AEI3012329	RLYM	1965	10	2015	5	39	50
TUAM ST NO.94 (Unit 7)	REYF2W1050	RLYM	1965	12	2015	5	94	50
TUAM ST NO.94 (Unit 8)	AEI3012296	RLYM	1965	10	2015	5	39	50
TUAM ST NO.94 (Unit 9)	REYF2W1049	RLYM	1965	12	2015	5	94	50
ADDINGTON GXP (Unit 4)	REYF2T121	RLYM	1965	12	2016	5	94	51
ADDINGTON GXP (Unit 5)	REYF2T120	RLYM	1965	12	2016	5	94	51
ADDINGTON GXP (Unit 9)	REYG2W938	RLYM	1966	12	2016	5	94	50
ALFRED ST (Unit 31)	EEC270177C	RLYM	1973	10	2016	3	60	43
ALFRED ST (Unit 32)	REYD3F1650	RLYM	1977	12	2016	3	94	39
ALFRED ST (Unit 33)	AEI3012318	RLYM	1965	10	2016	5	39	51
ALFRED ST (Unit 34)	REYA3A771	RLYM	1971	12	2016	4	94	45
APSLEY DR NO.6 (Unit 33)	AEI3012337	RLYM	1965	10	2016	5	39	51
APSLEY DR NO.6 (Unit 34)	REYG2Z45	RLYM	1968	12	2016	4	94	48
APSLEY DR NO.6 (Unit 35)	AEI3012315	RLYM	1965	10	2016	5	39	51
APSLEY DR NO.6 (Unit 36)	AEI3132216	RLYM	1970	10	2016	4	39	46
APSLEY DR NO.6 (Unit 37)	AEI3132217	RLYM	1970	10	2016	4	39	46
APSLEY DR NO.6 (Unit 38)	REYG2Z46	RLYM	1968	12	2016	4	94	48
BISHOPDALE ZONE SUB (Bus 1)	AEI3288680	RLYM	1970	56	2016	4	42	46
BISHOPDALE ZONE SUB (Unit 1)	REYF3A510	RLYM	1965	17	2016	5	94	51
BISHOPDALE ZONE SUB (Unit 1)	AEI3129043	RLYM	1966	0	2016	5	39	50
BISHOPDALE ZONE SUB (Unit 10)	ALS30071457	RLYE	2010	17	2016	1	97	6
BISHOPDALE ZONE SUB (Unit 11)	ALS4902053	RLYE	2003	17	2016	1	97	13
BISHOPDALE ZONE SUB (Unit 13)	ALS1000524	RLYE	2001	17	2016	2	97	15
BISHOPDALE ZONE SUB (Unit 14)	AEI3294007	RLYM	1964	17	2016	5	39	52
BISHOPDALE ZONE SUB (Unit 14)	REYG2W946	RLYM	1966	0	2016	5	94	50
BISHOPDALE ZONE SUB (Unit 15)	AEI3266645	RLYM	1968	17	2016	4	43	48
BISHOPDALE ZONE SUB (Unit 15)	REYG2W953	RLYM	1966	0	2016	4	94	50

BISHOPDALE ZONE SUB (Unit 16)	REYD3B1250	RLYM	1972	17	2016	6	94	44
BISHOPDALE ZONE SUB (Unit 16)	REY06237002-01	RLYM	1960	0	2016	6	51	56
BISHOPDALE ZONE SUB (Unit 17)	AEI3250747	RLYM	1967	17	2016	4	39	49
BISHOPDALE ZONE SUB (Unit 17)	REYD3B1270	RLYM	1972	0	2016	4	94	44
BISHOPDALE ZONE SUB (Unit 2)	REYD3B1247	RLYM	1972	17	2016	1	94	44
BISHOPDALE ZONE SUB (Unit 2)	ALS30005445	RLYE	2008	0	2016	1	97	8
BISHOPDALE ZONE SUB (Unit 3)	REYG2W949	RLYM	1966	17	2016	4	94	50
BISHOPDALE ZONE SUB (Unit 3)	AEI3266643	RLYM	1968	0	2016	4	43	48
BISHOPDALE ZONE SUB (Unit 4)	ALS0806892	RLYE	2007	10	2016	1	97	9
BISHOPDALE ZONE SUB (Unit 5)	GEC050352L	RLYM	1980	10	2016	2	60	36
BISHOPDALE ZONE SUB (Unit 5)	REYG2W951	RLYM	1966	0	2016	2	94	50
BISHOPDALE ZONE SUB (Unit 7)	AEI3293984	RLYM	1964	17	2016	5	39	52
BISHOPDALE ZONE SUB (Unit 7)	REYD3B1249	RLYM	1972	0	2016	5	94	44
BISHOPDALE ZONE SUB (Unit 8)	REYD3B1248	RLYM	1972	17	2016	1	94	44
BISHOPDALE ZONE SUB (Unit 8)	ALS30005446	RLYE	2008	0	2016	1	97	8
BISHOPDALE ZONE SUB (Unit 9)	AEI3266644	RLYM	1968	17	2016	4	43	48
BISHOPDALE ZONE SUB (Unit 9)	REYG2W956	RLYM	1966	0	2016	4	94	50
BRISBANE ST NO.82 (Unit 2)	AEI3012321	RLYM	1965	10	2016	5	39	51
BRISBANE ST NO.82 (Unit 3)	REYH2Y807	RLYM	1967	12	2016	4	94	49
BRISBANE ST NO.82 (Unit 4)	REYH2Y808	RLYM	1967	12	2016	4	94	49
FOSTER ZONE SUB (Unit 10)	GEC550619	RLYM	1991	17	2016	1	61	25
FOSTER ZONE SUB (Unit 10)	VAT263602-5	RLYM	2001	0	2016	1	94	15
FOSTER ZONE SUB (Unit 11)	GEC536713	RLYM	1991	10	2016	1	60	25
FOSTER ZONE SUB (Unit 12)	GEC770816	RLYM	1969	17	2016	4	46	47
FOSTER ZONE SUB (Unit 12)	VAT322604-1	RLYM	2001	0	2016	4	94	15
FOSTER ZONE SUB (Unit 14)	REY203392	RLYM	1971	10	2016	4	35	45
FOSTER ZONE SUB (Unit 15)	GEC101549	RLYM	1979	10	2016	2	60	37
FOSTER ZONE SUB (Unit 17)	GEC536717	RLYM	1991	10	2016	1	60	25
FOSTER ZONE SUB (Unit 18)	VAT263602-6	RLYM	2001	17	2016	1	94	15
FOSTER ZONE SUB (Unit 19)	VAT263602-9	RLYM	2001	17	2016	4	94	15
FOSTER ZONE SUB (Unit 19)	GEC770818	RLYM	1969	0	2016	4	46	47
FOSTER ZONE SUB (Unit 20)	GEC536714C	RLYM	1991	10	2016	1	60	25
FOSTER ZONE SUB (Unit 21)	GEC550618C	RLYM	1991	17	2016	1	61	25
FOSTER ZONE SUB (Unit 21)	VAT263602-7	RLYM	2001	0	2016	1	94	15

FOSTER ZONE SUB (Unit 3)	ALS2101662	RLYE	2002	17	2016	2	97	14
FOSTER ZONE SUB (Unit 3)	VAT101218301-5	RLYM	2006	0	2016	2	94	10
FOSTER ZONE SUB (Unit 4)	ALS2101659	RLYE	2002	17	2016	2	97	14
FOSTER ZONE SUB (Unit 5)	ALS1001994	RLYE	2002	10	2016	2	97	14
FOSTER ZONE SUB (Unit 5)	VAT381201-1	RLYM	2002	0	2016	2	94	14
FOSTER ZONE SUB (Unit 6)	VAT381201-3	RLYM	2002	17	2016	2	94	14
FOSTER ZONE SUB (Unit 6)	ALS1001992	RLYE	2002	0	2016	2	97	14
FOSTER ZONE SUB (Unit 7)	ALS2101660	RLYE	2002	10	2016	2	97	14
FOSTER ZONE SUB (Unit 8)	ALS1001993	RLYE	2002	10	2016	2	97	14
FOSTER ZONE SUB (Unit 9)	GEC536716	RLYM	1991	10	2016	1	60	25
HALSWELL ZONE SUB (Unit 152)	ASEG1-136	RLYE	1989	65	2016	5	35	27
HALSWELL ZONE SUB (Unit 152)	ASEAE1162	RLYE	1989	0	2016	5	39	27
HALSWELL ZONE SUB (Unit 172)	ASEAE1165	RLYE	1989	65	2016	5	39	27
HALSWELL ZONE SUB (Unit 172)	ASEG1-139	RLYE	1989	0	2016	5	35	27
LISMORE ST E (Unit 32)	AEI3012319	RLYM	1965	10	2016	5	39	51
LISMORE ST E (Unit 33)	VAT100420102-3	RLYM	2004	12	2016	1	94	12
LISMORE ST E (Unit 34)	REYE2Z1329	RLYM	1967	12	2016	4	94	49
LISMORE ST E (Unit 35)	AEI3012324	RLYM	1965	10	2016	5	39	51
MANDEVILLE ST NO.70A (Unit 31)	ALS1404677	RLYE	2005	10	2016	6	97	11
MANDEVILLE ST NO.70A (Unit 32)	VAT263602-10	RLYM	2001	12	2016	1	94	15
MANDEVILLE ST NO.70A (Unit 33)	VAT263602-12	RLYM	2001	12	2016	1	94	15
MANDEVILLE ST NO.70A (Unit 34)	ASEAE1104	RLYE	1987	10	2016	6	39	29
MANDEVILLE ST NO.70A (Unit 34)	ALS1405858	RLYE	2005	0	2016	6	97	11
ORCHARD RD SWITCHING STN (Unit 31)	GEC238472C	RLYM	1975	10	2016	3	61	41
ORCHARD RD SWITCHING STN (Unit 31)	GEC238488C	RLYM	1973	0	2016	3	42	43
ORCHARD RD SWITCHING STN (Unit 32)	GEC68578	RLYM	1986	10	2016	2	60	30
ORCHARD RD SWITCHING STN (Unit 33)	ASEG5-127	RLYE	1984	17	2016	6	35	32
ORCHARD RD SWITCHING STN (Unit 33)	ASEAE1121	RLYE	1987	0	2016	6	39	29
ORCHARD RD SWITCHING STN (Unit 34)	GEC238491C	RLYM	1973	10	2016	3	42	43
ORCHARD RD SWITCHING STN (Unit 34)	GEC238476C	RLYM	1975	0	2016	3	61	41
ORCHARD RD SWITCHING STN (Unit 35)	ASEG5-128	RLYE	1984	17	2016	6	35	32
ORCHARD RD SWITCHING STN (Unit 35)	ASEAE1122	RLYE	1987	0	2016	6	39	29
ORCHARD RD SWITCHING STN (Unit 36)	VAT606301-1	RLYM	2002	12	2016	2	94	14
ORCHARD RD SWITCHING STN (Unit 37)	GEC238494C	RLYM	1973	10	2016	3	42	43

ORCHARD RD SWITCHING STN (Unit 37)	GEC238478C	RLYM	1975	0	2016	3	61	41
ORCHARD RD SWITCHING STN (Unit 38)	GEC436197E	RLYM	1973	10	2016	3	42	43
ORCHARD RD SWITCHING STN (Unit 38)	GEC436185E	RLYM	1976	0	2016	3	61	40
PLYMOUTH LN (UNIT 33)	ALS2101676	RLYE	2002	10	2016	2	97	14
PLYMOUTH LN (UNIT 34)	ALS0802699	RLYE	2002	10	2016	2	97	14
PLYMOUTH LN (UNIT 35)	VAT471101-9	RLYM	2002	12	2016	1	94	14
PLYMOUTH LN (UNIT 37)	VAT498802-3	RLYM	2002	12	2016	1	94	14
SPREYDON ZONE SUB (Bus 1)	AEI3288681	RLYM	1980	56	2016	2	42	36
SPREYDON ZONE SUB (Unit 1)	E-E578000	RLYM	1967	17	2016	4	45	49
SPREYDON ZONE SUB (Unit 1)	REYH2W978	RLYM	1961	0	2016	4	94	55
SPREYDON ZONE SUB (Unit 10)	REYH2W68	RLYM	1961	10	2016	3	94	55
SPREYDON ZONE SUB (Unit 11)	REYH2W74	RLYM	1961	17	2016	5	94	55
SPREYDON ZONE SUB (Unit 11)	AEI3293964	RLYM	1964	0	2016	5	39	52
SPREYDON ZONE SUB (Unit 13)	GEC54594	RLYM	1984	10	2016	2	60	32
SPREYDON ZONE SUB (Unit 14)	AEI3293966	RLYM	1964	17	2016	5	39	52
SPREYDON ZONE SUB (Unit 14)	REYH2W396	RLYM	1961	0	2016	5	94	55
SPREYDON ZONE SUB (Unit 15)	AEI3266651	RLYM	1968	17	2016	4	43	48
SPREYDON ZONE SUB (Unit 15)	REYH2W397	RLYM	1961	0	2016	4	94	55
SPREYDON ZONE SUB (Unit 16)	REYH2W398	RLYM	1961	17	2016	3	94	55
SPREYDON ZONE SUB (Unit 16)	GEC126727	RLYM	1973	0	2016	3	61	43
SPREYDON ZONE SUB (Unit 17)	REYH2W401	RLYM	1961	17	2016	5	94	55
SPREYDON ZONE SUB (Unit 17)	AEI3293968	RLYM	1964	0	2016	5	39	52
SPREYDON ZONE SUB (Unit 2)	REYH2W979	RLYM	1961	17	2016	5	94	55
SPREYDON ZONE SUB (Unit 2)	AEI3293958	RLYM	1964	0	2016	5	39	52
SPREYDON ZONE SUB (Unit 3)	REYH2W980	RLYM	1961	17	2016	4	94	55
SPREYDON ZONE SUB (Unit 3)	AEI3266649	RLYM	1968	0	2016	4	43	48
SPREYDON ZONE SUB (Unit 4)	AEI3293959	RLYM	1964	17	2016	5	39	52
SPREYDON ZONE SUB (Unit 4)	REYH2W981	RLYM	1961	0	2016	5	94	55
SPREYDON ZONE SUB (Unit 5)	AEI3293960	RLYM	1964	17	2016	5	39	52
SPREYDON ZONE SUB (Unit 5)	REYH2W982	RLYM	1961	0	2016	5	94	55
SPREYDON ZONE SUB (Unit 7)	REYH2W51	RLYM	1961	17	2016	5	94	55
SPREYDON ZONE SUB (Unit 7)	AEI3293953	RLYM	1964	0	2016	5	39	52
SPREYDON ZONE SUB (Unit 8)	REYH2W56	RLYM	1961	17	2016	5	94	55
SPREYDON ZONE SUB (Unit 8)	AEI3293962	RLYM	1964	0	2016	5	39	52

SPREYDON ZONE SUB (Unit 9)	REYH2W64	RLYM	1961	17	2016	4	94	55
SPREYDON ZONE SUB (Unit 9)	AEI3266650	RLYM	1968	0	2016	4	43	48
SPRINGFIELD RD NO.56 (Unit 32)	GEC270137C	RLYM	1973	10	2016	3	60	43
SPRINGFIELD RD NO.56 (Unit 33)	GEC270163C	RLYM	1973	10	2016	3	60	43
SPRINGFIELD RD NO.56 (Unit 34)	REY182213	RLYM	1986	12	2016	2	94	30
SPRINGFIELD RD NO.56 (Unit 35)	REYG2Z41	RLYM	1968	12	2016	4	94	48
SPRINGFIELD RD NO.56 (Unit 36)	REYE2Y125	RLYM	1966	12	2016	5	94	50
STRAVEN RD NO.103 (Unit 11)	REY56759	RLYM	1979	12	2016	2	94	37
STRAVEN RD NO.103 (Unit 12)	REY36884	RLYM	1979	12	2016	2	94	37
STRAVEN RD NO.103 (Unit 13)	GEC065634P	RLYM	1984	25	2016	2	60	32
STRUTHERS LN (Unit 2)	AEI3012299	RLYM	1965	10	2016	5	39	51
STRUTHERS LN (Unit 3)	AEI3012300	RLYM	1965	10	2016	5	39	51
STRUTHERS LN (Unit 4)	REYE2Z1330	RLYM	1967	12	2016	4	94	49
STRUTHERS LN (Unit 5)	VAT538401-19	RLYM	2002	12	2016	1	94	14
STRUTHERS LN (Unit 6)	VAT538401-16	RLYM	2002	12	2016	1	94	14
TE PIRITA ZONE SUB (Unit 111)	GEMA2810343	RLYE	2002	20	2016	2	96	14
TE PIRITA ZONE SUB (Unit 112)	GEMA2810340	RLYE	2002	20	2016	2	96	14
TE PIRITA ZONE SUB (Unit 113)	GEMA2810345	RLYE	2002	20	2016	2	96	14
TE PIRITA ZONE SUB (Unit 114)	GEMA2810342	RLYE	2002	20	2016	2	96	14
TE PIRITA ZONE SUB (Unit 115)	GEMA2800460	RLYE	2001	20	2016	2	96	15
TE PIRITA ZONE SUB (Unit 4102)	GEMD3300779	RLYE	2002	75	2016	2	84	14
TEDDINGTON ZONE SUB (Unit 111)	ALS5100832	RLYE	2001	20	2016	2	91	15
TEDDINGTON ZONE SUB (Unit 112)	ALS1802429	RLYE	2001	20	2016	2	91	15
TOTARA ST (Unit 31)	EEC270159C	RLYM	1973	10	2016	3	60	43
TOTARA ST (Unit 32)	REYG2Z12	RLYM	1968	12	2016	4	94	48
TOTARA ST (Unit 33)	REYG2Z27	RLYM	1968	12	2016	4	94	48
WAIRAKEI RD NO.330 (Unit 33)	REYA3A752	RLYM	1971	12	2016	4	94	45
WAIRAKEI RD NO.330 (Unit 34)	EEC270158C	RLYM	1973	10	2016	3	60	43
WAIRAKEI RD NO.330 (Unit 35)	VAT538401-10	RLYM	2002	12	2016	1	94	14
WAIRAKEI RD NO.330 (Unit 37)	GEC054627R	RLYM	1984	10	2016	2	60	32
WAIRAKEI RD NO.330 (Unit 38)	GEC054548R	RLYM	1984	10	2016	2	60	32
WAIRAKEI RD NO.330 (Unit 39)	GEC059939N	RLYM	1982	10	2016	2	60	34
WATTS RD NO.41 (Unit 38)	ASEAE161	RLYE	1984	10	2016	6	38	32
WATTS RD NO.41 (Unit 38)	ASEBC106	RLYE	1981	0	2016	6	38	35

WILMER ST NO.10 (Unit 2)	GEC041610H	RLYM	1968	10	2016	4	60	48
WILMER ST NO.10 (Unit 3)	REYG2Z18	RLYM	1968	12	2016	4	94	48
WILMER ST NO.10 (Unit 4)	GEC041611H	RLYM	1968	10	2016	4	60	48
WILMER ST NO.10 (Unit 5)	REYE2Z1326	RLYM	1967	12	2016	4	94	49
WILMER ST NO.10 (Unit 6)	REYG2W945	RLYM	1966	12	2016	5	94	50
WILSONS RD NO.338 (Unit 3)	REYG2U789	RLYM	1965	12	2016	5	94	51
WILSONS RD NO.338 (Unit 4)	REYH2Y779	RLYM	1967	12	2016	4	94	49
WILSONS RD NO.338 (Unit 5)	REYH2Y795	RLYM	1967	12	2016	4	94	49
WILSONS RD NO.338 (Unit 6)	AEI3012320	RLYM	1965	10	2016	5	39	51
WYNDHAM ST (Unit 11)	REYD3H71	RLYM	1978	12	2016	3	94	38
WYNDHAM ST (Unit 12)	REYG2Z31	RLYM	1968	12	2016	4	94	48
WYNDHAM ST (Unit 13)	REYG2Z75	RLYM	1970	12	2016	4	94	46
WYNDHAM ST (Unit 14)	GEC054607R	RLYM	1984	10	2016	2	60	32
WYNDHAM ST (Unit 15)	GEC054595R	RLYM	1984	10	2016	2	60	32
ARMAGH ZONE SUB (Unit 11A)	ALS4701626	RLYE	2002	17	2017	2	97	15
ARMAGH ZONE SUB (Unit 11A)	VAT591801-9	RLYM	2002	0	2017	2	94	15
ARMAGH ZONE SUB (Unit 11B)	VAT591801-2	RLYM	2002	17	2017	2	94	15
ARMAGH ZONE SUB (Unit 11B)	ALS4701633	RLYE	2002	0	2017	2	97	15
ARMAGH ZONE SUB (Unit 13A)	ALS4701631	RLYE	2002	17	2017	2	97	15
ARMAGH ZONE SUB (Unit 13A)	VAT591801-3	RLYM	2002	0	2017	2	94	15
ARMAGH ZONE SUB (Unit 13B)	VAT591801-7	RLYM	2002	17	2017	2	94	15
ARMAGH ZONE SUB (Unit 13B)	ALS4701634	RLYE	2002	0	2017	2	97	15
ARMAGH ZONE SUB (Unit 15B)	ALS4701635	RLYE	2002	10	2017	2	97	15
ARMAGH ZONE SUB (Unit 19A)	ALS4701621	RLYE	2002	10	2017	2	97	15
ARMAGH ZONE SUB (Unit 1A)	ALS476366	RLYE	2004	16	2017	1	99	13
ARMAGH ZONE SUB (Unit 1B)	ALS476368	RLYE	2004	16	2017	1	99	13
ARMAGH ZONE SUB (Unit 3A)	VAT591801-10	RLYM	2002	17	2017	2	94	15
ARMAGH ZONE SUB (Unit 3A)	ALS4701628	RLYE	2002	0	2017	2	97	15
ARMAGH ZONE SUB (Unit 3B)	VAT591801-1	RLYM	2002	17	2017	2	94	15
ARMAGH ZONE SUB (Unit 3B)	ALS4701625	RLYE	2002	0	2017	2	97	15
ARMAGH ZONE SUB (Unit 5A)	VAT591801-5	RLYM	2002	17	2017	2	94	15
ARMAGH ZONE SUB (Unit 5A)	ALS4701630	RLYE	2002	0	2017	2	97	15
ARMAGH ZONE SUB (Unit 5B)	ALS4701627	RLYE	2002	17	2017	2	97	15
ARMAGH ZONE SUB (Unit 5B)	VAT591801-8	RLYM	2002	0	2017	2	94	15

ARMAGH ZONE SUB (Unit 7A)	ALS4701623	RLYE	2002	17	2017	2	97	15
ARMAGH ZONE SUB (Unit 7A)	VAT591801-4	RLYM	2002	0	2017	2	94	15
ARMAGH ZONE SUB (Unit 7B)	ALS4701629	RLYE	2002	17	2017	2	97	15
ARMAGH ZONE SUB (Unit 7B)	VAT591801-6	RLYM	2002	0	2017	2	94	15
ARMAGH ZONE SUB (Unit 9A)	ALS476367	RLYE	2004	16	2017	1	99	13
ARMAGH ZONE SUB (Bus Zone A1)	ALS240268N	RLYM	2002	56	2017	1	90	15
ARMAGH ZONE SUB (Bus Zone A1)	ALS239751N	RLYM	2002	0	2017	1	85	15
ARMAGH ZONE SUB (Bus Zone A1)	ALS240270N	RLYM	2002	0	2017	1	90	15
ARMAGH ZONE SUB (Bus Zone A1)	ALS236962N	RLYM	2002	0	2017	1	90	15
ARMAGH ZONE SUB (Bus Zone A3)	ALS239750N	RLYM	2002	56	2017	1	85	15
ARMAGH ZONE SUB (Bus Zone A3)	ALS236963N	RLYM	2002	0	2017	1	90	15
ARMAGH ZONE SUB (Bus Zone A3)	ALS240263N	RLYM	2002	0	2017	1	90	15
ARMAGH ZONE SUB (Bus Zone A3)	ALS240265N	RLYM	2002	0	2017	1	90	15
ARMAGH ZONE SUB (Bus Zone B1)	ALS240266N	RLYM	2002	56	2017	1	90	15
ARMAGH ZONE SUB (Bus Zone B1)	ALS240262N	RLYM	2002	0	2017	1	90	15
ARMAGH ZONE SUB (Bus Zone B1)	ALS236964N	RLYM	2002	0	2017	1	90	15
ARMAGH ZONE SUB (Bus Zone B1)	ALS239752N	RLYM	2002	0	2017	1	85	15
ARMAGH ZONE SUB (Bus Zone B3)	ALS239753N	RLYM	2002	56	2017	1	85	15
ARMAGH ZONE SUB (Bus Zone B3)	ALS236966N	RLYM	2002	0	2017	1	90	15
ARMAGH ZONE SUB (Bus Zone B3)	ALS240267N	RLYM	2002	0	2017	1	90	15
ARMAGH ZONE SUB (Bus Zone B3)	ALS240264N	RLYM	2002	0	2017	1	90	15
ARMAGH ZONE SUB (Bus Zone B3)	ALS240269N	RLYE	2002	0	2017	1	90	15
ARMAGH ZONE SUB (Bus Zone B3)	ALS240271N	RLYM	2002	0	2017	1	90	15
BEACH RD NO.120 (Unit 33)	AEI3012325	RLYM	1965	10	2017	5	39	52
BEACH RD NO.120 (Unit 34)	AEI3012326	RLYM	1965	10	2017	5	39	52
BEACH RD NO.120 (Unit 35)	AEI3012327	RLYM	1965	10	2017	5	39	52
BEACH RD NO.120 (Unit 36)	REYG2T1105	RLYM	1964	12	2017	5	94	53
BEACH RD NO.120 (Unit 37)	REYE2Z1322	RLYM	1967	12	2017	4	94	50
BEACH RD NO.120 (Unit 38)	ALS1405852	RLYE	2005	12	2017	1	97	12
BEACH RD NO.120 (Unit 38)	REYF2W866	RLYM	1965	0	2017	1	94	52
BEACH RD NO.228 (Unit 33)	REYH2Y789	RLYM	1967	12	2017	4	94	50
BEACH RD NO.228 (Unit 34)	ALS2803965	RLYE	2004	10	2017	1	97	13
BEACH RD NO.228 (Unit 35)	ALS1404704	RLYE	2005	10	2017	1	97	12
BEACH RD NO.228 (Unit 36)	REYG2T1133	RLYM	1964	12	2017	5	94	53

BEACH RD NO.228 (Unit 37)	REYG2T1113	RLYM	1964	12	2017	5	94	53
BEACH RD NO.228 (Unit 38)	VAT100277403-3	RLYM	2003	12	2017	1	94	14
BUCHANANS RD NO.79 (Unit 1)	REY42009	RLYM	1971	10	2017	4	37	46
BUCHANANS RD NO.79 (Unit 1)	REY41990	RLYM	1971	0	2017	4	35	46
BUCHANANS RD NO.79 (Unit 1)	REY99513	RLYM	1971	0	2017	4	55	46
BUCHANANS RD NO.79 (Unit 2)	REYB3A12499	RLYM	1971	10	2017	4	37	46
BUCHANANS RD NO.79 (Unit 2)	REYD3A1245	RLYM	1971	0	2017	4	55	46
BUCHANANS RD NO.79 (Unit 2)	REYA3A1897	RLYM	1971	0	2017	4	35	46
BUCHANANS RD NO.79 (Unit 3)	REYA3A1892	RLYM	1971	10	2017	4	35	46
BUCHANANS RD NO.79 (Unit 3)	REYB3A12500	RLYM	1971	0	2017	4	37	46
BUCHANANS RD NO.79 (Unit 3)	REYD3A1246	RLYM	1971	0	2017	4	55	46
BUCHANANS RD NO.79 (Unit 4)	REYB3A12501	RLYM	1971	10	2017	4	37	46
BUCHANANS RD NO.79 (Unit 4)	REYD3A1247	RLYM	1971	0	2017	4	55	46
BUCHANANS RD NO.79 (Unit 4)	REYA3A1838	RLYM	1971	0	2017	4	35	46
CHRISTS COLLEGE (Unit 2)	REYH2W431	RLYM	1966	12	2017	5	94	51
CHRISTS COLLEGE (Unit 3)	REYG2W239	RLYM	1966	12	2017	5	94	51
CHRISTS COLLEGE (Unit 4)	GEC060020M	RLYM	1982	10	2017	2	60	35
DEE ST NO.67 (Unit 11)	ALS1200728	RLYE	2001	10	2017	2	97	16
DEE ST NO.67 (Unit 12)	VAT224103-3	RLYM	2001	12	2017	1	94	16
DEE ST NO.67 (Unit 13)	VAT224103-1	RLYM	2001	12	2017	1	94	16
DEE ST NO.67 (Unit 14)	ALS1200729	RLYE	2001	10	2017	2	97	16
FACTORY RD NO.85 (Unit 31)	ALS3400497	RLYE	2001	10	2017	2	97	16
FACTORY RD NO.85 (Unit 32)	ALS3400496	RLYE	2001	10	2017	2	97	16
FACTORY RD NO.85 (Unit 33)	ALS3100080	RLYE	2001	17	2017	2	94	16
FACTORY RD NO.85 (Unit 33)	VAT292903-3	RLYM	2001	0	2017	2	94	16
FACTORY RD NO.85 (Unit 35)	ALS2101657	RLYE	2002	10	2017	2	91	15
FACTORY RD NO.85 (Unit 36)	VAT292901-1	RLYM	2001	12	2017	2	94	16
FACTORY RD NO.85 (Unit 36)	ALS3100078	RLYE	2001	0	2017	2	94	16
FACTORY RD NO.85 (Unit 37)	ALS3400502	RLYE	2001	10	2017	2	97	16
FIRESTONE (Unit 11)	AEI3293978	RLYM	1964	10	2017	5	39	53
FIRESTONE (Unit 12)	AEI3293989	RLYM	1964	10	2017	5	39	53
FIRESTONE (Unit 13)	AEI3293990	RLYM	1964	10	2017	5	39	53
FIRESTONE (Unit 14)	REYG2Z10	RLYM	1968	12	2017	4	94	49
FIRESTONE (Unit 15)	REYG2Z20	RLYM	1968	12	2017	4	94	49

FITZGERALD AV NO.93 (Unit 15)	REYA3A769	RLYM	1971	12	2017	4	94	46
GAMBLINS RD NO.33 (Unit 11)	VAT101012202-3	RLYM	2006	12	2017	1	94	11
GAMBLINS RD NO.33 (Unit 12)	VAT101012202-1	RLYM	2006	12	2017	1	94	11
GAMBLINS RD NO.33 (Unit 13)	VAT101012202-2	RLYM	2006	12	2017	1	94	11
GAMBLINS RD NO.33 (Unit 14)	VAT101012202-5	RLYM	2006	12	2017	1	94	11
GAMBLINS RD NO.33 (Unit 15)	ALS2803963	RLYE	2006	10	2017	1	97	11
GAMBLINS RD NO.33 (Unit 16)	ALS0802530	RLYE	2002	10	2017	2	97	15
HALSWELL ZONE SUB (Unit 1)	VAT268101-5	RLYM	2001	10	2017	2	94	16
HALSWELL ZONE SUB (Unit 1)	ALS2100988	RLYE	2001	0	2017	2	97	16
HALSWELL ZONE SUB (Unit 10)	VAT100607701-2	RLYM	2005	17	2017	2	94	12
HALSWELL ZONE SUB (Unit 10)	ALS4203042	RLYE	2001	0	2017	2	97	16
HALSWELL ZONE SUB (Unit 11)	ALS1009762	RLYE	2005	16	2017	1	99	12
HALSWELL ZONE SUB (Unit 142)	ALS2504292	RLYE	2002	75	2017	2	97	15
HALSWELL ZONE SUB (Unit 162)	GEMMAZC09000137	RLYE	2010	65	2017	1	100	7
HALSWELL ZONE SUB (Unit 182)	ASEG1-138	RLYE	1989	65	2017	5	35	28
HALSWELL ZONE SUB (Unit 182)	ASEAE1171	RLYE	1989	0	2017	5	39	28
HALSWELL ZONE SUB (Unit 2)	ALS2100989	RLYE	2001	10	2017	2	97	16
HALSWELL ZONE SUB (Unit 2)	VAT268101-9	RLYM	2001	0	2017	2	94	16
HALSWELL ZONE SUB (Unit 202)	ALS2504310	RLYE	2002	10	2017	2	97	15
HALSWELL ZONE SUB (Unit 3)	ALS1009766	RLYE	2005	16	2017	1	99	12
HALSWELL ZONE SUB (Unit 4)	VAT244102-1	RLYM	2001	17	2017	2	94	16
HALSWELL ZONE SUB (Unit 4)	ALS2100993	RLYE	2001	0	2017	2	97	16
HALSWELL ZONE SUB (Unit 5)	ALS2100984	RLYE	2001	17	2017	2	97	16
HALSWELL ZONE SUB (Unit 5)	VAT268101-1	RLYM	2001	0	2017	2	94	16
HALSWELL ZONE SUB (Unit 6)	VAT268101-2	RLYM	2001	10	2017	2	94	16
HALSWELL ZONE SUB (Unit 6)	ALS2100992	RLYE	2001	0	2017	2	97	16
HALSWELL ZONE SUB (Unit 7)	ALS1404695	RLYE	2005	17	2017	1	97	12
HALSWELL ZONE SUB (Unit 8)	ALS5099297	RLYE	2001	17	2017	2	97	16
HALSWELL ZONE SUB (Unit 8)	VAT100607701-9	RLYM	2005	0	2017	2	94	12
HALSWELL ZONE SUB (Unit 9)	ALS1404672	RLYE	2005	10	2017	1	97	12
HALSWELL ZONE SUB (Unit 9)	VAT100607701-7	RLYM	2005	0	2017	1	94	12
HALSWELL ZONE SUB (Bus Zone AB)	ALS1088899	RLYM	2005	56	2017	1	85	12
HALSWELL ZONE SUB (Bus Zone AB)	ALS1088900	RLYM	2005	0	2017	1	85	12
HALSWELL ZONE SUB (Bus Zone AB)	ALS1088901	RLYM	2005	0	2017	1	85	12

HALSWELL ZONE SUB (Bus Zone AB)	ALS1093099	RLYM	2005	0	2017	1	91	12
HALSWELL ZONE SUB (Bus Zone AB)	ALS1093101	RLYM	2005	0	2017	1	91	12
HALSWELL ZONE SUB (Bus Zone AB)	ALS1093102	RLYM	2005	0	2017	1	91	12
HAMPSHIRE ST SHOPS (Unit 33)	GEC065659P	RLYM	1986	10	2017	2	60	31
HAMPSHIRE ST SHOPS (Unit 34)	REYG2Z86	RLYM	1970	12	2017	4	94	47
HAMPSHIRE ST SHOPS (Unit 36)	GEC054615R	RLYM	1984	10	2017	2	60	33
HAMPSHIRE ST SHOPS (Unit 37)	AEI3132239	RLYM	1970	10	2017	4	39	47
HEREFORD ST GUARDIAN ASS (Unit 2)	REYG2S590	RLYM	1965	12	2017	5	94	52
HEREFORD ST GUARDIAN ASS (Unit 3)	REYA3A777	RLYM	1971	12	2017	4	94	46
HEREFORD ST GUARDIAN ASS (Unit 4)	AEI3012339	RLYM	1965	10	2017	5	39	52
LIVERPOOL ST CFM (Unit 2)	AEI3250725	RLYM	1967	10	2017	4	39	50
LIVERPOOL ST CFM (Unit 3)	AEI3012331	RLYM	1965	10	2017	5	39	52
LIVERPOOL ST CFM (Unit 4)	REY182203	RLYM	1986	12	2017	2	94	31
LIVERPOOL ST CFM (Unit 5)	VAT538401-5	RLYM	2002	12	2017	1	94	15
MONTREAL ST N (Unit 31)	REY232593	RLYM	1986	12	2017	2	94	31
MONTREAL ST N (Unit 32)	REYG2W250	RLYM	1966	12	2017	5	94	51
MONTREAL ST N (Unit 33)	GEC054560R	RLYM	1984	12	2017	4	60	33
MONTREAL ST N (Unit 34)	GEC060015M	RLYM	1982	10	2017	2	60	35
MONTREAL ST N (Unit 35)	EEC270175C	RLYM	1973	10	2017	3	60	44
MOORHOUSE AV NO.38 (Unit 2)	GEC054565R	RLYM	1984	10	2017	2	60	33
MOORHOUSE AV NO.38 (Unit 3)	REYE2Y150	RLYM	1966	12	2017	5	94	51
MOORHOUSE AV NO.38 (Unit 4)	REYG2Z7	RLYM	1968	12	2017	4	94	49
MOORHOUSE AV NO.38 (Unit 5)	GEC065629P	RLYM	1984	10	2017	2	60	33
MOORHOUSE AV NO.38 (Unit 6)	GEC050353L	RLYM	1980	10	2017	2	60	37
PAGES-KEARNEYS ZONE SUB (Bus 1)	REYB3F1930	RLYM	1975	56	2017	4	56	42
PAGES-KEARNEYS ZONE SUB (Unit 10)	GEC376971	RLYM	1976	17	2017	3	61	41
PAGES-KEARNEYS ZONE SUB (Unit 10)	REYC3F396	RLYM	1975	0	2017	3	94	42
PAGES-KEARNEYS ZONE SUB (Unit 11)	REYC3F408	RLYM	1975	17	2017	3	94	42
PAGES-KEARNEYS ZONE SUB (Unit 11)	GEC376956	RLYM	1976	0	2017	3	61	41
PAGES-KEARNEYS ZONE SUB (Unit 12)	REYC3F412	RLYM	1975	17	2017	3	94	42
PAGES-KEARNEYS ZONE SUB (Unit 12)	GEC376957	RLYM	1976	0	2017	3	61	41
PAGES-KEARNEYS ZONE SUB (Unit 14)	GEC376958	RLYM	1976	17	2017	3	61	41
PAGES-KEARNEYS ZONE SUB (Unit 14)	REYC3F413	RLYM	1975	0	2017	3	94	42
PAGES-KEARNEYS ZONE SUB (Unit 15)	REYC3F416	RLYM	1975	17	2017	3	94	42

PAGES-KEARNEYS ZONE SUB (Unit 15)	GEC376959	RLYM	1976	0	2017	3	61	41
PAGES-KEARNEYS ZONE SUB (Unit 16)	GEC376972	RLYM	1976	17	2017	3	61	41
PAGES-KEARNEYS ZONE SUB (Unit 16)	REYC3F418	RLYM	1975	0	2017	3	94	42
PAGES-KEARNEYS ZONE SUB (Unit 17)	REYC3F449	RLYM	1975	17	2017	3	94	42
PAGES-KEARNEYS ZONE SUB (Unit 17)	GEC376960	RLYM	1976	0	2017	3	61	41
PAGES-KEARNEYS ZONE SUB (Unit 3)	GEC376951	RLYM	1976	17	2017	3	61	41
PAGES-KEARNEYS ZONE SUB (Unit 3)	REYC3F218	RLYM	1975	0	2017	3	94	42
PAGES-KEARNEYS ZONE SUB (Unit 4)	GEC376970	RLYM	1976	17	2017	3	61	41
PAGES-KEARNEYS ZONE SUB (Unit 4)	REYC3F219	RLYM	1975	0	2017	3	94	42
PAGES-KEARNEYS ZONE SUB (Unit 5)	GEC376952	RLYM	1976	17	2017	3	61	41
PAGES-KEARNEYS ZONE SUB (Unit 5)	REYC3F225	RLYM	1975	0	2017	3	94	42
PAGES-KEARNEYS ZONE SUB (Unit 6)	REYC3F227	RLYM	1975	17	2017	3	94	42
PAGES-KEARNEYS ZONE SUB (Unit 6)	GEC376953	RLYM	1976	0	2017	3	61	41
PAGES-KEARNEYS ZONE SUB (Unit 8)	REYC3F405	RLYM	1975	17	2017	3	94	42
PAGES-KEARNEYS ZONE SUB (Unit 8)	GEC376954	RLYM	1976	0	2017	3	61	41
PAGES-KEARNEYS ZONE SUB (Unit 9)	REYC3F397	RLYM	1975	10	2017	3	94	42
PAGES-KEARNEYS ZONE SUB (Unit 9)	EEC307128D	RLYM	1974	0	2017	3	60	43
RESERVE BANK (Unit 3)	AEI3012312	RLYM	1965	10	2017	5	39	52
RESERVE BANK (Unit 4)	VAT538401-18	RLYM	2002	12	2017	1	94	15
RESERVE BANK (Unit 5)	VAT538401-4	RLYM	2002	12	2017	1	94	15
RESERVE BANK (Unit 6)	GEC270149C	RLYM	1973	10	2017	3	60	44
ST JOHNS ST WW (Unit 31)	EEC307134D	RLYM	1974	10	2017	3	60	43
ST JOHNS ST WW (Unit 32)	EEC307133D	RLYM	1974	10	2017	3	60	43
ST JOHNS ST WW (Unit 33)	EEC307132D	RLYM	1974	10	2017	3	60	43
ST JOHNS ST WW (Unit 34)	GEC065655P	RLYM	1986	10	2017	2	60	31
ST JOHNS ST WW (Unit 35)	REYC3E356	RLYM	1974	12	2017	3	94	43
ST JOHNS ST WW (Unit 36)	ASEG1-132	RLYE	1984	12	2017	6	35	33
ST JOHNS ST WW (Unit 37)	ASEG1-145	RLYE	1989	12	2017	5	35	28
ST JOHNS ST WW (Unit 37)	VAT502601-5	RLYM	2011	0	2017	5	94	6
WEST WATSON AV W (Unit 11)	REYA3A722	RLYM	1971	12	2017	4	94	46
WEST WATSON AV W (Unit 12)	VAT100296102-3	RLYM	2004	12	2017	1	94	13
WEST WATSON AV W (Unit 13)	REYG2Z11	RLYM	1968	12	2017	4	94	49
WEST WATSON AV W (Unit 14)	GEC54554	RLYM	1984	10	2017	4	60	33
WEST WATSON AV W (Unit 14)	REY6231102-1	RLYM	1995	0	2017	4	51	22

WEST WATSON AV W (Unit 14)	AEI3371871	RLYM	1971	0	2017	4	52	46
WEST WATSON AV W (Unit 15)	GEC065601P	RLYM	1984	10	2017	2	60	33
WICKHAM ST NO.24 (Unit 37)	EEC307141D	RLYM	1974	10	2017	3	60	43
BEXLEY RD NO.81 (Unit 34)	REYG2Z85	RLYM	1970	12	2018	4	94	48
BEXLEY RD NO.81 (Unit 35)	AEI3132237	RLYM	1970	10	2018	4	39	48
BEXLEY RD NO.81 (Unit 36)	REYG2Z82	RLYM	1970	12	2018	4	94	48
BEXLEY RD NO.81 (Unit 37)	AEI3250740	RLYM	1967	10	2018	4	39	51
BEXLEY RD NO.81 (Unit 38)	AEI3132238	RLYM	1970	10	2018	4	39	48
BOWER AV NO.179 (Unit 33)	EEC270173C	RLYM	1973	10	2018	3	60	45
BOWER AV NO.179 (Unit 34)	REYH2Y783	RLYM	1967	12	2018	4	94	51
BOWER AV NO.179 (Unit 35)	REYE2Z1378	RLYM	1967	17	2018	1	94	51
BOWER AV NO.179 (Unit 36)	REYG2Z81	RLYM	1970	12	2018	4	94	48
BOWER AV NO.179 (Unit 37)	REYA3G160	RLYM	1976	12	2018	3	94	42
BRIGHTON ZONE SUB (Unit 1)	ALS1009765	RLYE	2005	10	2018	1	99	13
BRIGHTON ZONE SUB (Unit 21)	ALS1251873	RLYE	2005	10	2018	1	99	13
BROMLEY GXP (Unit 142)	GEMAAZC04000281	RLYE	2005	65	2018	1	100	13
BROMLEY GXP (Unit 142)	REYE2Z279	RLYM	1975	0	2018	1	94	43
BROMLEY GXP (Unit 142)	REYA3F39	RLYM	1980	0	2018	1	39	38
BROMLEY GXP (Unit 142)	REYD3A715	RLYM	1972	0	2018	1	39	46
BROMLEY GXP (Unit 182)	GEMAAZC04000280	RLYE	2005	65	2018	1	100	13
BROMLEY GXP (Unit 182)	REYD3A716	RLYM	1972	0	2018	1	39	46
BROMLEY GXP (Unit 182)	REYE2Z280	RLYM	1975	0	2018	1	94	43
BROMLEY GXP (Unit 182)	REYA3F38	RLYM	1980	0	2018	1	39	38
BURWOOD HOSPITAL (Unit 12)	VAT100920401-1	RLYM	2006	17	2018	1	94	12
BURWOOD HOSPITAL (Unit 12)	ALS1904648	RLYE	2005	0	2018	1	97	13
BURWOOD HOSPITAL (Unit 13)	REYG2Z67	RLYM	1970	12	2018	4	94	48
BURWOOD HOSPITAL (Unit 14)	AEI3132230	RLYM	1970	10	2018	4	39	48
BURWOOD HOSPITAL (Unit 15)	GEC827224F	RLYM	1976	10	2018	3	60	42
BURWOOD RD NO.284 (Unit 31)	REYG2Z61	RLYM	1970	12	2018	4	94	48
BURWOOD RD NO.284 (Unit 32)	ALS2905989	RLYE	2006	10	2018	1	97	12
BURWOOD RD NO.284 (Unit 33)	REYG2Z60	RLYM	1970	12	2018	4	94	48
BURWOOD RD NO.284 (Unit 34)	ALS2905987	RLYE	2006	10	2018	1	97	12
BURWOOD RD NO.284 (Unit 35)	ALS31348691	RLYE	2011	10	2018	1	97	7
CARMEN RD NO.66 (Unit 1)	GEC436204	RLYM	1980	10	2018	2	42	38

CARMEN RD NO.66 (Unit 1)	GEC065638P	RLYM	1984	0	2018	2	60	34
CFM CANTERBURY (Unit 1)	REY36882	RLYM	1979	12	2018	2	94	39
CFM CANTERBURY (Unit 2)	REYH2W273	RLYM	1968	12	2018	4	55	50
CFM CANTERBURY (Unit 2)	AEI3279020	RLYM	1968	0	2018	4	45	50
CFM CANTERBURY (Unit 2)	REY199642	RLYM	1986	0	2018	4	94	32
CFM CANTERBURY (Unit 3)	GEC054573R	RLYM	1984	10	2018	2	60	34
CFM CANTERBURY (Unit 4)	GEC054572R	RLYM	1984	10	2018	2	60	34
CHESTER ST NO.97 (Unit 31)	ALS3400498	RLYE	2001	10	2018	2	97	17
CHESTER ST NO.97 (Unit 34)	ALS3400501	RLYE	2001	10	2018	2	97	17
DALLINGTON ZONE SUB (Unit 1)	REYH2W412	RLYM	1961	17	2018	4	94	57
DALLINGTON ZONE SUB (Unit 1)	E-E770773	RLYM	1969	0	2018	4	61	49
DALLINGTON ZONE SUB (Unit 10)	E-E770779	RLYM	1969	17	2018	4	61	49
DALLINGTON ZONE SUB (Unit 10)	REYH2W415	RLYM	1961	0	2018	4	94	57
DALLINGTON ZONE SUB (Unit 11)	REYH2W963	RLYM	1961	17	2018	4	94	57
DALLINGTON ZONE SUB (Unit 11)	E-E770780	RLYM	1969	0	2018	4	61	49
DALLINGTON ZONE SUB (Unit 13)	E-E124961	RLYM	1971	17	2018	4	60	47
DALLINGTON ZONE SUB (Unit 15)	E-E770808	RLYM	1969	17	2018	4	61	49
DALLINGTON ZONE SUB (Unit 15)	REYB3A221	RLYM	1970	0	2018	4	94	48
DALLINGTON ZONE SUB (Unit 16)	GEC60039	RLYM	1982	16	2018	2	61	36
DALLINGTON ZONE SUB (Unit 16)	GECAHHC09000234	RLYE	2010	0	2018	2	100	8
DALLINGTON ZONE SUB (Unit 17)	REYB3A217	RLYM	1970	17	2018	4	94	48
DALLINGTON ZONE SUB (Unit 17)	E-E770811	RLYM	1969	0	2018	4	61	49
DALLINGTON ZONE SUB (Unit 18)	EEC124964B	RLYM	1970	17	2018	4	60	48
DALLINGTON ZONE SUB (Unit 19)	VAT100277402-2	RLYM	2003	17	2018	4	94	15
DALLINGTON ZONE SUB (Unit 19)	E-E863567	RLYM	1971	0	2018	4	61	47
DALLINGTON ZONE SUB (Unit 2)	GEC60040	RLYM	1982	16	2018	2	61	36
DALLINGTON ZONE SUB (Unit 2)	GECAHHC09000232	RLYE	2010	0	2018	2	100	8
DALLINGTON ZONE SUB (Unit 21)	REYB3A220	RLYM	1970	17	2018	4	94	48
DALLINGTON ZONE SUB (Unit 21)	E-E770810	RLYM	1969	0	2018	4	61	49
DALLINGTON ZONE SUB (Unit 22)	E-E770812	RLYM	1969	17	2018	4	61	49
DALLINGTON ZONE SUB (Unit 22)	REYB3A216	RLYM	1970	0	2018	4	94	48
DALLINGTON ZONE SUB (Unit 23)	E-E863568	RLYM	1971	17	2018	4	61	47
DALLINGTON ZONE SUB (Unit 23)	REYB3A219	RLYM	1970	0	2018	4	94	48
DALLINGTON ZONE SUB (Unit 25)	REYB3A222	RLYM	1970	17	2018	4	94	48

DALLINGTON ZONE SUB (Unit 25)	E-E770809	RLYM	1969	0	2018	4	61	49
DALLINGTON ZONE SUB (Unit 3)	REYH2W961	RLYM	1961	17	2018	4	94	57
DALLINGTON ZONE SUB (Unit 3)	E-E770774	RLYM	1969	0	2018	4	61	49
DALLINGTON ZONE SUB (Unit 4)	REYH2W406	RLYM	1961	17	2018	4	94	57
DALLINGTON ZONE SUB (Unit 4)	E-E770775	RLYM	1969	0	2018	4	61	49
DALLINGTON ZONE SUB (Unit 5)	REYH2W960	RLYM	1961	17	2018	4	94	57
DALLINGTON ZONE SUB (Unit 5)	E-E770776	RLYM	1969	0	2018	4	61	49
DALLINGTON ZONE SUB (Unit 6)	ALS1103754	RLYE	2002	17	2018	2	97	16
DALLINGTON ZONE SUB (Unit 8)	REYH2W416	RLYM	1961	17	2018	4	94	57
DALLINGTON ZONE SUB (Unit 8)	E-E770777	RLYM	1969	0	2018	4	61	49
DALLINGTON ZONE SUB (Unit 9)	REYH2W404	RLYM	1961	17	2018	4	94	57
DALLINGTON ZONE SUB (Unit 9)	E-E770778	RLYM	1969	0	2018	4	61	49
GLOUCESTER ST NO.56 Unit 15)	ALS2101681	RLYE	2002	10	2018	2	97	16
HARMAN ST NO.102 (Unit 31)	ALS1602539	RLYE	2003	10	2018	1	97	15
HARMAN ST NO.102 (Unit 32)	ALS4699715	RLYE	2001	12	2018	2	97	17
HARMAN ST NO.102 (Unit 33)	ALS1602536	RLYE	2003	10	2018	1	97	15
HARMAN ST NO.102 (Unit 34)	VAT100124702-1	RLYM	2003	12	2018	1	94	15
HEBERDEN AV NO.18 (Unit 16)	ALS1602540	RLYE	2003	10	2018	1	97	15
HEBERDEN AV NO.18 (Unit 17)	VAT101218301-6	RLYM	2006	12	2018	1	94	12
HEBERDEN AV NO.18 (Unit 18)	ALS1602537	RLYE	2003	10	2018	1	97	15
HILLS RD NO.130 (Unit 12)	REYG2Z56	RLYM	1968	12	2018	4	94	50
HILLS RD NO.130 (Unit 13)	AEI3250735	RLYM	1967	10	2018	4	39	51
HILLS RD NO.130 (Unit 14)	AEI3250733	RLYM	1967	10	2018	4	39	51
HILLS RD NO.130 (Unit 15)	AEI2991352	RLYM	1965	10	2018	5	39	53
HILLS RD NO.130 (Unit 16)	REYA3A731	RLYM	1971	12	2018	4	94	47
HILLS RD NO.130 (Unit 17)	REYG2Z54	RLYM	1968	12	2018	4	94	50
HILLS RD ZONE SUB (Unit 111)	GEMA2871793	RLYE	1998	20	2018	3	96	20
HILLS RD ZONE SUB (Unit 112)	GEMA2800466	RLYE	2001	20	2018	2	96	17
HILLS RD ZONE SUB (Unit 113)	GEMA2893860	RLYE	1999	20	2018	2	96	19
HILLS RD ZONE SUB (Unit 114)	GEMA2871796	RLYE	1998	20	2018	3	96	20
HILLS RD ZONE SUB (Unit 3002)	GEMD3381351	RLYE	1998	75	2018	3	84	20
HOON HAY RD NO.181 (Unit 34)	ALS3400494	RLYE	2001	10	2018	2	97	17
HORORATA ZONE SUB (Unit 912)	ASEBC139	RLYE	1983	25	2018	6	38	35
HORORATA ZONE SUB (Unit 912)	ASEAE271	RLYE	1986	0	2018	6	38	32

HORORATA ZONE SUB (Unit 912)	ASET109	RLYM	1987	0	2018	6	35	31
HORORATA ZONE SUB (Unit 912)	ASEC116	RLYE	1988	0	2018	6	40	30
ILAM RD NO.38 (Unit 11)	ALS4699716	RLYE	2001	10	2018	2	97	17
ILAM RD NO.38 (Unit 15)	ALS3999069	RLYE	2001	10	2018	2	97	17
ILAM ZONE SUB (Unit 10)	VAT100469601-11	RLYM	2004	10	2018	2	94	14
ILAM ZONE SUB (Unit 10)	ALS4203036	RLYE	2001	0	2018	2	97	17
ILAM ZONE SUB (Unit 11)	ALS4203038	RLYE	2001	17	2018	2	97	17
ILAM ZONE SUB (Unit 11)	VAT100469601-9	RLYM	2004	0	2018	2	94	14
ILAM ZONE SUB (Unit 12)	VAT100469601-7	RLYM	2004	17	2018	2	94	14
ILAM ZONE SUB (Unit 12)	ALS4203039	RLYE	2001	0	2018	2	97	17
ILAM ZONE SUB (Unit 13)	ALS4203040	RLYE	2001	17	2018	2	97	17
ILAM ZONE SUB (Unit 13)	VAT100469601-10	RLYM	2004	0	2018	2	94	14
ILAM ZONE SUB (Unit 14)	ALS4203041	RLYE	2001	17	2018	2	97	17
ILAM ZONE SUB (Unit 14)	VAT100469601-5	RLYM	2004	0	2018	2	94	14
ILAM ZONE SUB (Unit 2)	VAT100469601-3	RLYM	2004	17	2018	2	94	14
ILAM ZONE SUB (Unit 2)	ALS2101671	RLYE	2002	0	2018	2	97	16
ILAM ZONE SUB (Unit 3)	ALS4701636	RLYE	2002	17	2018	2	97	16
ILAM ZONE SUB (Unit 3)	VAT100469601-8	RLYM	2004	0	2018	2	94	14
ILAM ZONE SUB (Unit 4)	VAT100469601-2	RLYM	2004	17	2018	2	94	14
ILAM ZONE SUB (Unit 4)	ALS2101668	RLYE	2002	0	2018	2	97	16
ILAM ZONE SUB (Unit 5)	ALS4701632	RLYE	2002	17	2018	2	97	16
ILAM ZONE SUB (Unit 5)	VAT100469601-1	RLYM	2004	0	2018	2	94	14
ILAM ZONE SUB (Unit 6)	VAT100469601-6	RLYM	2004	10	2018	2	94	14
ILAM ZONE SUB (Unit 6)	ALS4701622	RLYE	2002	0	2018	2	97	16
ILAM ZONE SUB (Unit 7)	ALS2701756	RLYE	2002	17	2018	2	97	16
ILAM ZONE SUB (Unit 7)	VAT100469601-4	RLYM	2004	0	2018	2	94	14
ILAM ZONE SUB (Unit 8)	ALS2101664	RLYE	2002	10	2018	2	97	16
ILAM ZONE SUB (Unit 9)	ALS4701624	RLYE	2002	17	2018	2	97	16
ILAM ZONE SUB (Unit 9)	VAT100469601-12	RLYM	2004	0	2018	2	94	14
JEFFREYS RD NO.8 (Unit 16)	EEC270157C	RLYM	1973	10	2018	3	60	45
JEFFREYS RD NO.8 (Unit 17)	EEC270156C	RLYM	1973	10	2018	3	60	45
JEFFREYS RD NO.8 (Unit 18)	REYA3A774	RLYM	1971	12	2018	4	94	47
JEFFREYS RD NO.8 (Unit 19)	REYG2Z32	RLYM	1968	12	2018	4	94	50
JEFFREYS RD NO.8 (Unit 20)	GEC059935N	RLYM	1982	10	2018	2	60	36

LAKE TERRACE RD NO.5 (Unit 15)	REYE2Z1336	RLYM	1967	12	2018	4	94	51
LAKE TERRACE RD NO.5 (Unit 16)	EEC270167C	RLYM	1973	10	2018	3	60	45
LAKE TERRACE RD NO.5 (Unit 36)	REYH2Y806	RLYM	1967	12	2018	4	94	51
LAKE TERRACE RD NO.5 (Unit 37)	REYG2Z28	RLYM	1968	12	2018	4	94	50
LAKE TERRACE RD NO.5 (Unit 38)	AEI3132227	RLYM	1970	10	2018	4	39	48
LAKE TERRACE RD NO.5 (Unit 39)	REYG2Z57	RLYM	1970	12	2018	4	94	48
MAIN NORTH RD NO.204 (Unit 36)	VAT584101-2	RLYM	2002	12	2018	1	94	16
MAIN NORTH RD NO.204 (Unit 37)	ALS2101678	RLYE	2002	10	2018	2	97	16
MAIN NORTH RD NO.204 (Unit 38)	VAT596201-2	RLYM	2002	12	2018	1	94	16
MAIN NORTH RD NO.722 (Unit 32)	REYA3BB1772	RLYM	1979	10	2018	2	37	39
MAIN NORTH RD NO.722 (Unit 32)	REYH2W276	RLYM	1968	0	2018	2	55	50
MAIN NORTH RD NO.722 (Unit 32)	GEC68588	RLYM	1986	0	2018	2	60	32
MAIN NORTH RD NO.722 (Unit 33)	VAT473501-2	RLYM	2002	12	2018	1	94	16
MAIN NORTH RD NO.722 (Unit 34)	REY199644	RLYM	1986	12	2018	2	94	32
MAIN NORTH RD NO.722 (Unit 36)	REYH2W241	RLYM	1968	10	2018	2	55	50
MAIN NORTH RD NO.722 (Unit 36)	GEC59968	RLYM	1983	0	2018	2	60	35
MAIN NORTH RD NO.722 (Unit 36)	REYH2WB11360	RLYM	1966	0	2018	2	37	52
MAIN NORTH RD NO.722 (Unit 37)	REYA3B770	RLYM	1979	10	2018	3	37	39
MAIN NORTH RD NO.722 (Unit 37)	EEC307095	RLYM	1974	0	2018	3	61	44
MAIN NORTH RD NO.722 (Unit 37)	REYH2W255	RLYM	1968	0	2018	3	55	50
MAIN NORTH RD NO.722 (Unit 38)	REY232595	RLYM	1986	12	2018	2	94	32
MAJOR HORN BROOK RD NO.106 (Unit 12)	ALS1502341	RLYE	2003	10	2018	1	97	15
MAJOR HORN BROOK RD NO.106 (Unit 13)	VAT538402-12	RLYM	2002	12	2018	1	94	16
MAJOR HORN BROOK RD NO.106 (Unit 14)	ALS1502344	RLYE	2003	10	2018	1	97	15
MAJOR HORN BROOK RD NO.106 (Unit 15)	ALS1602920	RLYE	2003	10	2018	1	97	15
MAJOR HORN BROOK RD NO.106 (Unit 17)	ALS1502345	RLYE	2003	10	2018	1	97	15
MAJOR HORN BROOK RD NO.106 (Unit 18)	VAT538402-11	RLYM	2002	12	2018	1	94	16
MAXWELL ST NO.2 (Unit 13)	VAT100168803-2	RLYM	2003	12	2018	1	94	15
MAXWELL ST NO.2 (Unit 14)	ALS1602922	RLYE	2003	10	2018	1	97	15

MAXWELL ST NO.2 (Unit 16)	VAT100168804-2	RLYM	2003	12	2018	1	94	15
MAXWELL ST NO.2 (Unit 17)	ALS1602912	RLYE	2003	10	2018	1	97	15
MAXWELL ST NO.2 (Unit 18)	ALS1602919	RLYE	2003	10	2018	1	97	15
MAYS RD NO.107 (Unit 33)	AEI3132225	RLYM	1970	10	2018	4	39	48
MAYS RD NO.107 (Unit 34)	REYG2Z98	RLYM	1970	12	2018	4	94	48
MAYS RD NO.107 (Unit 35)	AEI3132224	RLYM	1970	10	2018	4	39	48
MAYS RD NO.107 (Unit 36)	AEI3132223	RLYM	1970	10	2018	4	39	48
MAYS RD NO.107 (Unit 37)	AEI3132221	RLYM	1970	10	2018	4	39	48
MAYS RD NO.107 (Unit 38)	REYE2Y165	RLYM	1966	12	2018	5	94	52
MAYS RD NO.107 (Unit 39)	AEI3132222	RLYM	1970	10	2018	4	39	48
MEMORIAL AV NO.254 (Unit 31)	VAT100446501-2	RLYM	2004	12	2018	1	94	14
MEMORIAL AV NO.254 (Unit 32)	ALS2803970	RLYE	2004	17	2018	1	97	14
MEMORIAL AV NO.254 (Unit 33)	VAT100432501-2	RLYM	2004	12	2018	1	94	14
MEMORIAL AV NO.254 (Unit 34)	VAT100405301-3	RLYM	2004	12	2018	1	94	14
MEMORIAL AV NO.348 (Unit 31)	ALS2803962	RLYE	2004	10	2018	1	97	14
MEMORIAL AV NO.348 (Unit 32)	VAT100436802-17	RLYM	2004	12	2018	1	94	14
MEMORIAL AV NO.348 (Unit 33)	VAT100436802-13	RLYM	2004	12	2018	1	94	14
MEMORIAL AV NO.348 (Unit 34)	ALS30071452	RLYE	2010	10	2018	1	97	8
ORCHARD RD AIR WORKSHOP (Unit 36)	GEC855704	RLYM	1977	10	2018	3	61	41
ORCHARD RD AIR WORKSHOP (Unit 36)	GEC436205	RLYM	1977	0	2018	3	42	41
ORCHARD RD AIR WORKSHOP (Unit 44)	GEC855703	RLYM	1977	10	2018	3	61	41
ORCHARD RD AIR WORKSHOP (Unit 44)	GEC436208	RLYM	1977	0	2018	3	42	41
PRESS LN (Unit 11)	ALS1602914	RLYE	2003	10	2018	1	97	15
PRESS LN (Unit 12)	ALS1602910	RLYE	2003	10	2018	1	97	15
RADBROOK ST NO.14 (Unit 12)	REY36893	RLYM	1978	12	2018	3	94	40
RADBROOK ST NO.14 (Unit 13)	REYG2U781	RLYM	1965	12	2018	5	94	53
RADBROOK ST NO.14 (Unit 14)	REYH2S19	RLYM	1966	12	2018	5	94	52
RADBROOK ST NO.14 (Unit 15)	AEI3250742	RLYM	1967	10	2018	4	39	51
RADBROOK ST NO.14 (Unit 16)	AEI3250743	RLYM	1967	10	2018	4	39	51
RADCLIFFE RD NO.25 (UNIT 15)	ALS3100079	RLYE	2001	17	2018	2	94	17
RADCLIFFE RD NO.25 (UNIT 17)	ALS2101674	RLYE	2002	10	2018	2	97	16
SHANDS RD NO.225 (Unit 1)	ASEA163	RLYM	1988	17	2018	2	35	30
SHANDS RD NO.225 (Unit 1)	ASEA166	RLYM	1988	0	2018	2	35	30
SHANDS RD NO.225 (Unit 1)	ASEA164	RLYM	1988	0	2018	2	35	30

SHANDS RD NO.225 (Unit 1)	ASEG5-137	RLYE	1984	0	2018	2	35	34
SHANDS RD NO.225 (Unit 1)	ASEA165	RLYM	1988	0	2018	2	35	30
SHANDS RD NO.225 (Unit 2)	ASEG5-138	RLYE	1984	17	2018	2	35	34
SHANDS RD NO.225 (Unit 2)	ASEA159	RLYM	1988	0	2018	2	35	30
SHANDS RD NO.225 (Unit 2)	ASEA160	RLYM	1988	0	2018	2	35	30
SHANDS RD NO.225 (Unit 2)	ASEA161	RLYM	1988	0	2018	2	35	30
SHANDS RD NO.225 (Unit 2)	ASEA162	RLYM	1988	0	2018	2	35	30
TRAFALGAR ST (UNIT 15)	ALS2101675	RLYE	2002	10	2018	2	97	16
TRAFALGAR ST (UNIT 17)	ALS2101680	RLYE	2002	10	2018	2	97	16
UNIVERSITY (Unit 21)	ALS2803966	RLYE	2004	10	2018	1	97	14
UNIVERSITY (Unit 22)	VAT100446501-12	RLYM	2004	12	2018	1	94	14
UNIVERSITY (Unit 23)	VAT100446501-11	RLYM	2004	12	2018	1	94	14
UNIVERSITY (Unit 24)	VAT100446501-5	RLYM	2004	12	2018	1	94	14
WASHINGTON WAY NO.18 (Unit 14)	ALS2803969	RLYE	2004	10	2018	1	97	14
WASHINGTON WAY NO.18 (Unit 15)	VAT100446501-9	RLYM	2004	12	2018	1	94	14
WASHINGTON WAY NO.18 (Unit 16)	VAT100446501-7	RLYM	2004	12	2018	1	94	14
WASHINGTON WAY NO.18 (Unit 17)	VAT100446501-3	RLYM	2004	12	2018	1	94	14
ADDINGTON GXP (Unit 142)	GEMAAZC07000779	RLYE	2008	125	2019	1	100	11
ADDINGTON GXP (Unit 172)	REYA3F26	RLYM	1980	65	2019	2	39	39
ADDINGTON GXP (Unit 172)	REYB3G469	RLYM	1979	0	2019	2	94	40
ADDINGTON GXP (Unit 172)	REYD3A18	RLYM	1980	0	2019	2	39	39
ADDINGTON GXP (Unit 42)	REYA3F23	RLYM	1980	65	2019	2	39	39
ADDINGTON GXP (Unit 42)	REYD3B112	RLYM	1980	0	2019	2	39	39
ADDINGTON GXP (Unit 42)	REYD3B1518	RLYM	1975	0	2019	2	39	44
ADDINGTON GXP (Unit 42)	REYB3G466	RLYM	1979	0	2019	2	94	40
ADDINGTON GXP (Unit 42)	REYG3A17	RLYM	1978	0	2019	2	39	41
ADDINGTON GXP (Unit 42)	REYG3A483	RLYM	1970	0	2019	2	94	49
BRITTAN TR NO.4 (Unit 3)	ALS30005439	RLYE	2008	10	2019	1	97	11
BRITTAN TR NO.4 (Unit 4)	GEC68592	RLYM	1986	10	2019	2	60	33
BROMLEY GXP (Unit 172)	GEMSURC05000186	RLYE	2001	65	2019	2	100	18
BROMLEY GXP (Unit 172)	GEMSURC05000185	RLYE	2001	0	2019	2	100	18
BROOKSIDE ZONE SUB (Unit 105)	GEMA2871795	RLYE	1998	20	2019	3	96	21
BROOKSIDE ZONE SUB (Unit 111)	GEMA2840358	RLYE	2005	20	2019	1	96	14
BROOKSIDE ZONE SUB (Unit 112)	GEMA2840357	RLYE	2005	20	2019	1	96	14

BROOKSIDE ZONE SUB (Unit 113)	GEMA2840356	RLYE	2005	20	2019	1	96	14
BROOKSIDE ZONE SUB (Unit 114)	GEMA2871794	RLYE	1998	20	2019	3	96	21
BROOKSIDE ZONE SUB (Unit 121)	GEMA2893861	RLYE	1999	20	2019	2	96	20
BROOKSIDE ZONE SUB (Unit 122)	GEMA2800527	RLYE	1999	20	2019	2	96	20
BROOKSIDE ZONE SUB (Unit 123)	GEMA2870891	RLYE	1998	20	2019	3	96	21
FENDALTON ZONE SUB (Bus Zone A)	ALS798774	RLYM	2004	56	2019	1	85	15
FENDALTON ZONE SUB (Bus Zone A)	ALS784152	RLYM	2004	0	2019	1	91	15
FENDALTON ZONE SUB (Bus Zone B)	ALS784150	RLYM	2004	56	2019	1	91	15
FENDALTON ZONE SUB (Bus Zone B)	ALS798775	RLYM	2004	0	2019	1	85	15
FENDALTON ZONE SUB (Unit 1)	ALS785089	RLYE	2004	16	2019	1	99	15
FENDALTON ZONE SUB (Unit 10)	ALS2803986	RLYE	2004	10	2019	1	97	15
FENDALTON ZONE SUB (Unit 11)	VAT100436802-3	RLYM	2004	10	2019	1	94	15
FENDALTON ZONE SUB (Unit 11)	ALS2803987	RLYE	2004	0	2019	1	97	15
FENDALTON ZONE SUB (Unit 12)	ALS2803988	RLYE	2004	17	2019	1	97	15
FENDALTON ZONE SUB (Unit 12)	VAT100436802-8	RLYM	2004	0	2019	1	94	15
FENDALTON ZONE SUB (Unit 13)	VAT100436802-15	RLYM	2004	17	2019	1	94	15
FENDALTON ZONE SUB (Unit 13)	ALS2803991	RLYE	2004	0	2019	1	97	15
FENDALTON ZONE SUB (Unit 14)	ALS2803993	RLYE	2004	17	2019	1	97	15
FENDALTON ZONE SUB (Unit 14)	VAT100436802-11	RLYM	2004	0	2019	1	94	15
FENDALTON ZONE SUB (Unit 15)	VAT100436802-12	RLYM	2004	17	2019	1	94	15
FENDALTON ZONE SUB (Unit 15)	ALS2803994	RLYE	2004	0	2019	1	97	15
FENDALTON ZONE SUB (Unit 16)	ALS2803995	RLYE	2004	17	2019	1	97	15
FENDALTON ZONE SUB (Unit 16)	VAT100436802-7	RLYM	2004	0	2019	1	94	15
FENDALTON ZONE SUB (Unit 17)	VAT100436802-16	RLYM	2004	17	2019	1	94	15
FENDALTON ZONE SUB (Unit 17)	ALS2803996	RLYE	2004	0	2019	1	97	15
FENDALTON ZONE SUB (Unit 18)	ALS2803997	RLYE	2004	17	2019	1	97	15
FENDALTON ZONE SUB (Unit 18)	VAT100436802-6	RLYM	2004	0	2019	1	94	15
FENDALTON ZONE SUB (Unit 19)	VAT100436802-5	RLYM	2004	17	2019	1	94	15
FENDALTON ZONE SUB (Unit 19)	ALS2803998	RLYE	2004	0	2019	1	97	15
FENDALTON ZONE SUB (Unit 2)	VAT100436802-14	RLYM	2004	17	2019	1	94	15
FENDALTON ZONE SUB (Unit 2)	ALS2803001	RLYE	2004	0	2019	1	97	15
FENDALTON ZONE SUB (Unit 20)	ALS785090	RLYE	2004	16	2019	1	99	15
FENDALTON ZONE SUB (Unit 3)	ALS2803002	RLYE	2004	10	2019	1	97	15
FENDALTON ZONE SUB (Unit 3)	VAT100436802-10	RLYM	2004	0	2019	1	94	15

FENDALTON ZONE SUB (Unit 4)	VAT100436802-2	RLYM	2004	17	2019	1	94	15
FENDALTON ZONE SUB (Unit 4)	ALS2803003	RLYE	2004	0	2019	1	97	15
FENDALTON ZONE SUB (Unit 5)	ALS2803979	RLYE	2004	17	2019	1	97	15
FENDALTON ZONE SUB (Unit 6)	ALS2803980	RLYE	2004	17	2019	1	97	15
FENDALTON ZONE SUB (Unit 6)	VAT100446501-8	RLYM	2004	0	2019	1	94	15
FENDALTON ZONE SUB (Unit 7)	ALS2803981	RLYE	2004	17	2019	1	97	15
FENDALTON ZONE SUB (Unit 7)	VAT100436802-9	RLYM	2004	0	2019	1	94	15
FENDALTON ZONE SUB (Unit 8)	VAT100446501-10	RLYM	2004	17	2019	1	94	15
FENDALTON ZONE SUB (Unit 8)	ALS2803982	RLYE	2004	0	2019	1	97	15
FENDALTON ZONE SUB (Unit 9)	ALS2803984	RLYE	2004	17	2019	1	97	15
FENDALTON ZONE SUB (Unit 9)	VAT100436802-4	RLYM	2004	0	2019	1	94	15
HALSWELL JTN RD NO.700 (Unit 1)	AEI3342202	RLYM	1970	10	2019	4	52	49
HALSWELL JTN RD NO.700 (Unit 1)	AEI3326494B	RLYM	1969	0	2019	4	35	50
HAWTHORNDEN ZONE SUB (Bus 1)	AEI3350970	RLYM	1980	56	2019	2	42	39
HAWTHORNDEN ZONE SUB (Unit 1)	VAT100628902-1	RLYM	2005	10	2019	1	94	14
HAWTHORNDEN ZONE SUB (Unit 1)	ALS1404689	RLYE	2005	0	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 10)	ALS1404696	RLYE	2005	17	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 10)	VAT100628902-7	RLYM	2004	0	2019	1	94	15
HAWTHORNDEN ZONE SUB (Unit 11)	ALS1404686	RLYE	2005	17	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 11)	VAT100628902-6	RLYM	2005	0	2019	1	94	14
HAWTHORNDEN ZONE SUB (Unit 12)	ALS1009764	RLYE	2005	10	2019	1	99	14
HAWTHORNDEN ZONE SUB (Unit 13)	ALS1404676	RLYE	2005	17	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 13)	VAT100628902-12	RLYM	2004	0	2019	1	94	15
HAWTHORNDEN ZONE SUB (Unit 14)	ALS1404697	RLYE	2005	16	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 15)	ALS1404693	RLYE	2005	17	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 15)	VAT100628902-14	RLYM	2005	0	2019	1	94	14
HAWTHORNDEN ZONE SUB (Unit 16)	ALS1009761	RLYE	2005	16	2019	1	99	14
HAWTHORNDEN ZONE SUB (Unit 17)	ALS1404694	RLYE	2005	10	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 17)	VAT100628902-13	RLYM	2005	0	2019	1	94	14
HAWTHORNDEN ZONE SUB (Unit 18)	VAT100628902-9	RLYM	2005	17	2019	1	94	14
HAWTHORNDEN ZONE SUB (Unit 18)	ALS1404673	RLYE	2005	0	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 19)	VAT100628902-17	RLYM	2005	10	2019	1	94	14
HAWTHORNDEN ZONE SUB (Unit 19)	ALS1405846	RLYE	2005	0	2019	1	91	14
HAWTHORNDEN ZONE SUB (Unit 19)	ALS1405844	RLYE	2005	0	2019	1	91	14

HAWTHORNDEN ZONE SUB (Unit 2)	ALS1094961	RLYE	2005	16	2019	1	99	14
HAWTHORNDEN ZONE SUB (Unit 20)	ALS1404675	RLYE	2005	10	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 20)	ALS1404675	RLYE	2005	0	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 21)	ALS1404670	RLYE	2005	17	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 21)	VAT100628902-16	RLYM	2005	0	2019	1	94	14
HAWTHORNDEN ZONE SUB (Unit 22)	VAT100628902-20	RLYM	2005	10	2019	1	94	14
HAWTHORNDEN ZONE SUB (Unit 22)	ALS0304788	RLYE	2004	0	2019	1	97	15
HAWTHORNDEN ZONE SUB (Unit 23)	ALS0304790	RLYE	2004	17	2019	1	97	15
HAWTHORNDEN ZONE SUB (Unit 23)	VAT100628902-18	RLYM	2005	0	2019	1	94	14
HAWTHORNDEN ZONE SUB (Unit 25)	VAT100628902-19	RLYM	2005	17	2019	2	94	14
HAWTHORNDEN ZONE SUB (Unit 25)	ALS4203043	RLYE	2001	0	2019	2	97	18
HAWTHORNDEN ZONE SUB (Unit 26)	ALS0304789	RLYE	2004	17	2019	1	97	15
HAWTHORNDEN ZONE SUB (Unit 3)	ALS1404682	RLYE	2005	10	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 3)	VAT100628902-3	RLYM	2005	0	2019	1	94	14
HAWTHORNDEN ZONE SUB (Unit 31)	ALS1051906	RLYE	2005	25	2019	1	99	14
HAWTHORNDEN ZONE SUB (Unit 31)	VAT100677501-6	RLYM	2005	0	2019	1	94	14
HAWTHORNDEN ZONE SUB (Unit 32)	ALS1051905	RLYE	2005	25	2019	1	99	14
HAWTHORNDEN ZONE SUB (Unit 32)	VAT100677501-5	RLYM	2005	0	2019	1	94	14
HAWTHORNDEN ZONE SUB (Unit 4)	ALS5004008	RLYE	2005	17	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 4)	VAT100628902-15	RLYM	2005	0	2019	1	94	14
HAWTHORNDEN ZONE SUB (Unit 5)	VAT100628902-2	RLYM	2005	17	2019	1	94	14
HAWTHORNDEN ZONE SUB (Unit 5)	ALS1404679	RLYE	2005	0	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 6)	VAT100628902-10	RLYM	2005	10	2019	1	94	14
HAWTHORNDEN ZONE SUB (Unit 7)	ALS1404678	RLYE	2005	16	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 8)	VAT100628902-4	RLYM	2005	17	2019	1	94	14
HAWTHORNDEN ZONE SUB (Unit 8)	ALS1404692	RLYE	2005	0	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 9)	ALS1404687	RLYE	2005	17	2019	1	97	14
HAWTHORNDEN ZONE SUB (Unit 9)	VAT100628902-5	RLYM	2005	0	2019	1	94	14
HIGHFIELD ZONE SUB (Unit 111)	GEMA2830349	RLYE	2004	20	2019	1	96	15
HIGHFIELD ZONE SUB (Unit 112)	GEMA2830350	RLYE	2004	20	2019	1	96	15
HIGHFIELD ZONE SUB (Unit 113)	GEMA2810339	RLYE	2002	20	2019	2	96	17
HIGHFIELD ZONE SUB (Unit 114)	GEMA2830352	RLYE	2004	20	2019	1	96	15
HIGHFIELD ZONE SUB (Unit 4212)	GEMD3330102	RLYE	2000	75	2019	2	84	19
KNOX ZONE SUB (Unit 10)	GEC863595	RLYM	1971	17	2019	4	61	48

KNOX ZONE SUB (Unit 10)	REYD3B1262	RLYM	1972	0	2019	4	94	47
KNOX ZONE SUB (Unit 11)	GEC770788	RLYM	1969	17	2019	4	61	50
KNOX ZONE SUB (Unit 11)	REYH2W1179	RLYM	1961	0	2019	4	94	58
KNOX ZONE SUB (Unit 12)	GEC770782	RLYM	1969	17	2019	4	61	50
KNOX ZONE SUB (Unit 12)	REYH2W1184	RLYM	1961	0	2019	4	94	58
KNOX ZONE SUB (Unit 13)	GEC770814	RLYM	1969	17	2019	4	61	50
KNOX ZONE SUB (Unit 13)	REYH2W1190	RLYM	1961	0	2019	4	94	58
KNOX ZONE SUB (Unit 14)	GEC770785	RLYM	1969	17	2019	4	61	50
KNOX ZONE SUB (Unit 14)	REYD3B1267A	RLYM	1972	0	2019	4	94	47
KNOX ZONE SUB (Unit 16)	REYH2W1183	RLYM	1961	17	2019	4	94	58
KNOX ZONE SUB (Unit 16)	GEC770783	RLYM	1969	0	2019	4	61	50
KNOX ZONE SUB (Unit 17)	GEC770813	RLYM	1969	17	2019	4	61	50
KNOX ZONE SUB (Unit 17)	REYH2W1189	RLYM	1961	0	2019	4	94	58
KNOX ZONE SUB (Unit 18)	GEC12185	RLYM	1979	17	2019	2	61	40
KNOX ZONE SUB (Unit 19)	REYH2W1191	RLYM	1961	17	2019	4	94	58
KNOX ZONE SUB (Unit 19)	GEC770787	RLYM	1969	0	2019	4	61	50
KNOX ZONE SUB (Unit 2)	REYH2W1193	RLYM	1961	17	2019	4	94	58
KNOX ZONE SUB (Unit 2)	GEC770786	RLYM	1969	0	2019	4	61	50
KNOX ZONE SUB (Unit 20)	REYD3B1263	RLYM	1972	17	2019	2	94	47
KNOX ZONE SUB (Unit 20)	GEC12186	RLYM	1979	0	2019	2	61	40
KNOX ZONE SUB (Unit 21)	GEC770803	RLYM	1969	17	2019	4	61	50
KNOX ZONE SUB (Unit 21)	REYD3B1261	RLYM	1972	0	2019	4	94	47
KNOX ZONE SUB (Unit 3)	GEC770815	RLYM	1969	17	2019	4	61	50
KNOX ZONE SUB (Unit 3)	REYH2W1181	RLYM	1961	0	2019	4	94	58
KNOX ZONE SUB (Unit 4)	REYH2W1194	RLYM	1961	17	2019	4	94	58
KNOX ZONE SUB (Unit 5)	REYH2W1188	RLYM	1961	17	2019	2	94	58
KNOX ZONE SUB (Unit 5)	GEC50327	RLYM	1980	0	2019	2	60	39
KNOX ZONE SUB (Unit 6)	GEC770792	RLYM	1969	17	2019	4	61	50
KNOX ZONE SUB (Unit 6)	REYG2W943	RLYM	1966	0	2019	4	94	53
KNOX ZONE SUB (Unit 7)	GEC863574	RLYM	1971	17	2019	4	61	48
KNOX ZONE SUB (Unit 9)	REYH2W1180	RLYM	1961	17	2019	4	94	58
KNOX ZONE SUB (Unit 9)	GEC770790	RLYM	1969	0	2019	4	61	50
LINCOLN UNIVERSITY WEEDONS (Unit 21)	ALS4902052	RLYE	2003	10	2019	1	97	16

MERRIN ST NO.51 (Unit 32)	REYG2U762	RLYM	1965	12	2019	5	94	54
MERRIN ST NO.51 (Unit 33)	REYG2Z19	RLYM	1968	12	2019	4	94	51
MERRIN ST NO.51 (Unit 34)	AEI3132234	RLYM	1970	10	2019	4	39	49
MERRIN ST NO.51 (Unit 35)	AEI3132235	RLYM	1970	10	2019	4	39	49
OFFICE RD W (Unit 34)	REYA3A740	RLYM	1971	12	2019	4	94	48
OFFICE RD W (Unit 35)	AEI3250724	RLYM	1967	10	2019	4	39	52
OFFICE RD W (Unit 36)	REYG2Z99	RLYM	1970	12	2019	4	94	49
OFFICE RD W (Unit 37)	ALS30056364	RLYE	2009	10	2019	1	97	10
OFFICE RD W (Unit 38)	GEC054582R	RLYM	1984	10	2019	2	60	35
OFFICE RD W (Unit 40)	REYA3A782	RLYM	1971	12	2019	4	94	48
OFFICE RD W (Unit 41)	GEC054583R	RLYM	1984	10	2019	2	60	35
OFFICE RD W (Unit 42)	REYG2T1102	RLYM	1964	12	2019	5	94	55
PHILPOTTS RD NO.65 (Unit 34)	REYH2Y803	RLYM	1967	12	2019	4	94	52
PHILPOTTS RD NO.65 (Unit 35)	REYG2Z90	RLYM	1970	12	2019	4	94	49
PHILPOTTS RD NO.65 (Unit 36)	AEI3132243	RLYM	1970	10	2019	4	39	49
PHILPOTTS RD NO.65 (Unit 37)	AEI3132244	RLYM	1970	10	2019	4	39	49
REDRUTH AV (Unit 31)	EEC307130D	RLYM	1974	10	2019	3	60	45
ROWLEY AV NO.11 (Unit 36)	REYG2Z73	RLYM	1970	12	2019	4	94	49
ROWLEY AV NO.11 (Unit 37)	REYG2Z72	RLYM	1970	12	2019	4	94	49
SMITH ST (Unit 32)	REYG2Z13	RLYM	1968	12	2019	4	94	51
SMITH ST (Unit 33)	REYG2Z92	RLYM	1970	12	2019	4	94	49
SMITH ST (Unit 34)	EEC270145C	RLYM	1973	10	2019	3	60	46
SMITH ST (Unit 35)	EEC270146C	RLYM	1973	10	2019	3	60	46
ST ASAPH ST W (Unit 32)	AEI3250726	RLYM	1967	10	2019	4	39	52
ST ASAPH ST W (Unit 33)	AEI3250727	RLYM	1967	10	2019	4	39	52
ST ASAPH ST W (Unit 34)	AEI3250729	RLYM	1967	10	2019	4	39	52
ST ASAPH ST W (Unit 35)	REYH2Y799	RLYM	1967	12	2019	4	94	52
ST ASAPH ST W (Unit 36)	REYA3A716	RLYM	1971	12	2019	4	94	48
ST ASAPH ST W (Unit 37)	AEI3250728	RLYM	1967	10	2019	4	39	52
SUVA ST E (Unit 31)	EEC270154C	RLYM	1973	10	2019	3	60	46
SUVA ST E (Unit 32)	EEC270153C	RLYM	1973	10	2019	3	60	46
SUVA ST E (Unit 33)	EEC270152C	RLYM	1973	10	2019	3	60	46
SUVA ST E (Unit 34)	REYC3E341	RLYM	1974	12	2019	3	94	45
SUVA ST E (Unit 35)	ALS30018742	RLYE	2008	10	2019	1	97	11

SUVA ST E (Unit 36)	REYC3E338	RLYM	1974	12	2019	3	94	45
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SWITCHGEAR REPLACEMENT

CPP36

Programme Summary

1 April 2013 – 31 March 2019

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1 Programme Introduction

Programme Name	<i>Switchgear (CPP36)</i>
Service Category	<i>Provide and operate network infrastructure</i>
Capex Category	<i>Replacement</i>

1.1 Description

The work undertaken in this programme involves replacement of Orion's switchgear. The programme is expected to continue in perpetuity.

1.2 Assets included

The assets that are in this programme are high voltage and low voltage switchgear and high voltage circuit breakers. These include;

- Ring Main Units (Epoxy Insulated, Switches (Fused and Non-fused)
- Oil switches, fused and non-fused (Fuse Switch/OIS)
- Air break isolators
- Sectionalisers
- Low voltage switches
- HV Circuit breakers
 - 11kV – gas, oil vacuum
 - 33kV – oil, vacuum
 - 66kV – gas, oil

1.3 Aims and objectives

The main objectives of the programme are to:

- Ensure the safety of the public and our personnel and contractors around our assets.
- Replace on an annual basis high voltage and low voltage switchgear and high voltage circuit breakers that have been determined to be at the end of their lifecycles.

1.4 Drivers

The main drivers for the programme are:

- That assets are replaced in a timely and cost effective manner to ensure the condition and performance of our assets are such that they:
 - meet acceptable target levels of safety to people and property
 - provide acceptable levels of network reliability
- The prudent cost effective management of our assets and associated risks

2 Key Assumptions

The project relies on the following key assumptions

2.1 Unit cost

Asset Type	Cost FY13 \$000
11kV network CB	54
11kV zone CB	70
11kV switchgear	24
33/66kV CB	270
Urban SWGR	15
Rural SWGR	8
ABI	11

The costs for this capex programme are derived based on a brown fields basis for replacement of like with like switchgear. These values have been constant from 2008 and have been inflated by 8% in 2013. Our construction cost benchmarks (included in appendix 24 of the CPP) show for comparable assets that our 2010 switchgear costs were on or below the industry average for all but one switch type. These costs have been projected forward consistent with our cost estimation approach which is described in section 9.26 of our CPP.

2.2 Spur assets

The forecast assumes we will purchase the Islington 33kV assets and these 33kV circuit breakers will need replacing in 2017. There is also an assumption that at least two 66kV CB relating to spur assets will be replaced on an annual basis.

2.3 Labour escalators

We estimate that 40% of the project cost is labour related and we have determined that it is not appropriate to use the standard New Zealand wide LCI in relation to this project.

We note that Statistics NZ has recently started to monitor construction costs in Canterbury due to the local pressures on construction resources as a result of the Christchurch rebuild, however their data time series is currently limited and unsuitable.

As local labour cost pressure is evident in our most recent contract tenders we have determined a proposed cost escalation index which we refer to as the Canterbury construction labour index based on estimates of labour.

We have sought external advice cost from two quantity surveyor firms on what we may expect in the market over the remainder of the CPP period in this respect. There is considerable uncertainty, however this CPP process requires us to make appropriate estimates. The resulting labour escalators that we propose are:

Index	FY14	FY15	FY16	FY17	FY18	FY19
Canterbury construction labour	7.5%	7.5%	7.5%	5%	5%	5%

For further information on our derivation see section 9.26.4 to 9.26.6 of the CPP proposal.

2.4 Material escalators

We estimate that 60% of the project costs are material related. In order to create input cost escalators we have considered the most relevant input components for this project these are considered to be copper and steel. We have used World Bank commodity price forecasts in conjunction with the NZIER NZD/USD exchange rate forecast to convert the World Bank prices into NZD. The prices are weighted based on an estimate of the quantities of the relevant materials used. The resulting material escalator for this project are:

Index materials	FY14	FY15	FY16	FY17	FY18	FY19
Switchgear	4.13%	-4.69%	-2.65%	-2.83%	-5.71%	2.57%

For further information on our derivation this see section 9.26.4 of the CPP proposal.

2.5 Age of the assets

The age of an asset is considered as a factor in assessing whether an asset has reached the end of its economic life

2.6 When capex should be undertaken

We do not have a specific policy that determines when an asset should be replaced. Our asset management policy NW70.00.46 outlines at a high level our approach to asset management and our objective which is to optimise the lifecycle costs for each network asset group (including creation, operation, maintenance, renewal and disposal) to meet agreed service levels and future demand. The asset management policy lists a large range of other documents that inform the asset management process.

Generally assets are not replaced on age alone, but are kept in service until their continued maintenance is uneconomic or until they pose a safety, environmental or reliability risk. While various techniques and software packages such as CBRM can assist with this process ultimately it relies on engineering judgement.

2.7 Basis for expenditure forecast

The expenditure process is basically a bottom up process which relies on the forecast of units to be replaced which are set out below. These quantities together with the appropriate unit cost and material and labour escalators give rise to the forecast costs set out below.

We use a mixture of practices to determine which assets need to be replaced and when. No single method provides the ultimate solution from an asset management perspective but by using a combination of them we can tailor our replacement programme to be the most effective. As can be seen from the attached asset management reports YE 2012 NW70.00.24 and NW70.00.33 relating to HV and LV switchgear and HV circuit breakers respectively, we have a wide range of equipment that is covered by this project, with a wide age profile.

The process used to forecast our replacement expenditure historically used time based replacement, together with Orion's own condition based replacement analysis, reliability based replacement and more recently the CBRM model developed for Orion by EA Technology. This is based on type – past performance, obsolescence and age in conjunction. These inputs, together with engineering judgement, lead to the forecast replacement programme.

The engineering judgement will take into account other factors that may be occurring in the network, the importance of the assets (eg network zone substations which may have equipment with a better health index and/or Orion ranking, may be assigned a higher priority in the replacement list than another smaller network substation). The larger number of circuit breakers at a network zone substation may push the replacement of circuit breakers at smaller network substations back on the basis of the amount of resource available to carry out the replacement. This detailed approach is used primarily to drive the next few years replacement programme, whereas the forecast expenditure for years further out is dependent to a greater degree on the age of the asset. The objective is to maintain asset health profiles consistent with current levels.

Failure to maintain asset health profiles consistent with current levels will, over time, lead to a gradual reduction in reliability, increase the risk of catastrophic equipment failure, and increased safety risks. It may also make maintaining the viability of the contractor base more difficult leading to peaks and troughs in workload and costs.

The CBRM model is discussed in our asset management policy NW70.00.46 and is a relatively recent addition to our forecasting approach. It builds on the information and asset records that have been established from the Orion in-house model. The development of the CBRM model required the use of internal engineering experience and judgement in conjunction with historical asset performance/condition, to establish the foundation for the estimates of future replacement requirements.

For a number of asset types (Urban Switchgear, rural Switchgear and ABIs) we plan to replace a fixed number of these assets on an annual basis.

Ongoing development work regarding the application of CBRM has been disrupted as a result of staff having to deal with earthquake related response.

2.8 Non-network analysis

We have not considered any non-network alternatives in relation to this project.

2.9 Cost-benefit analysis

We have not undertaken any cost benefit analysis in relation to this project.

2.10 Other project links

However the programme is closely related to the 'Switchgear Scheduled Maintenance Programme' (CPP112) and maintenance costs relating to specific assets will feed into the replacement analysis. Also the 'Switchgear Scheduled Maintenance Programme' is itself a network solution to replacement.

2.11 Obligations

Like all companies, we are subject to the general provisions a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

- Electricity Act
- Local Government Act
- Electricity Reform Act
- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act
- Energy Companies Act
- Electricity Industries Act

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a "lifeline" utility, Orion must comply with the Civil Defence Emergency Management (CDEM) Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand's communities. The Act requires us to

- be able to function to the fullest possible extent during and after an emergency
- have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- help define the Crown's CDEM goals and objectives in a National CDEM Strategy
- participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- be capable of managing our own response to emergencies
- develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary NW70.00.14
- Asset Risk Management NW70.60.02

3 Relevant policies and planning standards

Asset management policy NW70.00.46

- We have used Orion's condition based risk management (CBRM) models and engineering knowledge and experience to forecast asset replacement.

Procurement policy OR00.00.19 and Contract management NW73.00.03

- We follow our procurement and contract management policies to achieve value for money by competitively tendering our work with a value over \$20,000.

Delegations of authority policy OR00.00.11

- The overall budgeted expenditure for this programme is approved by the Board as part of the overall Asset management Plan. As and when the expenditure is incurred then approval for the actual expenditure are made in compliance with the delegations of authority policy.

Authorised contractors NW73.10.15

- We ensure only authorised contractors are allowed access to our network (such access may be subject to limits that can be specific to each contractor).

Health and Safety policy OR00.00.01

- We follow our health and safety requirements to ensure the safety of the public and our personnel and contractors around our assets.

Environmental Sustainability Policy OR00.00.03

- We work towards environmental sustainability in our operations.

HV and Low Voltage Switchgear – Asset Management Report YE 2012 (NW70.00.24)

High Voltage Circuit breakers – Asset Management Report YE 2012 (NW70.00.33)

4 Programme description

4.1 Work to be undertaken

The work to be undertaken in this programme involves the replacement of switchgear assets that have reached the end of their economic lives as a result of a number of factors such as their condition, age, obsolescence, lack of spares, and/or lack of support.

The process for determining which assets need to be replaced is outlined above. The programme is closely related to the Switchgear maintenance programme and the attached Asset Management reports FY12 for 'HV and LV Switchgear' and for 'HV Circuit Breakers' cover both areas. More detailed asset condition information is contained within the CBRM spreadsheet model.

4.2 Forecast number of Assets to be replaced

The following table provides a summary of the number of units and type of switchgear to be replaced. A detailed list is appended. The detailed list shows that we will be replacing switchgear in at least one zone substation and in some cases two zone substations on an annual basis. The exception being FY17.

As can be seen the average age of assets being replaced generally exceeds the IM standard life. The large number of MSU's being replaced in general reflects the large number of this type of switchgear on our Network and the age profile of these units. In FY 17 a larger number of MSU's are programmed to be replaced as we were not planning to carry out any 11kV Zone substation Circuit breaker replacements in that year. As described below we will now also replace the Islington 33kV spur assets circuit breakers in FY17.

The fitting of safety barriers to LV panels and Link boxes is forecast to be completed in FY14

Asset Types	FY14	FY15	FY16	FY17	FY18	FY19	Total No.	Avg Age (yrs)	IM Standard Life
66/33kV switchgear	-	3	-	-	-	-	3		
Spur asset CB replacement (excludes Islington)	2	2	2	2	2	2	12		
11kV Zone CB	19	15	53	-	35	52	174	49	45
11kV Network CB	60	52	27	57	52	37	285	48	45
11 kV Swgr (MSU)	2	23	42	140	34	71	312	49	40
11kV Swgr (Fuse Switch)	17	10	11	-	8	-	46	47	35
11kV Switchgear (OIS)	-	6	2	-	-	-	8	39	40
Urban LV SWGR	80	80	80	80	80	80	480		
Rural LV SWGR	55	55	55	55	55	55	330		
ABI's	35	35	35	35	35	35	210		
Addington 11kV Swgr	-	8	-	-	-	-	8		

4.3 Network constraints and service targets

There are no constraints expected due to forecast load.

Assets must be replaced in a timely manner. Running assets to failure (electrically or mechanically) is not appropriate as the consequences of doing so pose a significant risk to people and property and are very costly to rectify.

This project contributes to meeting Orion's overall service targets (including safety) by ensuring that assets are replaced as and when required.

4.4 Dependencies

The programme is closely related to the 'Switchgear Scheduled Maintenance Programme' (CPP112).

Orion's network architecture review may lead to a different configuration of assets being installed at the time replacements are needed.

4.5 Programme deliverability

The ongoing replacement programme can be carried out within normal contracting arrangements. The work in this programme is competitively tendered to selected contractors on a conforming tender/lowest price basis. Tenders and contract works are processed and managed by our infrastructure management group. We use a range of contracting resources to deliver our works plan.

Our use of a number of contractors for field work is a core component of ensuring deliverability of our programmes.

However the scheduling of the work is altered to some extent to take into account resource constraints and network loadings. By having a smooth expenditure forecast we try and avoid peaks and troughs in the work load for our contractors. This enables us to achieve our medium to long term requirements and assists the contractors in their resource planning.

4.6 Prioritisation

Prioritisation is based on a number of factors including:

Safety to the public, our personnel and contractors

Replacement of assets as a result of immediate safety issues will be dealt with under our emergency works contracts. Accelerated replacement of assets with known safety issues that can be kept in service with restricted operating protocols is factored into our CBRM.

Satisfying individual or collective consumer expectations:

We consider satisfying consumers reasonable expectations as a very influential prioritisation factor. We give priority to the constraints that are most likely to impact consumer supply through extended or frequent outages, or compromised power quality. This is in the context of the overall level of quality that we believe is reasonable to provide.

Managing contractor resource constraints:

We aim to maintain a steady work flow to contractors. The contractors have a diversity of skill sets covering different aspects of our assets and we seek to ensure that our mix of projects, in any given year broadly aligns with that diversity. This ensures that contractor personnel and equipment levels match our capital build program year-on-year at a consistent level, reducing the risk of our contractors being over or under resourced.

Coordination with Transpower:

We endeavour to coordinate any major network structural changes adjacent to a grid exit point with Transpower's planned asset replacement programmes, and also provide direction to Transpower to ensure consistency with our sub-transmission upgrade plans.

Our asset replacement programme:

We determine our maintenance priorities by risk based analysis and hence by following the general principle that the assets supplying the greatest number of consumers receive the highest priority. We extensively review areas of the network where scheduled asset replacement programmes occur to ensure the most efficient and cost-effective solution is sought to fit in with the current and long-term network development structure, for example replacement of switchgear in substations.

The risk with any type of replacement programme is that network switching or alternative supplies (generators) will be required to off-load the assets which are to be replaced. This leads to reduced reliability levels and increased risk of outages. We try to mitigate this by co-ordinating replacements with other work and where possible carry out the work at periods of lower network loading.

5 Earthquake Consequences

As a result of the earthquake activity experienced in Canterbury since September 2010 the reliability of the network has been reduced and in some areas the ability to transfer load has been restricted. This will continue to lead to a higher than normal possibility of outages as a result of switching the network to allow assets to be removed from service.

Our resources were constrained following the earthquakes as staff and contractors were diverted to deal with the immediate aftermath of the events. This resulted in a reduction in the planned replacement programme for those years.

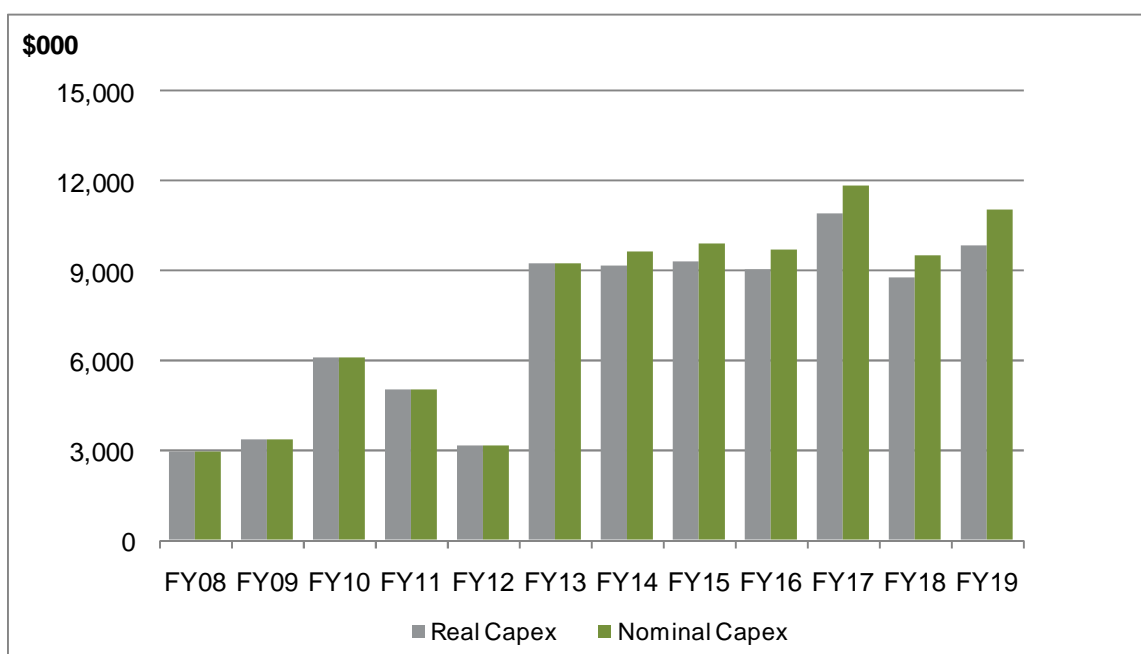
The data on asset condition may not have been captured as fully as a result of the earthquakes and less time has been available to develop the replacement programmes.

6 Expenditure plan

The following chart shows our high and low voltage switchgear and high voltage circuit breaker historical and forecast replacement expenditure in both real and nominal terms (\$000). The real terms have been escalated as per methodology outlined above and in the CPP proposal to ascertain the nominal terms. This shows that, with the exception of an increase in FY17, capital expenditure is expected to remain relatively constant.

These expenditure forecasts do not include any contingencies. However, post earthquake we are not currently operating under normal circumstances and new information is constantly emerging. We have collated together all of the information we can reasonably acquire, and used our expertise and judgement to prepare the forecasts on which this programme is based. We anticipate however that information will emerge subsequent to submitting this proposal which, if incorporated into our thinking, may cause us to modify our views. The replacement programme may need to be adjusted in the future once planning decisions regarding the CBD rebuild are refined by CERA.

Historical and forecast expenditure



The following tables summarise our high and low voltage switchgear and high voltage circuit breaker forecast and historical replacement expenditure in both real and nominal terms (\$000's).

About 41% of the expenditure relates to 'HV and LV Switchgear' and 59% of the expenditure relates to 'HV Circuit Breakers'. The actuals in 2011 and 2012 represent a step down from previous forecasts as a result of the earthquakes. The step up in 2013 represents a mixture of additional expenditure and a catch up on work deferred from earlier. For example in the 2011 AMP (not published due to earthquakes) our forecast for FY13 was \$6.965m compared to the 2012 AMP forecast for FY 2013 of \$9.239m.

The difference of \$2.274m reflects:

- +520k (spur assets)
- +300k additional safety programme
- +70k material costs
- -200k circuit breakers
- -250k Palmers Road No193 lost in earthquake
- -390k Springston 11kV deferred until 2015
- -250k Colombo St BNZ lost in earthquake
- +1004k 50% Milton carried over from FY12
- +216k Montrose St carried over from FY12
- +324k Wainoni Rd carried over from FY12
- +590k Simeon brought forward from FY15
- +306k New Brighton Rd No11 brought forward from FY16

While it might be expected that ongoing expenditure would drop in future years once earthquake delayed work has been carried out, the forecast continues at a similar level to FY13. This continued level of expenditure is due to increased levels of replacement of assets, as a result of more assets reaching the end of their economic lives, and this is based on the age of assets modified using engineering judgement to prioritise the spend. This step up was originally signalled in the 2010 AMP, to occur in FY14.

The step increase in expenditure in FY17 for HV and LV switchgear is due to a significant increase in the replacement of magnifix units. This increase was made because they are approaching the end of their expected lifecycle. Large numbers of these units were installed in approximately 1960 when the use of oil based switchgear started to decline.

In order to maintain a reasonably constant overall budget for total switchgear replacement the replacement of magnifix units has been increased. Since that time the acquisition of Transpower spur assets and the need to replace a number of 33kV circuit breakers at Islington has required a forecast allowance for their replacement. As these assets have not yet been acquired by us they are not included in the CBRM model.

Also in FY10 a barrier programme for switch panels was introduced for safety reasons. This is scheduled to end in 2014.

Historical expenditure (nominal)

	Nominal \$000				
	FY08	FY09	FY10	FY11	FY12
Indoor circuit breakers and switchgear	2,450	2,082	1,831	2,267	1,947
Outdoor circuit breakers and switchgear	-	-	2,043	337	-
11kV Disconnectors & Dropout fuses	-	-	384	168	271
Link Pillars & LV customer service conne	506	1,255	1,825	2,272	937
Total	2,956	3,337	6,084	5,043	3,155

Forecast expenditure (real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Indoor circuit breakers and switchgear	4,785	4,574	5,871	5,179	5,078	5,265	5,648
Outdoor circuit breakers and switchgear	829	971	1,447	1,827	3,846	1,518	2,207
11kV Disconnectors & Dropout fuses	900	385	385	385	385	385	385
Link Pillars & LV customer service conne	2,725	3,240	1,640	1,640	1,640	1,640	1,640
Total	9,239	9,170	9,343	9,031	10,949	8,808	9,880

Forecast expenditure (nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Indoor circuit breakers and switchgear	4,785	4,825	6,210	5,576	5,510	5,681	6,326
Outdoor circuit breakers and switchgear	829	1,024	1,531	1,967	4,173	1,638	2,472
11kV Disconnectors & Dropout fuses	900	406	407	415	418	415	431
Link Pillars & LV customer service conne	2,725	3,417	1,735	1,766	1,779	1,770	1,837
Total	9,239	9,672	9,882	9,723	11,880	9,504	11,066

7 References

Documents that should be read in conjunction with this project summary are:

- HV and Low Voltage Switchgear – Asset Management Report YE 2012 (NW70.00.24)
- High Voltage Circuit breakers – Asset Management Report YE 2012 (NW70.00.33)
- Application of CBRM with Orion New Zealand – EA Technology Report No. 76500 Issue 1 : March 2012
- Asset Management Policy NW70.00.46
- Asset Management Lifecycle budget forecasting process

Location	OrionAssetID	Category	Specification	Manuf Year	kV	Cost \$,000	ProjectYear	Health Index	Orion Ranking	Age
BATH ST NO.23 (Unit 12)	SWS46953	CB	OCB	1964	11	54	2014	5	47	50
BATH ST NO.23 (Unit 13)	SWS46949	CB	OCB	1964	11	54	2014	6	47	50
BATH ST NO.23 (Unit 14)	SWS46966	CB	OCB	1964	11	54	2014	6	47	50
BRISBANE ST S (Unit 2)	SWS46971	CB	OCB	1964	11	54	2014	5	56	50
BRISBANE ST S (Unit 3)	SWS46970	CB	OCB	1964	11	54	2014	5	47	50
BRISBANE ST S (Unit 4)	SWS46932	CB	OCB	1964	11	54	2014	5	47	50
BRISBANE ST S (Unit 5)	SWS46941	CB	OCB	1964	11	54	2014	6	47	50
BRISBANE ST S (Unit 6)	SWS46964	CB	OCB	1964	11	54	2014	5	47	50
DURHAM ST NO.191 (Unit 1)	SWS38739	CB	OCB	1963	11	54	2014	6	47	51
DURHAM ST NO.191 (Unit 2)	SWS46960	CB	OCB	1964	11	54	2014	5	47	50
DURHAM ST NO.191 (Unit 3)	SWS46954	CB	OCB	1964	11	54	2014	5	47	50
DURHAM ST NO.191 (Unit 4)	SWS46972	CB	OCB	1964	11	54	2014	5	47	50
DURHAM ST NO.191 (Unit 5)	SWS46933	CB	OCB	1964	11	54	2014	5	47	50
ESTUARY RD NO.299 (Unit 11)	SWS54393	CB	OCB	1966	11	54	2014	5	56	48
ESTUARY RD NO.299 (Unit 12)	SWS54378	CB	OCB	1965	11	54	2014	6	56	49
ESTUARY RD NO.299 (Unit 13)	SWS54634	CB	OCB	1965	11	54	2014	6	56	49
ESTUARY RD NO.299 (Unit 14)	SWS54467	CB	OCB	1967	11	54	2014	5	56	47
ESTUARY RD NO.299 (Unit 15)	SWS54376	CB	OCB	1965	11	54	2014	6	56	49
ESTUARY RD NO.299 (Unit SP)	SWS54368	CB	OCB	1965	11	54	2014	6	56	49
FITZGERALD AV NO.211 (Unit 13)	SWS54479	CB	OCB	1967	11	54	2014	5	56	47
FITZGERALD AV NO.211 (Unit 14)	SWS54422	CB	OCB	1966	11	54	2014	5	56	48
GASSON ST S (Unit 12)	SWS54644	CB	OCB	1965	11	54	2014	5	56	49
GASSON ST S (Unit 13)	SWS54475	CB	OCB	1967	11	54	2014	5	56	47
KILMORE ST PARK ROYAL (Unit 33)	AEI77541	CB	OCB	1964	11	54	2014	5	62	50
MACKENZIE AV NO.117 (Unit 12)	SWS46938	CB	OCB	1964	11	54	2014	5	47	50
MACKENZIE AV NO.117 (Unit 13)	SWS46935	CB	OCB	1964	11	54	2014	5	47	50
MACKENZIE AV NO.117 (Unit 14)	SWS46944	CB	OCB	1964	11	54	2014	5	47	50
MACKENZIE AV NO.117 (Unit 15)	SWS46928	CB	OCB	1964	11	54	2014	5	47	50
MEMORIAL AV NO.82 (Unit 33)	AEI77458	CB	OCB	1964	11	54	2014	5	62	50
RANDOLPH ST NO.55 (Unit 16)	AEI77452	CB	OCB	1963	11	54	2014	6	62	51

RANDOLPH ST NO.55 (Unit 17)	AEI77424	CB	OCB	1963	11	54	2014	6	62	51
RANDOLPH ST NO.55 (Unit 18)	AEI77444	CB	OCB	1963	11	54	2014	6	62	51
SEDDON ST (Unit 14)	SWS54614	CB	OCB	1968	11	54	2014	4	56	46
SEDDON ST (Unit 15)	SWS54619	CB	OCB	1968	11	54	2014	5	56	46
SEDDON ST (Unit 35)	SWS54397	CB	OCB	1966	11	54	2014	5	56	48
SEDDON ST (Unit 36)	SWS54494	CB	OCB	1967	11	54	2014	5	56	47
SHAKESPEARE RD NO.6 (Unit 15)	AEI77432	CB	OCB	1963	11	54	2014	6	62	51
SHAKESPEARE RD NO.6 (Unit 16)	AEI77394	CB	OCB	1963	11	54	2014	6	62	51
SHAKESPEARE RD NO.6 (Unit 17)	AEI77428	CB	OCB	1963	11	54	2014	6	62	51
WILSONS RD NO.284 (Unit 1)	AEI77414	CB	OCB	1963	11	54	2014	6	62	51
WILSONS RD NO.284 (Unit 2)	AEI77440	CB	OCB	1963	11	54	2014	6	62	51
WILSONS RD NO.284 (Unit 3)	AEI77405	CB	OCB	1963	11	54	2014	6	62	51
WINCHESTER ST S (Unit 32)	SWS54575	CB	OCB	1968	11	54	2014	4	56	46
WINCHESTER ST S (Unit 33)	SWS54526	CB	OCB	1967	11	54	2014	5	56	47
WINCHESTER ST S (Unit 34)	SWS54621	CB	OCB	1968	11	54	2014	4	56	46
WINCHESTER ST S (Unit 35)	SWS54458	CB	OCB	1967	11	54	2014	5	56	47
WOODHAM RD NO.271 (Unit 12)	SWS54546	CB	OCB	1967	11	54	2014	6	56	47
WOODHAM RD NO.271 (Unit 13)	SWS54547	CB	OCB	1967	11	54	2014	5	56	47
WOODHAM RD NO.271 (Unit 31)	SWS54455	CB	OCB	1967	11	54	2014	5	56	47
WOODHAM RD NO.271 (Unit 32)	SWS54442	CB	OCB	1967	11	54	2014	5	56	47
WOODHAM RD NO.271 (Unit 33)	SWS54536	CB	OCB	1967	11	54	2014	5	56	47
WOODHAM RD NO.271 (Unit 34)	SWS54381	CB	OCB	1965	11	54	2014	5	56	49
WORDSWORTH ST NO.125 (Unit 2)	SWS46947	CB	OCB	1964	11	54	2014	5	47	50
WORDSWORTH ST NO.125 (Unit 3)	SWS46959	CB	OCB	1964	11	54	2014	5	47	50
WORDSWORTH ST NO.125 (Unit 4)	SWS46969	CB	OCB	1964	11	54	2014	5	47	50
WORDSWORTH ST NO.125 (Unit 5)	SWS46952	CB	OCB	1964	11	54	2014	5	47	50
WORDSWORTH ST NO.49 (Unit 11)	SWS54437	CB	OCB	1966	11	54	2014	5	56	48
WORDSWORTH ST NO.49 (Unit 12)	SWS54507	CB	OCB	1967	11	54	2014	5	56	47
WORDSWORTH ST NO.49 (Unit 13)	SWS54424	CB	OCB	1966	11	54	2014	5	56	48
WORDSWORTH ST NO.49 (Unit 14)	SWS54486	CB	OCB	1967	11	54	2014	5	56	47
BREEZES RD N (Unit 12)	SWS72136	CB	OCB	1969	11	54	2015	4	62	46
BREEZES RD N (Unit 13)	SWS72155	CB	OCB	1970	11	54	2015	4	62	45
BREEZES RD N (Unit 14)	SWS72317	CB	OCB	1974	11	54	2015	3	62	41
BREEZES RD N (Unit 15)	SWS72265	CB	OCB	1973	11	54	2015	3	62	42

BREEZES RD N (Unit 32)	SWS72388	CB	OCB	1972	11	54	2015	4	62	43
BREEZES RD N (Unit 33)	SWS72123	CB	OCB	1969	11	54	2015	4	62	46
CLYDE RD NO.146 (Unit 11)	SWS54589	CB	OCB	1968	11	54	2015	4	56	47
CLYDE RD NO.146 (Unit 12)	SWS54412	CB	OCB	1966	11	54	2015	5	56	49
CLYDE RD NO.146 (Unit 13)	SWS54395	CB	OCB	1966	11	54	2015	5	56	49
CLYDE RD NO.146 (Unit 14)	SWS54403	CB	OCB	1966	11	54	2015	5	56	49
DICKENS ST (Unit 31)	SWS54359	CB	OCB	1965	11	54	2015	5	56	50
DICKENS ST (Unit 32)	SWS54673	CB	OCB	1966	11	54	2015	5	56	49
DICKENS ST (Unit 33)	SWS54385	CB	OCB	1965	11	54	2015	5	56	50
FERRY RD NO.331 (Unit 10)	SWS54396	CB	OCB	1966	11	54	2015	5	56	49
FERRY RD NO.331 (Unit 8)	SWS54629	CB	OCB	1968	11	54	2015	4	56	47
FERRY RD NO.331 (Unit 9)	SWS54398	CB	OCB	1966	11	54	2015	5	56	49
HORATIO ST (Unit 3)	SWS54648	CB	OCB	1966	11	54	2015	5	56	49
HORATIO ST (Unit 4)	SWS54566	CB	OCB	1968	11	54	2015	4	56	47
HORATIO ST (Unit 5)	SWS54670	CB	OCB	1966	11	54	2015	5	56	49
HORATIO ST (Unit 6)	SWS54572	CB	OCB	1968	11	54	2015	4	56	47
ILAM RD NO.115 (Unit 15)	SWS46987	CB	OCB	1964	11	54	2015	5	47	51
ILAM RD NO.115 (Unit 16)	SWS46929	CB	OCB	1964	11	54	2015	5	47	51
ILAM RD NO.115 (Unit 17)	SWS46981	CB	OCB	1964	11	54	2015	5	47	51
ILAM RD NO.115 (Unit 18)	SWS46948	CB	OCB	1964	11	54	2015	5	56	51
KILMARNOCK ST NO.44 (Unit 34)	SWS46983	CB	OCB	1964	11	54	2015	5	47	51
KILMARNOCK ST NO.44 (Unit 35)	SWS46950	CB	OCB	1964	11	54	2015	5	47	51
KILMARNOCK ST NO.44 (Unit 36)	SWS46973	CB	OCB	1964	11	54	2015	5	47	51
KILMARNOCK ST NO.44 (Unit 37)	SWS46936	CB	OCB	1964	11	54	2015	5	47	51
KINGSLEY ST NO.61 (Unit 2)	SWS54464	CB	OCB	1967	11	54	2015	5	56	48
KINGSLEY ST NO.61 (Unit 3)	SWS54435	CB	OCB	1966	11	54	2015	5	56	49
KINGSLEY ST NO.61 (Unit 4)	SWS54401	CB	OCB	1966	11	54	2015	5	56	49
MACES RD NO.180 (Unit 2)	SWS54454	CB	OCB	1967	11	54	2015	5	56	48
MACES RD NO.180 (Unit 3)	SWS54591	CB	OCB	1968	11	54	2015	4	56	47
MACES RD NO.180 (Unit 4)	SWS54550	CB	OCB	1968	11	54	2015	4	56	47
MACES RD NO.180 (Unit 5)	SWS54384	CB	OCB	1965	11	54	2015	5	56	50
MANCHESTER ST NO.176 (Unit 19)	SWS54586	CB	OCB	1968	11	54	2015	4	56	47
MANCHESTER ST NO.176 (Unit 20)	SWS54615	CB	OCB	1968	11	54	2015	4	56	47
MANCHESTER ST NO.176 (Unit 21)	SWS54645	CB	OCB	1966	11	54	2015	5	56	49

MANCHESTER ST NO.176 (Unit 22)	SWS54647	CB	OCB	1966	11	54	2015	5	56	49
MATSONS AV (Unit 11)	SWS54815	CB	OCB	1967	11	54	2015	5	56	48
RANDOLPH ST S (Unit 17)	SWS54402	CB	OCB	1966	11	54	2015	5	56	49
RANDOLPH ST S (Unit 18)	SWS54372	CB	OCB	1965	11	54	2015	5	56	50
RANDOLPH ST S (Unit 29)	SWS54474	CB	OCB	1967	11	54	2015	5	56	48
RANDOLPH ST S (Unit 30)	SWS54356	CB	OCB	1965	11	54	2015	5	56	50
RANDOLPH ST S (Unit 31)	SWS54382	CB	OCB	1965	11	54	2015	5	56	50
RANDOLPH ST S (Unit 32)	SWS54592	CB	OCB	1968	11	54	2015	4	56	47
ST ASAPH ST NO.455 (Unit 4)	SWS54404	CB	OCB	1966	11	54	2015	5	56	49
ST ASAPH ST NO.455 (Unit 5)	SWS54448	CB	OCB	1967	11	54	2015	5	56	48
ST ASAPH ST NO.455 (Unit 6)	SWS54433	CB	OCB	1966	11	54	2015	5	56	49
TUAM ST NO.94 (Unit 7)	SWS54354	CB	OCB	1965	11	54	2015	5	56	50
TUAM ST NO.94 (Unit 8)	SWS54379	CB	OCB	1965	11	54	2015	5	56	50
TUAM ST NO.94 (Unit 9)	SWS54357	CB	OCB	1965	11	54	2015	5	56	50
LISMORE ST E (Unit 32)	SWS54533	CB	OCB	1967	11	54	2016	5	56	49
LISMORE ST E (Unit 33)	SWS54488	CB	OCB	1967	11	54	2016	5	56	49
LISMORE ST E (Unit 34)	SWS54628	CB	OCB	1968	11	54	2016	4	56	48
LISMORE ST E (Unit 35)	SWS54576	CB	OCB	1968	11	54	2016	4	56	48
MATSONS AV (Unit 12)	SWS54469	CB	OCB	1967	11	54	2016	5	56	49
MATSONS AV (Unit 13)	SWS54420	CB	OCB	1966	11	54	2016	5	56	50
SPRINGFIELD RD NO.56 (Unit 32)	SWS54601	CB	OCB	1968	11	54	2016	4	56	48
SPRINGFIELD RD NO.56 (Unit 33)	SWS54371	CB	OCB	1965	11	54	2016	5	56	51
SPRINGFIELD RD NO.56 (Unit 34)	SWS54616	CB	OCB	1968	11	54	2016	4	56	48
SPRINGFIELD RD NO.56 (Unit 35)	SWS54509	CB	OCB	1967	11	54	2016	5	56	49
SPRINGFIELD RD NO.56 (Unit 36)	SWS54370	CB	OCB	1965	11	54	2016	5	56	51
STRAVEN RD NO.103 (Unit 11)	SWS54439	CB	OCB	1967	11	54	2016	5	56	49
STRAVEN RD NO.103 (Unit 12)	SWS54451	CB	OCB	1967	11	54	2016	5	56	49
STRAVEN RD NO.103 (Unit 13)	SWS54421	CB	OCB	1966	11	54	2016	5	56	50
STRUTHERS LN (Unit 2)	SWS54391	CB	OCB	1966	11	54	2016	5	56	50
STRUTHERS LN (Unit 3)	SWS54461	CB	OCB	1967	11	54	2016	5	56	49
STRUTHERS LN (Unit 4)	SWS54545	CB	OCB	1967	11	54	2016	5	56	49
STRUTHERS LN (Unit 5)	SWS54537	CB	OCB	1967	11	54	2016	5	56	49
STRUTHERS LN (Unit 6)	SWS54410	CB	OCB	1966	11	54	2016	5	56	50
TOTARA ST (Unit 31)	SWS54534	CB	OCB	1967	11	54	2016	5	56	49

TOTARA ST (Unit 32)	SWS54497	CB	OCB	1967	11	54	2016	5	56	49
TOTARA ST (Unit 33)	SWS54416	CB	OCB	1966	11	54	2016	5	56	50
WILMER ST NO.10 (Unit 2)	SWS54635	CB	OCB	1966	11	54	2016	5	56	50
WILMER ST NO.10 (Unit 3)	SWS54524	CB	OCB	1967	11	54	2016	5	56	49
WILMER ST NO.10 (Unit 4)	SWS54482	CB	OCB	1967	11	54	2016	5	56	49
WILMER ST NO.10 (Unit 5)	SWS54607	CB	OCB	1968	11	54	2016	4	56	48
WILMER ST NO.10 (Unit 6)	SWS54483	CB	OCB	1967	11	54	2016	5	56	49
BUCHANANS RD NO.79 (Unit 1)	REYSLMT2902	CB	OCB	1982	11	54	2017	2	59	35
BUCHANANS RD NO.79 (Unit 2)	REYSLMT2035	CB	OCB	1970	11	54	2017	4	55	47
BUCHANANS RD NO.79 (Unit 3)	REYSLMT2036	CB	OCB	1970	11	54	2017	4	55	47
BUCHANANS RD NO.79 (Unit 4)	REYSLMT2068	CB	OCB	1970	11	54	2017	4	55	47
CHRISTS COLLEGE (Unit 2)	SWS54552	CB	OCB	1968	11	54	2017	4	56	49
CHRISTS COLLEGE (Unit 3)	SWS54394	CB	OCB	1966	11	54	2017	5	56	51
CHRISTS COLLEGE (Unit 4)	SWS54605	CB	OCB	1968	11	54	2017	4	56	49
FIRESTONE (Unit 11)	SWS72390	CB	OCB	1969	11	54	2017	4	62	48
FIRESTONE (Unit 12)	SWS72253	CB	OCB	1973	11	54	2017	3	62	44
FIRESTONE (Unit 13)	SWS72251	CB	OCB	1973	11	54	2017	3	62	44
FIRESTONE (Unit 14)	SWS72258	CB	OCB	1973	11	54	2017	3	62	44
FIRESTONE (Unit 15)	SWS72209	CB	OCB	1971	11	54	2017	4	62	46
FITZGERALD AV NO.93 (Unit 15)	SWS72105	CB	OCB	1968	11	54	2017	4	62	49
HAMPSHIRE ST SHOPS (Unit 33)	SWS104795	CB	OCB	1978	11	54	2017	3	62	39
HAMPSHIRE ST SHOPS (Unit 36)	SWS72199	CB	OCB	1970	11	54	2017	4	62	47
HAMPSHIRE ST SHOPS (Unit 37)	SWS72195	CB	OCB	1970	11	54	2017	4	62	47
HEREFORD ST GUARDIAN ASS (Unit 2)	SWS72101	CB	OCB	1968	11	54	2017	4	62	49
HEREFORD ST GUARDIAN ASS (Unit 3)	SWS72271	CB	OCB	1973	11	54	2017	3	62	44
LIVERPOOL ST CFM (Unit 2)	SWS54587	CB	OCB	1968	11	54	2017	4	56	49
LIVERPOOL ST CFM (Unit 3)	SWS54443	CB	OCB	1967	11	54	2017	5	56	50
LIVERPOOL ST CFM (Unit 4)	SWS54562	CB	OCB	1968	11	54	2017	5	56	49
LIVERPOOL ST CFM (Unit 5)	SWS54559	CB	OCB	1968	11	54	2017	4	56	49
MONTREAL ST N (Unit 31)	SWS54499	CB	OCB	1967	11	54	2017	5	56	50
MONTREAL ST N (Unit 32)	SWS54551	CB	OCB	1968	11	54	2017	4	56	49
MONTREAL ST N (Unit 33)	SWS54630	CB	OCB	1968	11	54	2017	4	56	49
MONTREAL ST N (Unit 34)	SWS54392	CB	OCB	1966	11	54	2017	5	56	51
MONTREAL ST N (Unit 35)	SWS54626	CB	OCB	1968	11	54	2017	4	56	49

MOORHOUSE AV NO.38 (Unit 2)	SWS54429	CB	OCB	1966	11	54	2017	5	56	51
MOORHOUSE AV NO.38 (Unit 3)	SWS54408	CB	OCB	1966	11	54	2017	5	56	51
MOORHOUSE AV NO.38 (Unit 4)	SWS54452	CB	OCB	1967	11	54	2017	5	56	50
MOORHOUSE AV NO.38 (Unit 5)	SWS54638	CB	OCB	1966	11	54	2017	5	56	51
MOORHOUSE AV NO.38 (Unit 6)	SWS54571	CB	OCB	1968	11	54	2017	5	56	49
Parent for Switchgear & SG Cabinet Stock	SWS72181	CB	OCB	1970	11	54	2017	4	62	47
RESERVE BANK (Unit 3)	SWS54623	CB	OCB	1968	11	54	2017	4	56	49
RESERVE BANK (Unit 4)	SWS54440	CB	OCB	1967	11	54	2017	5	56	50
RESERVE BANK (Unit 5)	SWS54617	CB	OCB	1968	11	54	2017	4	56	49
RESERVE BANK (Unit 6)	SWS54606	CB	OCB	1968	11	54	2017	4	56	49
ST JOHNS ST WW (Unit 31)	SWS72109	CB	OCB	1968	11	54	2017	4	62	49
ST JOHNS ST WW (Unit 32)	SWS72377	CB	OCB	1975	11	54	2017	3	62	42
ST JOHNS ST WW (Unit 33)	SWS72372	CB	OCB	1975	11	54	2017	3	62	42
ST JOHNS ST WW (Unit 34)	SWS72165	CB	OCB	1970	11	54	2017	4	62	47
ST JOHNS ST WW (Unit 35)	SWS72382	CB	OCB	1970	11	54	2017	4	62	47
ST JOHNS ST WW (Unit 36)	SWS72111	CB	OCB	1968	11	54	2017	4	62	49
ST JOHNS ST WW (Unit 37)	SWS72373	CB	OCB	1975	11	54	2017	3	62	42
WAIRAKEI RD NO.330 (Unit 33)	SWS54604	CB	OCB	1968	11	54	2017	4	56	49
WAIRAKEI RD NO.330 (Unit 34)	SWS54596	CB	OCB	1968	11	54	2017	4	56	49
WAIRAKEI RD NO.330 (Unit 35)	SWS54641	CB	OCB	1967	11	54	2017	5	56	50
WAIRAKEI RD NO.330 (Unit 36)	SWS54476	CB	OCB	1967	11	54	2017	5	56	50
WAIRAKEI RD NO.330 (Unit 37)	SWS54478	CB	OCB	1967	11	54	2017	5	56	50
WAIRAKEI RD NO.330 (Unit 38)	SWS54642	CB	OCB	1967	11	54	2017	5	56	50
WAIRAKEI RD NO.330 (Unit 39)	SWS54611	CB	OCB	1968	11	54	2017	4	56	49
WEST WATSON AV W (Unit 11)	SWS54558	CB	OCB	1968	11	54	2017	4	56	49
WEST WATSON AV W (Unit 12)	SWS54438	CB	OCB	1966	11	54	2017	5	56	51
WEST WATSON AV W (Unit 13)	SWS54563	CB	OCB	1968	11	54	2017	4	56	49
WEST WATSON AV W (Unit 14)	SWS54580	CB	OCB	1968	11	54	2017	4	56	49
WEST WATSON AV W (Unit 15)	SWS54631	CB	OCB	1968	11	54	2017	4	56	49
WICKHAM ST NO.24 (Unit 37)	SWS72107	CB	OCB	1968	11	54	2017	4	62	49
BEXLEY RD NO.81 (Unit 33)	SWS72229	CB	OCB	1972	11	54	2018	4	62	46
BEXLEY RD NO.81 (Unit 34)	SWS72367	CB	OCB	1975	11	54	2018	3	62	43
BEXLEY RD NO.81 (Unit 35)	SWS72169	CB	OCB	1970	11	54	2018	4	62	48
BEXLEY RD NO.81 (Unit 36)	SWS72191	CB	OCB	1970	11	54	2018	4	62	48

BEXLEY RD NO.81 (Unit 37)	SWS72170	CB	OCB	1970	11	54	2018	4	62	48
BEXLEY RD NO.81 (Unit 38)	SWS72280	CB	OCB	1973	11	54	2018	4	62	45
BURWOOD HOSPITAL (Unit 12)	SWS72157	CB	OCB	1970	11	54	2018	4	62	48
BURWOOD HOSPITAL (Unit 13)	SWS99046	CB	OCB	1977	11	54	2018	3	62	41
BURWOOD HOSPITAL (Unit 14)	SWS72316	CB	OCB	1974	11	54	2018	3	62	44
BURWOOD HOSPITAL (Unit 15)	SWS72337	CB	OCB	1974	11	54	2018	3	62	44
BURWOOD RD NO.284 (Unit 31)	SWS72234	CB	OCB	1972	11	54	2018	4	62	46
BURWOOD RD NO.284 (Unit 32)	SWS72174	CB	OCB	1970	11	54	2018	4	62	48
BURWOOD RD NO.284 (Unit 33)	SWS72343	CB	OCB	1975	11	54	2018	3	62	43
BURWOOD RD NO.284 (Unit 34)	SWS72285	CB	OCB	1973	11	54	2018	3	62	45
BURWOOD RD NO.284 (Unit 35)	SWS72173	CB	OCB	1970	11	54	2018	4	62	48
CARMEN RD NO.66 (Unit 1)	SWS84258	CB	OCB	1970	11	54	2018	4	62	48
CFM CANTERBURY (Unit 1)	SWS72137	CB	OCB	1970	11	54	2018	4	62	48
CFM CANTERBURY (Unit 2)	SWS72365	CB	OCB	1975	11	54	2018	3	62	43
CFM CANTERBURY (Unit 3)	SWS72393	CB	OCB	1970	11	54	2018	4	62	48
CFM CANTERBURY (Unit 4)	SWS72147	CB	OCB	1970	11	54	2018	4	62	48
HILLS RD NO.130 (Unit 12)	SWS72133	CB	OCB	1969	11	54	2018	4	62	49
HILLS RD NO.130 (Unit 13)	SWS72112	CB	OCB	1968	11	54	2018	4	62	50
HILLS RD NO.130 (Unit 14)	SWS72197	CB	OCB	1970	11	54	2018	4	62	48
HILLS RD NO.130 (Unit 15)	SWS72122	CB	OCB	1969	11	54	2018	4	62	49
HILLS RD NO.130 (Unit 16)	SWS72139	CB	OCB	1970	11	54	2018	4	62	48
HILLS RD NO.130 (Unit 17)	SWS72146	CB	OCB	1970	11	54	2018	4	62	48
JEFFREYS RD NO.8 (Unit 16)	SWS54578	CB	OCB	1968	11	54	2018	4	56	50
JEFFREYS RD NO.8 (Unit 17)	SWS54387	CB	OCB	1965	11	54	2018	5	56	53
JEFFREYS RD NO.8 (Unit 18)	SWS54481	CB	OCB	1967	11	54	2018	5	56	51
JEFFREYS RD NO.8 (Unit 19)	SWS54512	CB	OCB	1967	11	54	2018	5	56	51
JEFFREYS RD NO.8 (Unit 20)	SWS54649	CB	OCB	1966	11	54	2018	5	56	52
LAKE TERRACE RD NO.5 (Unit 14)	SWS54517	CB	OCB	1967	11	54	2018	5	56	51
LAKE TERRACE RD NO.5 (Unit 15)	SWS54493	CB	OCB	1967	11	54	2018	5	56	51
LAKE TERRACE RD NO.5 (Unit 16)	SWS54445	CB	OCB	1967	11	54	2018	5	56	51
LAKE TERRACE RD NO.5 (Unit 36)	SWS54600	CB	OCB	1968	11	54	2018	4	56	50
LAKE TERRACE RD NO.5 (Unit 37)	SWS54460	CB	OCB	1967	11	54	2018	5	56	51
LAKE TERRACE RD NO.5 (Unit 38)	SWS54561	CB	OCB	1968	11	54	2018	4	56	50
LAKE TERRACE RD NO.5 (Unit 39)	SWS54567	CB	OCB	1968	11	54	2018	5	56	50

MAYS RD NO.107 (Unit 33)	SWS72179	CB	OCB	1970	11	54	2018	4	62	48
MAYS RD NO.107 (Unit 34)	SWS72117	CB	OCB	1968	11	54	2018	4	62	50
MAYS RD NO.107 (Unit 35)	SWS72227	CB	OCB	1972	11	54	2018	4	62	46
MAYS RD NO.107 (Unit 36)	SWS72380	CB	OCB	1969	11	54	2018	4	62	49
MAYS RD NO.107 (Unit 37)	SWS72350	CB	OCB	1975	11	54	2018	3	62	43
MAYS RD NO.107 (Unit 38)	SWS72134	CB	OCB	1969	11	54	2018	4	62	49
MAYS RD NO.107 (Unit 39)	SWS98992	CB	OCB	1976	11	54	2018	3	62	42
ORCHARD RD AIR WORKSHOP (Unit 36)	SWS100847	CB	OCB	1977	11	54	2018	3	62	41
ORCHARD RD AIR WORKSHOP (Unit 44)	SWS100648	CB	OCB	1977	11	54	2018	3	62	41
RADBROOK ST NO.14 (Unit 12)	SWS72375	CB	OCB	1975	11	54	2018	3	62	43
RADBROOK ST NO.14 (Unit 13)	SWS72383	CB	OCB	1970	11	54	2018	4	62	48
RADBROOK ST NO.14 (Unit 14)	SWS72118	CB	OCB	1968	11	54	2018	4	62	50
RADBROOK ST NO.14 (Unit 15)	SWS72140	CB	OCB	1970	11	54	2018	4	62	48
RADBROOK ST NO.14 (Unit 16)	SWS72130	CB	OCB	1969	11	54	2018	4	62	49
HALSWELL JTN RD NO.700 (Unit 1)	SWS72151A	CB	OCB	1970	11	54	2019	4	62	49
MERRIN ST NO.51 (Unit 32)	SWS72183	CB	OCB	1970	11	54	2019	4	62	49
MERRIN ST NO.51 (Unit 33)	SWS72150	CB	OCB	1970	11	54	2019	4	62	49
MERRIN ST NO.51 (Unit 34)	SWS72178	CB	OCB	1970	11	54	2019	4	62	49
MERRIN ST NO.51 (Unit 35)	SWS72104	CB	OCB	1968	11	54	2019	4	62	51
OFFICE RD W (Unit 34)	SWS72160	CB	OCB	1970	11	54	2019	4	62	49
OFFICE RD W (Unit 35)	SWS72277	CB	OCB	1973	11	54	2019	3	62	46
OFFICE RD W (Unit 36)	SWS72182	CB	OCB	1970	11	54	2019	4	62	49
OFFICE RD W (Unit 37)	SWS72131	CB	OCB	1969	11	54	2019	4	62	50
OFFICE RD W (Unit 38)	SWS72322	CB	OCB	1974	11	54	2019	3	62	45
OFFICE RD W (Unit 39)	SWS72211	CB	OCB	1971	11	54	2019	4	62	48
OFFICE RD W (Unit 40)	SWS72237	CB	OCB	1972	11	54	2019	4	62	47
OFFICE RD W (Unit 41)	SWS72161	CB	OCB	1970	11	54	2019	4	62	49
OFFICE RD W (Unit 42)	SWS72266	CB	OCB	1973	11	54	2019	3	62	46
PHILPOTTS RD NO.65 (Unit 34)	SWS72176	CB	OCB	1970	11	54	2019	4	62	49
PHILPOTTS RD NO.65 (Unit 35)	SWS72159	CB	OCB	1970	11	54	2019	4	62	49
PHILPOTTS RD NO.65 (Unit 36)	SWS72349	CB	OCB	1975	11	54	2019	3	62	44
PHILPOTTS RD NO.65 (Unit 37)	SWS72188	CB	OCB	1970	11	54	2019	4	62	49
REDRUTH AV (Unit 31)	SWS72175	CB	OCB	1970	11	54	2019	4	62	49
ROWLEY AV NO.11 (Unit 36)	SWS72180	CB	OCB	1970	11	54	2019	4	62	49

ROWLEY AV NO.11 (Unit 37)	SWS72198	CB	OCB	1970	11	54	2019	4	62	49
SMITH ST (Unit 32)	SWS72119	CB	OCB	1970	11	54	2019	4	62	49
SMITH ST (Unit 33)	SWS72102	CB	OCB	1968	11	54	2019	4	62	51
SMITH ST (Unit 34)	SWS72326	CB	OCB	1974	11	54	2019	3	62	45
SMITH ST (Unit 35)	SWS72238	CB	OCB	1972	11	54	2019	4	62	47
ST ASAPH ST W (Unit 32)	SWS72244	CB	OCB	1973	11	54	2019	4	62	46
ST ASAPH ST W (Unit 33)	SWS72163	CB	OCB	1970	11	54	2019	4	62	49
ST ASAPH ST W (Unit 34)	SWS72204	CB	OCB	1971	11	54	2019	4	62	48
ST ASAPH ST W (Unit 35)	SWS72269	CB	OCB	1973	11	54	2019	4	62	46
ST ASAPH ST W (Unit 36)	SWS72190	CB	OCB	1970	11	54	2019	4	62	49
ST ASAPH ST W (Unit 37)	SWS72158	CB	OCB	1970	11	54	2019	4	62	49
SUVA ST E (Unit 31)	SWS72243	CB	OCB	1973	11	54	2019	3	62	46
SUVA ST E (Unit 32)	SWS72381	CB	OCB	1970	11	54	2019	4	62	49
SUVA ST E (Unit 33)	SWS72129	CB	OCB	1969	11	54	2019	4	62	50
SUVA ST E (Unit 34)	SWS72348	CB	OCB	1975	11	54	2019	3	62	44
SUVA ST E (Unit 35)	SWS72314	CB	OCB	1974	11	54	2019	3	62	45
SUVA ST E (Unit 36)	SWS72218	CB	OCB	1971	11	54	2019	4	62	48
MONTREAL ZONE SUB (Unit 1)	BRU63431-6	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit 10)	BRU63431-15	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit 11)	BRU63431-16	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit 12)	BRU63431-17	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit 13)	BRU63431-18	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit 14)	BRU63431-2	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit 15)	BRU63431-3	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit 16)	BRU63431-4	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit 17)	BRU63431-19	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit 18)	BRU63431-5	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit 2)	BRU63431-7	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit 3)	BRU63431-8	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit 4)	BRU63431-9	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit 5)	BRU63431-10	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit 6)	BRU63431-11	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit 7)	BRU63431-1	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit 8)	BRU63431-13	CB	OCB	1963	11	70	2014	5	43	51

MONTREAL ZONE SUB (Unit 9)	BRU63431-14	CB	OCB	1963	11	70	2014	5	43	51
MONTREAL ZONE SUB (Unit SP)	BRU63431-12	CB	OCB	1963	11	70	2014	5	43	51
HAREWOOD ZONE SUB (Unit 105)	AEI92488-A1	CB	OCB	1965	11	70	2015	5	62	50
HAREWOOD ZONE SUB (Unit 110)	AEI81004	CB	OCB	1965	11	70	2015	5	62	50
HAREWOOD ZONE SUB (Unit 111)	AEI88908-A6	CB	OCB	1965	11	70	2015	5	62	50
HAREWOOD ZONE SUB (Unit 112)	AEI78325	CB	OCB	1964	11	70	2015	5	62	51
HAREWOOD ZONE SUB (Unit 120)	AEI78324	CB	OCB	1964	11	70	2015	5	62	51
HAREWOOD ZONE SUB (Unit 121)	AEI92489-A2	CB	OCB	1965	11	70	2015	6	62	50
HAREWOOD ZONE SUB (Unit 122)	AEI88906-A8	CB	OCB	1965	11	70	2015	6	62	50
HAREWOOD ZONE SUB (Unit 123)	AEI78321	CB	OCB	1964	11	70	2015	5	62	51
HAREWOOD ZONE SUB (Unit 124)	AEI78323	CB	OCB	1964	11	70	2015	5	62	51
SPRINGSTON ZONE SUB (Unit 110)	REYSLMT1607	CB	OCB	1975	11	70	2015	3	54	40
SPRINGSTON ZONE SUB (Unit 111)	REYSLMT1618	CB	OCB	1975	11	70	2015	6	54	40
SPRINGSTON ZONE SUB (Unit 112)	REYSLMT847	CB	OCB	1975	11	70	2015	6	54	40
SPRINGSTON ZONE SUB (Unit 113)	REYSLMT1621	CB	OCB	1975	11	70	2015	6	54	40
SPRINGSTON ZONE SUB (Unit 114)	REYSLMT1612	CB	OCB	1975	11	70	2015	6	54	40
SPRINGSTON ZONE SUB (Unit 115)	REYSLMT1620	CB	OCB	1975	11	70	2015	3	54	40
BISHOPDALE ZONE SUB (Unit 1)	BRU64653-11	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit 10)	BRU64653-17	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit 11)	BRU64657-2	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit 12)	BRU64653-12	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit 13)	BRU64653-13	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit 14)	BRU64653-14	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit 15)	BRU64653-18	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit 16)	BRU64653-16	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit 17)	BRU64653-10	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit 18)	BRU64653-2	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit 2)	BRU64653-8	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit 3)	BRU64653-3	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit 4)	BRU64653-4	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit 5)	BRU64653-5	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit 6)	BRU64653-6	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit 7)	BRU64653-7	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit 8)	BRU64653-15	CB	OCB	1966	11	70	2016	5	46	50

BISHOPDALE ZONE SUB (Unit 9)	BRU64653-9	CB	OCB	1966	11	70	2016	5	46	50
BISHOPDALE ZONE SUB (Unit SP)	BRU64653-1	CB	OCB	1966	11	70	2016	5	46	50
FOSTER ZONE SUB (Unit 10)	AEI77457	CB	OCB	1964	11	70	2016	5	62	52
FOSTER ZONE SUB (Unit 11)	AEI77456	CB	OCB	1964	11	70	2016	5	62	52
FOSTER ZONE SUB (Unit 12)	AEI77462	CB	OCB	1964	11	70	2016	5	62	52
FOSTER ZONE SUB (Unit 13)	AEI77425	CB	OCB	1963	11	70	2016	6	62	53
FOSTER ZONE SUB (Unit 14)	AEI77395	CB	OCB	1963	11	70	2016	6	62	53
FOSTER ZONE SUB (Unit 15)	AEI83226	CB	OCB	1965	11	70	2016	5	62	51
FOSTER ZONE SUB (Unit 16)	AEI77442	CB	OCB	1963	11	70	2016	6	62	53
FOSTER ZONE SUB (Unit 17)	AEI80042	CB	OCB	1965	11	70	2016	5	62	51
FOSTER ZONE SUB (Unit 18)	AEI87636	CB	OCB	1965	11	70	2016	5	62	51
FOSTER ZONE SUB (Unit 19)	AEI77431	CB	OCB	1963	11	70	2016	6	62	53
FOSTER ZONE SUB (Unit 20)	AEI87661	CB	OCB	1965	11	70	2016	5	62	51
FOSTER ZONE SUB (Unit 21)	AEI86068	CB	OCB	1965	11	70	2016	5	62	51
FOSTER ZONE SUB (Unit 22)	AEI84044	CB	OCB	1965	11	70	2016	5	62	51
FOSTER ZONE SUB (Unit 8)	AEI77410	CB	OCB	1963	11	70	2016	6	62	53
FOSTER ZONE SUB (Unit 9)	AEI77461	CB	OCB	1964	11	70	2016	5	62	52
FOSTER ZONE SUB (Unit SP)	AEI77769	CB	OCB	1964	11	70	2016	5	62	52
SPREYDON ZONE SUB (Unit 1)	BRU64651-7	CB	OCB	1966	11	70	2016	5	43	50
SPREYDON ZONE SUB (Unit 10)	BRU64651-5	CB	OCB	1966	11	70	2016	5	43	50
SPREYDON ZONE SUB (Unit 11)	BRU64651-2	CB	OCB	1966	11	70	2016	5	43	50
SPREYDON ZONE SUB (Unit 12)	BRU64655-15	CB	OCB	1967	11	70	2016	4	43	49
SPREYDON ZONE SUB (Unit 13)	BRU64651-6	CB	OCB	1967	11	70	2016	4	43	49
SPREYDON ZONE SUB (Unit 14)	BRU64651-18	CB	OCB	1966	11	70	2016	5	43	50
SPREYDON ZONE SUB (Unit 15)	BRU64655-12	CB	OCB	1967	11	70	2016	4	43	49
SPREYDON ZONE SUB (Unit 16)	BRU64651-4	CB	OCB	1966	11	70	2016	5	43	50
SPREYDON ZONE SUB (Unit 17)	BRU64651-9	CB	OCB	1966	11	70	2016	5	43	50
SPREYDON ZONE SUB (Unit 18)	BRU64655-6	CB	OCB	1966	11	70	2016	5	43	50
SPREYDON ZONE SUB (Unit 2)	BRU64651-8	CB	OCB	1966	11	70	2016	5	43	50
SPREYDON ZONE SUB (Unit 3)	BRU64655-3	CB	OCB	1966	11	70	2016	5	43	50
SPREYDON ZONE SUB (Unit 4)	BRU64651-11	CB	OCB	1966	11	70	2016	5	43	50
SPREYDON ZONE SUB (Unit 5)	BRU64651-10	CB	OCB	1966	11	70	2016	5	43	50
SPREYDON ZONE SUB (Unit 6)	BRU64655-18	CB	OCB	1967	11	70	2016	4	43	49
SPREYDON ZONE SUB (Unit 7)	BRU64651-17	CB	OCB	1966	11	70	2016	5	43	50

SPREYDON ZONE SUB (Unit 8)	BRU64651-12	CB	OCB	1966	11	70	2016	5	43	50
SPREYDON ZONE SUB (Unit 9)	BRU64651-16	CB	OCB	1966	11	70	2016	5	43	50
DALLINGTON ZONE SUB (Unit 1)	SWS73636	CB	OCB	1969	11	70	2018	4	62	49
DALLINGTON ZONE SUB (Unit 10)	SWS73641	CB	OCB	1969	11	70	2018	4	62	49
DALLINGTON ZONE SUB (Unit 11)	SWS73631	CB	OCB	1969	11	70	2018	4	62	49
DALLINGTON ZONE SUB (Unit 12)	SWS73642	CB	OCB	1969	11	70	2018	4	59	49
DALLINGTON ZONE SUB (Unit 13)	SWS73633	CB	OCB	1969	11	70	2018	4	62	49
DALLINGTON ZONE SUB (Unit 14)	SWS73632	CB	OCB	1969	11	70	2018	4	59	49
DALLINGTON ZONE SUB (Unit 15)	GEC88307-A1	CB	OCB	1972	11	70	2018	4	62	46
DALLINGTON ZONE SUB (Unit 16)	GEC88216	CB	OCB	1972	11	70	2018	4	62	46
DALLINGTON ZONE SUB (Unit 18)	GEC88307-A7	CB	OCB	1972	11	70	2018	4	62	46
DALLINGTON ZONE SUB (Unit 19)	GEC88307-A4	CB	OCB	1972	11	70	2018	4	62	46
DALLINGTON ZONE SUB (Unit 2)	SWS73644	CB	OCB	1969	11	70	2018	4	59	49
DALLINGTON ZONE SUB (Unit 20)	GEC88308-A4	CB	OCB	1972	11	70	2018	4	62	46
DALLINGTON ZONE SUB (Unit 21)	GEC88784-A1	CB	OCB	1972	11	70	2018	4	62	46
DALLINGTON ZONE SUB (Unit 22)	GEC88307-A2	CB	OCB	1972	11	70	2018	4	62	46
DALLINGTON ZONE SUB (Unit 23)	GEC89665-A1	CB	OCB	1972	11	70	2018	4	62	46
DALLINGTON ZONE SUB (Unit 24)	GEC88308-A2	CB	OCB	1972	11	70	2018	4	62	46
DALLINGTON ZONE SUB (Unit 25)	GEC88307-A3	CB	OCB	1972	11	70	2018	4	62	46
DALLINGTON ZONE SUB (Unit 26)	GEC74333-A5	CB	OCB	1977	11	70	2018	3	62	41
DALLINGTON ZONE SUB (Unit 3)	SWS73639	CB	OCB	1969	11	70	2018	4	62	49
DALLINGTON ZONE SUB (Unit 4)	SWS73640	CB	OCB	1969	11	70	2018	4	62	49
DALLINGTON ZONE SUB (Unit 5)	SWS73635	CB	OCB	1969	11	70	2018	4	62	49
DALLINGTON ZONE SUB (Unit 6)	SWS73638	CB	OCB	1969	11	70	2018	4	62	49
DALLINGTON ZONE SUB (Unit 7)	SWS73637	CB	OCB	1969	11	70	2018	4	59	49
DALLINGTON ZONE SUB (Unit 8)	SWS73634	CB	OCB	1969	11	70	2018	4	62	49
DALLINGTON ZONE SUB (Unit 9)	SWS73643	CB	OCB	1969	11	70	2018	4	62	49
DALLINGTON ZONE SUB (Unit SP1)	GEC88307-A5	CB	OCB	1972	11	70	2018	4	62	46
DALLINGTON ZONE SUB (Unit SP2)	GEC88307-A6	CB	OCB	1972	11	70	2018	4	62	46
DALLINGTON ZONE SUB (Unit SP4)	SWS73604	CB	OCB	1969	11	70	2018	4	59	49
DALLINGTON ZONE SUB (Unit SP5)	SWS81344	CB	OCB	1969	11	70	2018	4	62	49
MIDDLETON ZONE SUB (Unit 1)	GEC88089	CB	OCB	1970	11	70	2018	4	62	48
MIDDLETON ZONE SUB (Unit 2)	GEC92489-A3	CB	OCB	1965	11	70	2018	5	62	53
MIDDLETON ZONE SUB (Unit 3)	GEC84288C1	CB	OCB	1970	11	70	2018	4	62	48

MIDDLETON ZONE SUB (Unit 4)	GEC85411	CB	OCB	1970	11	70	2018	4	62	48
MIDDLETON ZONE SUB (Unit 5)	GEC88114	CB	OCB	1970	11	70	2018	4	62	48
MIDDLETON ZONE SUB (Unit 6)	GEC88000	CB	OCB	1970	11	70	2018	4	62	48
HAWTHORNDEN ZONE SUB (Unit 1)	SWS73605	CB	OCB	1969	11	70	2019	4	62	50
HAWTHORNDEN ZONE SUB (Unit 10)	SWS73610	CB	OCB	1969	11	70	2019	4	62	50
HAWTHORNDEN ZONE SUB (Unit 11)	SWS73611	CB	OCB	1969	11	70	2019	4	62	50
HAWTHORNDEN ZONE SUB (Unit 12)	SWS73609	CB	OCB	1969	11	70	2019	4	59	50
HAWTHORNDEN ZONE SUB (Unit 13)	SWS73608	CB	OCB	1969	11	70	2019	4	62	50
HAWTHORNDEN ZONE SUB (Unit 14)	SWS73616	CB	OCB	1969	11	70	2019	4	59	50
HAWTHORNDEN ZONE SUB (Unit 15)	GEC88309-A5	CB	OCB	1972	11	70	2019	4	62	47
HAWTHORNDEN ZONE SUB (Unit 16)	GEC88312-A8	CB	OCB	1972	11	70	2019	4	62	47
HAWTHORNDEN ZONE SUB (Unit 17)	GEC88309-A8	CB	OCB	1972	11	70	2019	4	62	47
HAWTHORNDEN ZONE SUB (Unit 18)	GEC88309-A10	CB	OCB	1972	11	70	2019	4	62	47
HAWTHORNDEN ZONE SUB (Unit 19)	GEC88309-A9	CB	OCB	1972	11	70	2019	6	62	47
HAWTHORNDEN ZONE SUB (Unit 2)	SWS73768	CB	OCB	1969	11	70	2019	4	59	50
HAWTHORNDEN ZONE SUB (Unit 20)	GEC88312-A2	CB	OCB	1972	11	70	2019	4	62	47
HAWTHORNDEN ZONE SUB (Unit 21)	GEC88309-A4	CB	OCB	1972	11	70	2019	4	62	47
HAWTHORNDEN ZONE SUB (Unit 22)	GEC88784-A2	CB	OCB	1972	11	70	2019	4	62	47
HAWTHORNDEN ZONE SUB (Unit 23)	GEC86153-A4	CB	OCB	1972	11	70	2019	4	62	47
HAWTHORNDEN ZONE SUB (Unit 24)	GEC88312-A6	CB	OCB	1972	11	70	2019	4	62	47
HAWTHORNDEN ZONE SUB (Unit 25)	GEC88309-A14	CB	OCB	1972	11	70	2019	4	62	47
HAWTHORNDEN ZONE SUB (Unit 26)	GEC88312-A7	CB	OCB	1972	11	70	2019	4	62	47
HAWTHORNDEN ZONE SUB (Unit 3)	SWS81342	CB	OCB	1969	11	70	2019	4	62	50
HAWTHORNDEN ZONE SUB (Unit 4)	SWS73606	CB	OCB	1969	11	70	2019	4	62	50
HAWTHORNDEN ZONE SUB (Unit 5)	SWS73619	CB	OCB	1969	11	70	2019	4	62	50
HAWTHORNDEN ZONE SUB (Unit 6)	SWS73603	CB	OCB	1969	11	70	2019	6	62	50
HAWTHORNDEN ZONE SUB (Unit 7)	SWS73614	CB	OCB	1969	11	70	2019	4	59	50
HAWTHORNDEN ZONE SUB (Unit 8)	SWS73615	CB	OCB	1969	11	70	2019	4	62	50
HAWTHORNDEN ZONE SUB (Unit 8)	SWS73607	CB	OCB	1969	11	70	2019	4	62	50
HAWTHORNDEN ZONE SUB (Unit 9)	SWS73613	CB	OCB	1969	11	70	2019	4	62	50
HAWTHORNDEN ZONE SUB (Unit SP1)	SWS73612	CB	OCB	1969	11	70	2019	4	62	50
HEATHCOTE ZONE SUB (Unit SP3)	SWS73591	CB	OCB	1969	11	70	2019	4	62	50
KNOX ZONE SUB (Unit 1)	STA68-198	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 10)	STA68-203	CB	OCB	1969	11	70	2019	5	35	50

KNOX ZONE SUB (Unit 11)	STA68-213	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 12)	STA68-207	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 13)	STA68-201	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 14)	STA68-210	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 15)	STA69-680	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 16)	STA68-206	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 17)	STA68-200	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 18)	STA68-218	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 19)	STA68-217	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 2)	STA68-215	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 20)	STA68-202	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 21)	STA68-205	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 3)	STA68-196	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 4)	STA68-208	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 5)	STA68-211	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 6)	STA68-216	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 7)	STA68-209	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 8)	STA68-197	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit 9)	STA68-214	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit SP1)	STA68-195	CB	OCB	1969	11	70	2019	5	35	50
KNOX ZONE SUB (Unit SP2)	STA68-204	CB	OCB	1969	11	70	2019	5	35	50
BRANSTON ST NO.32 (Unit 51)	HAZ3B734	SWIT	AIU	1970	11	24	2014	5	41	44
BRANSTON ST NO.76 (Unit 41)	STA69-3865	SWIT	FSW	1969	11	24	2014	6	2	45
BRANSTON ST NO.76 (Unit 42)	STA69-3864	SWIT	FSW	1969	11	24	2014	6	2	45
FITZGERALD AV NO.211 (Unit 15)	BRU097-052	SWIT	FSW	1967	11	24	2014	7	0	47
FITZGERALD AV NO.211 (Unit 16)	BRU097-047	SWIT	FSW	1967	11	24	2014	7	0	47
FITZGERALD AV NO.211 (Unit 61)	HAZ11179	SWIT	AIU	1969	11	24	2014	5	41	45
GASSON ST S (Unit 14)	BRU087-032	SWIT	FSW	1967	11	24	2014	7	0	47
GASSON ST S (Unit 15)	BRU087-026	SWIT	FSW	1967	11	24	2014	7	0	47
SEDDON ST (Unit 16)	BRU64298-92	SWIT	FSW	1966	11	24	2014	7	0	48
SEDDON ST (Unit 17)	BRU64298-85	SWIT	FSW	1966	11	24	2014	7	0	48
SEDDON ST (Unit 18)	BRU64298-64	SWIT	FSW	1966	11	24	2014	7	0	48
SEDDON ST (Unit 37)	BRU64298-71	SWIT	FSW	1966	11	24	2014	7	0	48
SEDDON ST (Unit 38)	BRU64298-66	SWIT	FSW	1966	11	24	2014	7	0	48

SEDDON ST (Unit 39)	BRU64298-60	SWIT	FSW	1966	11	24	2014	7	0	48
SEDDON ST (Unit 40)	BRU107-072	SWIT	FSW	1967	11	24	2014	7	0	47
WINCHESTER ST S (Unit 36)	BRU107-088	SWIT	FSW	1967	11	24	2014	7	0	47
WINCHESTER ST S (Unit 37)	BRU107-086	SWIT	FSW	1967	11	24	2014	7	0	47
WINCHESTER ST S (Unit 38)	BRU107-090	SWIT	FSW	1967	11	24	2014	7	0	47
WOODHAM RD NO.271 (Unit 14)	BRU64298-04	SWIT	FSW	1965	11	24	2014	8	0	49
BLLENHEIM RD NO.8 (Unit 31)	L&CJ475324	SWIT	OIS	1975	11	24	2015	5	5	40
BLLENHEIM RD NO.8 (Unit 32)	L&CGF375268	SWIT	FSW	1975	11	24	2015	5	3	40
BLLENHEIM RD NO.8 (Unit 33)	L&CJ475311	SWIT	OIS	1975	11	24	2015	5	5	40
BLLENHEIM RD NO.8 (Unit 34)	L&CGF375140	SWIT	FSW	1975	11	24	2015	5	3	40
BLLENHEIM RD NO.8 (Unit 35)	L&CJ477699	SWIT	OIS	1977	11	24	2015	5	5	38
BREEZES RD N (Unit 34)	BRU107-084	SWIT	FSW	1967	11	24	2015	7	0	48
BREEZES RD N (Unit 35)	BRU64298-55	SWIT	FSW	1966	11	24	2015	8	0	49
BREEZES RD N (Unit 36)	BRU64298-56	SWIT	FSW	1966	11	24	2015	8	0	49
BREEZES RD N (Unit 51)	HAZ3B150	SWIT	AIU	1970	11	24	2015	5	41	45
CAMELIA PL NO.2 (Unit 51)	HAZ5896	SWIT	AIU	1966	11	24	2015	5	41	49
CHAPMANS RD NO.41 (Unit 51)	HAZ5421	SWIT	AIU	1966	11	24	2015	8	41	49
CLIPPER PL (Unit 51)	HAZ5411	SWIT	AIU	1966	11	24	2015	8	41	49
CUTHBERTS RD KIWI BACON (Unit 51)	HAZ5442	SWIT	AIU	1966	11	24	2015	8	41	49
FRANCIS AV (Unit 51)	HAZ5422	SWIT	AIU	1966	11	24	2015	8	41	49
HAMILTON AV NO.90 (Unit 51)	HAZ5436	SWIT	AIU	1966	11	24	2015	7	41	49
HAWKE ST SCHOOL (Unit 51)	HAZ5410	SWIT	AIU	1966	11	24	2015	8	41	49
HELANCA AV NO.3 (Unit 51)	HAZ5440	SWIT	AIU	1966	11	24	2015	8	41	49
HEYWOOD TR (Unit 51)	HAZ5443	SWIT	AIU	1966	11	24	2015	8	41	49
KINGSLEY ST NO.61 (Unit 51)	HAZD183	SWIT	AIU	1973	11	24	2015	5	41	42
LEITCH ST (Unit 51)	HAZ5441	SWIT	AIU	1966	11	24	2015	8	41	49
MACAULAY ST (Unit 51)	HAZ5424	SWIT	AIU	1966	11	24	2015	8	41	49
MACES RD NO.120A (Unit 51)	HAZD122	SWIT	AIU	1972	11	24	2015	5	41	43
MATAI ST CHATEAU (Unit 31)	L&CJ477703	SWIT	OIS	1977	11	24	2015	5	5	38
MATAI ST CHATEAU (Unit 32)	L&CGF375029	SWIT	FSW	1975	11	24	2015	5	3	40
MATAI ST CHATEAU (Unit 33)	L&CJ475048	SWIT	OIS	1975	11	24	2015	5	5	40
MATAI ST CHATEAU (Unit 34)	L&CJ475041	SWIT	OIS	1975	11	24	2015	5	5	40
MATAI ST WEST NO.84 (Unit 51)	HAZ8261	SWIT	AIU	1968	11	24	2015	6	41	47
MATSONS AV (Unit 14)	BRU64298-18	SWIT	FSW	1965	11	24	2015	7	0	50

MATSONS AV (Unit 15)	BRU64298-07	SWIT	FSW	1965	11	24	2015	7	0	50
MILLBROOK FLATS (Unit 51)	HAZ5408	SWIT	AIU	1966	11	24	2015	6	41	49
MOUNTFORT ST (Unit 51)	HAZ5406	SWIT	AIU	1966	11	24	2015	8	41	49
NEWTOWN ST NO.15 (Unit 51)	HAZ5416	SWIT	AIU	1966	11	24	2015	8	41	49
PARKLANDS DR N (Unit 51)	HAZ5426	SWIT	AIU	1966	11	24	2015	8	41	49
RANDOLPH ST S (Unit 15)	BRU097-042	SWIT	FSW	1967	11	24	2015	7	0	48
RANDOLPH ST S (Unit 16)	BRU64298-36	SWIT	FSW	1965	11	24	2015	8	0	50
RICCARTON RACECOURSE KITCHEN (Unit 51)	HAZ5617	SWIT	AIU	1966	11	24	2015	7	41	49
WESTON RD NO.204 (Unit 51)	HAZ5430	SWIT	AIU	1966	11	24	2015	8	41	49
WILSONS RD POOL (Unit 51)	HAZ5439	SWIT	AIU	1966	11	24	2015	8	41	49
WOODCHESTER HOME (Unit 51)	HAZ5418	SWIT	AIU	1966	11	24	2015	8	41	49
ARRAN CR NO.6 (Unit 51)	HAZ3B145	SWIT	AIU	1970	11	24	2016	8	41	46
BALCAIRN ST NO.24 (Unit 51)	HAZ3B164	SWIT	AIU	1970	11	24	2016	6	41	46
BALCAIRN ST NO.59 (Unit 51)	HAZ3B106	SWIT	AIU	1970	11	24	2016	6	41	46
BALFOUR TR NO.9 (Unit 51)	HAZ3B245	SWIT	AIU	1970	11	24	2016	7	41	46
BARLOW ST N (Unit 51)	HAZ3B102	SWIT	AIU	1970	11	24	2016	6	41	46
BEALEY AV CARLTON (Unit 51)	HAZ3B272	SWIT	AIU	1970	11	24	2016	7	41	46
BERESFORD ST E (Unit 51)	HAZ9362	SWIT	AIU	1967	11	24	2016	8	41	49
BERESFORD ST W (Unit 51)	HAZ3B101	SWIT	AIU	1970	11	24	2016	8	41	46
BERMUDA DR NO.25 (Unit 51)	HAZ7758	SWIT	AIU	1967	11	24	2016	5	41	49
BRIXTON ST NO.5 (Unit 51)	HAZ11171	SWIT	AIU	1969	11	24	2016	5	41	47
CHALMERS ST NO.15 (Unit 51)	HAZ7764	SWIT	AIU	1967	11	24	2016	5	41	49
CHARTWELL ST N (Unit 51)	HAZ9346	SWIT	AIU	1967	11	24	2016	8	41	49
CHEYENNE ST NO.70 (Unit 51)	HAZ7782	SWIT	AIU	1967	11	24	2016	6	41	49
COLMAN AV NO.72 (Unit 51)	HAZ7787	SWIT	AIU	1967	11	24	2016	6	41	49
DENISE CR NO.18 (Unit 51)	HAZ7781	SWIT	AIU	1967	11	24	2016	5	41	49
DONCASTER ST NO.38 (Unit 51)	HAZ7761	SWIT	AIU	1967	11	24	2016	6	41	49
GLADSON AV NO.42 (Unit 51)	HAZ7766	SWIT	AIU	1967	11	24	2016	6	41	49
GREENHAVEN DR NO.58 (Unit 51)	HAZ9358	SWIT	AIU	1967	11	24	2016	8	41	49
HEWITTS RD N (Unit 51)	HAZ9344	SWIT	AIU	1967	11	24	2016	8	41	49
KAHU RD NO.33 (Unit 51)	HAZ9360	SWIT	AIU	1967	11	24	2016	6	41	49
KEYES RD NO.270 (Unit 51)	HAZ9350	SWIT	AIU	1967	11	24	2016	8	41	49
MABEL HOWARD PL (Unit 51)	HAZ9345	SWIT	AIU	1967	11	24	2016	8	41	49
MATAI ST GIRLS HIGH (Unit 31)	L&CJ477707	SWIT	OIS	1977	11	24	2016	5	5	39

MATAI ST GIRLS HIGH (Unit 32)	L&CGF375218	SWIT	FSW	1975	11	24	2016	5	3	41
MATAI ST GIRLS HIGH (Unit 33)	L&CJ477701	SWIT	OIS	1977	11	24	2016	5	5	39
MATSONS AV (Unit 51)	HAZ11133	SWIT	AIU	1968	11	24	2016	5	41	48
OLDWOOD ST S (Unit 51)	HAZ9348	SWIT	AIU	1967	11	24	2016	6	41	49
OXFORD TR NO.160 (Unit 36)	BRU107-079	SWIT	FSW	1967	11	24	2016	7	0	49
OXFORD TR NO.160 (Unit 37)	BRU107-074	SWIT	FSW	1967	11	24	2016	7	0	49
PENRITH AV (Unit 51)	HAZ9353	SWIT	AIU	1967	11	24	2016	8	41	49
PERTH ST (Unit 51)	HAZ5404	SWIT	AIU	1966	11	24	2016	8	41	50
PIMLICO PL (Unit 51)	HAZ9352	SWIT	AIU	1967	11	24	2016	6	41	49
RAMAHANA RD NO.40 (Unit 51)	HAZ9342	SWIT	AIU	1967	11	24	2016	8	41	49
RICCARTON HOUSE (Unit 51)	HAZ5433	SWIT	AIU	1966	11	24	2016	7	41	50
RILEY CR (Unit 51)	HAZ5425	SWIT	AIU	1966	11	24	2016	8	41	50
RIVERLAW TR NO.108 (Unit 51)	HAZ5409	SWIT	AIU	1966	11	24	2016	8	41	50
RIVERLAW TR NO.342 (Unit 51)	HAZ9343	SWIT	AIU	1967	11	24	2016	8	41	49
ROSWELL PL NO.2 (Unit 51)	HAZ5895	SWIT	AIU	1966	11	24	2016	5	41	50
SOUTHAMPTON ST NO.181 (Unit 51)	HAZ5419	SWIT	AIU	1966	11	24	2016	8	41	50
STORRY PL (Unit 51)	HAZ5405	SWIT	AIU	1966	11	24	2016	7	41	50
TASMAN PL (Unit 51)	HAZ5428	SWIT	AIU	1966	11	24	2016	8	41	50
THERESE ST (Unit 12)	BRU107-065	SWIT	FSW	1967	11	24	2016	7	0	49
THERESE ST (Unit 13)	BRU097-043	SWIT	FSW	1967	11	24	2016	7	0	49
THERESE ST (Unit 14)	BRU097-034	SWIT	FSW	1967	11	24	2016	7	0	49
THERESE ST (Unit 15)	BRU097-045	SWIT	FSW	1967	11	24	2016	7	0	49
THERESE ST (Unit 36)	BRU64298-39	SWIT	FSW	1965	11	24	2016	8	0	51
THERESE ST (Unit 37)	BRU64298-44	SWIT	FSW	1965	11	24	2016	8	0	51
THERESE ST (Unit 38)	BRU107-093	SWIT	FSW	1967	11	24	2016	7	0	49
THERESE ST (Unit 39)	BRU107-089	SWIT	FSW	1967	11	24	2016	7	0	49
THORNTON ST (Unit 51)	HAZ9349	SWIT	AIU	1967	11	24	2016	8	41	49
TOTARA ST (Unit 51)	HAZE559	SWIT	AIU	1974	11	24	2016	4	41	42
TUAM ST NO.230 (Unit 51)	HAZ9359	SWIT	AIU	1967	11	24	2016	8	41	49
VIVIAN ST NO.73 (Unit 51)	HAZ9341	SWIT	AIU	1967	11	24	2016	8	41	49
WEST WATSON AV E (Unit 51)	HAZ9347	SWIT	AIU	1967	11	24	2016	6	41	49
WILMER ST NO.19 (Unit 51)	HAZ11129	SWIT	AIU	1968	11	24	2016	7	41	48
ABBERLEY CR (Unit 51)	HAZ9413	SWIT	AIU	1968	11	24	2017	7	41	49
ADAMS PL (Unit 51)	HAZ9380	SWIT	AIU	1968	11	24	2017	8	41	49

ALBANY ST (Unit 51)	HAZ9401	SWIT	AIU	1968	11	24	2017	7	41	49
AMBLESIDE DR NO.23 (Unit 51)	HAZ9363	SWIT	AIU	1968	11	24	2017	6	41	49
AMYES RD NO.24 (Unit 51)	HAZ9418	SWIT	AIU	1968	11	24	2017	5	41	49
ARMAGH ST NO.181 (Unit 51)	HAZ9383	SWIT	AIU	1968	11	24	2017	7	41	49
ASHBOURNE ST (Unit 51)	HAZ9367	SWIT	AIU	1968	11	24	2017	6	41	49
ASHCROFT PL (Unit 51)	HAZ9366	SWIT	AIU	1968	11	24	2017	6	41	49
AURORA ST NO.26 (Unit 51)	HAZ9436	SWIT	AIU	1968	11	24	2017	5	41	49
AVONHEAD PARK (Unit 51)	HAZ11122	SWIT	AIU	1968	11	24	2017	6	41	49
AVONSIDE DR NO.550 (Unit 51)	HAZ11112	SWIT	AIU	1968	11	24	2017	8	41	49
BARCLAY PL (Unit 51)	HAZ9392	SWIT	AIU	1968	11	24	2017	8	41	49
BEACH RD NO.87 (Unit 51)	HAZ9410	SWIT	AIU	1968	11	24	2017	8	41	49
BEALEY AV SOUTHERN CROSS (Unit 51)	HAZ11144	SWIT	AIU	1968	11	24	2017	6	41	49
BLAKEHALL PL (Unit 51)	HAZ9408	SWIT	AIU	1968	11	24	2017	6	41	49
BLENHEIM RD NO.295 (Unit 51)	HAZ9369	SWIT	AIU	1968	11	24	2017	6	41	49
BLIGHS RD NO.123 (Unit 51)	HAZ11156	SWIT	AIU	1968	11	24	2017	6	41	49
BOWHILL RD E (Unit 51)	HAZ11150	SWIT	AIU	1968	11	24	2017	8	41	49
BROUGHAM ST NO.273 (Unit 51)	HAZ9421	SWIT	AIU	1968	11	24	2017	7	41	49
BROUGHAM ST NO.99 (Unit 51)	HAZ11127	SWIT	AIU	1968	11	24	2017	7	41	49
CAMBRIDGE TR NO.79 (Unit 51)	HAZ11113	SWIT	AIU	1968	11	24	2017	7	41	49
CANON ST NO.71 (Unit 51)	HAZ11100	SWIT	AIU	1968	11	24	2017	7	41	49
CANTERBURY COURT (Unit 51)	HAZ9424	SWIT	AIU	1968	11	24	2017	5	41	49
CARDOME ST (Unit 51)	HAZ11155	SWIT	AIU	1968	11	24	2017	6	41	49
CHARTWELL ST NO.64 (Unit 51)	HAZ9407	SWIT	AIU	1968	11	24	2017	8	41	49
CHRISTS COLLEGE (Unit 51)	HAZ11194	SWIT	AIU	1968	11	24	2017	6	41	49
CRANFORD ST NO.297 (Unit 51)	HAZ9390	SWIT	AIU	1968	11	24	2017	7	41	49
CRESSWELL AV (Unit 51)	HAZ9422	SWIT	AIU	1968	11	24	2017	8	41	49
CURRIES RD NO.51 (Unit 51)	HAZ11189	SWIT	AIU	1968	11	24	2017	8	41	49
DALGLISH PL (Unit 51)	HAZ11151	SWIT	AIU	1968	11	24	2017	6	41	49
DEEPPDALE ST NO.11 (Unit 51)	HAZ9365	SWIT	AIU	1968	11	24	2017	6	41	49
DISRAELI ST NO.31 (Unit 51)	HAZ11192	SWIT	AIU	1968	11	24	2017	7	41	49
DOMAIN TR (Unit 51)	HAZ9378	SWIT	AIU	1968	11	24	2017	6	41	49
DONALD PL (Unit 51)	HAZ9409	SWIT	AIU	1968	11	24	2017	7	41	49
DYMOCK PL (Unit 51)	HAZ9402	SWIT	AIU	1968	11	24	2017	6	41	49
EFFINGHAM ST N (Unit 51)	HAZ9412	SWIT	AIU	1968	11	24	2017	8	41	49

EFFINGHAM ST WW (Unit 51)	HAZ9355	SWIT	AIU	1967	11	24	2017	8	41	50
EGLINTON ST S (Unit 51)	HAZ8394	SWIT	AIU	1968	11	24	2017	8	41	49
ELLESMERE COLLEGE (Unit 51)	HAZ11137	SWIT	AIU	1968	11	24	2017	6	41	49
EMMETT ST S (Unit 51)	HAZ11152	SWIT	AIU	1968	11	24	2017	7	41	49
FAIRFORD ST (Unit 51)	HAZC029	SWIT	AIU	1971	11	24	2017	5	41	46
FARRINGTON AV NO.108 (Unit 51)	HAZ9406	SWIT	AIU	1968	11	24	2017	6	41	49
FARRINGTON AV SHOPS N (Unit 51)	HAZ11099	SWIT	AIU	1968	11	24	2017	6	41	49
FENHALL ST (Unit 51)	HAZ11101	SWIT	AIU	1968	11	24	2017	6	41	49
FERN DR (Unit 51)	HAZ11158	SWIT	AIU	1968	11	24	2017	6	41	49
FORTUNE ST NO.17 (Unit 51)	HAZ11128	SWIT	AIU	1968	11	24	2017	7	41	49
FUSILIER ST NO.2 (Unit 51)	HAZ9393	SWIT	AIU	1968	11	24	2017	6	41	49
GARDEN RD (Unit 51)	HAZ9437	SWIT	AIU	1968	11	24	2017	7	41	49
GLENROWAN AV (Unit 51)	HAZ9396	SWIT	AIU	1968	11	24	2017	8	41	49
GLYNNE CR (Unit 51)	HAZ9411	SWIT	AIU	1968	11	24	2017	6	41	49
GREENHAVEN DR S (Unit 51)	HAZ9379	SWIT	AIU	1968	11	24	2017	8	41	49
GREERS RD S (Unit 51)	HAZ11124	SWIT	AIU	1968	11	24	2017	6	41	49
GUILD ST CHURCHILL COURTS (Unit 51)	HAZ9398	SWIT	AIU	1968	11	24	2017	7	41	49
GUINNESS CR E (Unit 51)	HAZ11135	SWIT	AIU	1968	11	24	2017	6	41	49
HAREWOOD RD NO.210 (Unit 51)	HAZ11136	SWIT	AIU	1968	11	24	2017	6	41	49
HARROW ST (Unit 51)	HAZ9376	SWIT	AIU	1968	11	24	2017	8	41	49
HARTFORD ST (Unit 51)	HAZ9397	SWIT	AIU	1968	11	24	2017	6	41	49
HARTNELL PL (Unit 51)	HAZ9400	SWIT	AIU	1968	11	24	2017	8	41	49
HEATHRIDGE PL NO.59 (Unit 51)	HAZ11132	SWIT	AIU	1968	11	24	2017	5	41	49
HEATON ST EAST (Unit 51)	HAZ9399	SWIT	AIU	1968	11	24	2017	7	41	49
HELANCA AV LEISUREWEAR (Unit 51)	HAZ9414	SWIT	AIU	1968	11	24	2017	6	41	49
HELMSDALE ST (Unit 51)	HAZ9438	SWIT	AIU	1968	11	24	2017	8	41	49
HEREFORD ST NO.31 (Unit 51)	HAZ9382	SWIT	AIU	1968	11	24	2017	7	41	49
HEREFORD ST NO.501 (Unit 51)	HAZ11102	SWIT	AIU	1968	11	24	2017	8	41	49
HILLVIEW RD (Unit 51)	HAZ9426	SWIT	AIU	1968	11	24	2017	8	41	49
HOANI ST EAST (Unit 51)	HAZ11125	SWIT	AIU	1968	11	24	2017	6	41	49
HOOD ST (Unit 51)	HAZ9372	SWIT	AIU	1968	11	24	2017	8	41	49
HOPE ST (Unit 51)	HAZ11154	SWIT	AIU	1968	11	24	2017	7	41	49
ILAM RD NO.395 (Unit 51)	HAZ11148	SWIT	AIU	1968	11	24	2017	6	41	49
ILAM RD NO.488 (Unit 51)	HAZ11149	SWIT	AIU	1968	11	24	2017	6	41	49

ILAM RD ROCHESTER HALL (Unit 51)	HAZ11120	SWIT	AIU	1968	11	24	2017	5	41	49
ILFRACOMBE PL (Unit 51)	HAZ9368	SWIT	AIU	1968	11	24	2017	6	41	49
JELLIE PARK (Unit 51)	HAZ11196	SWIT	AIU	1968	11	24	2017	6	41	49
JELLIE POOL (Unit 51)	HAZ9428	SWIT	AIU	1968	11	24	2017	6	41	49
JOHNSON ST DEPOT (Unit 51)	HAZ9371	SWIT	AIU	1968	11	24	2017	7	41	49
KING EDWARD TR NO.27 (Unit 51)	HAZ9432	SWIT	AIU	1968	11	24	2017	8	41	49
LAKE TERRACE RD NO.30 (Unit 51)	HAZ3B047	SWIT	AIU	1970	11	24	2017	8	41	47
LANGDONS RD NO.152 (Unit 51)	HAZ11142	SWIT	AIU	1968	11	24	2017	6	41	49
LEINSTER RD W (Unit 51)	HAZ11160	SWIT	AIU	1968	11	24	2017	7	41	49
LUNNS RD NO.51 (Unit 51)	HAZ11187	SWIT	AIU	1968	11	24	2017	5	41	49
MASCOT PL (Unit 51)	HAZ9420	SWIT	AIU	1968	11	24	2017	8	41	49
MORLEY ST (Unit 51)	HAZ11195	SWIT	AIU	1968	11	24	2017	6	41	49
MOUNTBATTEN ST (Unit 51)	HAZ9375	SWIT	AIU	1968	11	24	2017	8	41	49
NEW BRIGHTON RD NO.144 (Unit 51)	HAZ9388	SWIT	AIU	1968	11	24	2017	6	41	49
NEW BRIGHTON RD W (Unit 51)	HAZ11161	SWIT	AIU	1968	11	24	2017	6	41	49
NICHOLLS RD NO.9 (Unit 51)	HAZ9416	SWIT	AIU	1968	11	24	2017	6	41	49
NORTH AVON RD (Unit 51)	HAZ11116	SWIT	AIU	1968	11	24	2017	8	41	49
NORWOOD ST (Unit 51)	HAZ11140	SWIT	AIU	1968	11	24	2017	7	41	49
OAK ST (Unit 51)	HAZ11115	SWIT	AIU	1968	11	24	2017	8	41	49
O'LEARY ST (Unit 51)	HAZ9391	SWIT	AIU	1968	11	24	2017	6	41	49
OPIHI ST (Unit 51)	HAZ9415	SWIT	AIU	1968	11	24	2017	7	41	49
ORCHARD RD AIRWAYS CORP (Unit 51)	HAZ9417	SWIT	AIU	1968	11	24	2017	6	41	49
PAPANUI RD NO.88 (Unit 51)	HAZ11138	SWIT	AIU	1968	11	24	2017	7	41	49
PHILPOTTS RD NO.23 (Unit 51)	HAZ11110	SWIT	AIU	1968	11	24	2017	7	41	49
POWELL CR (Unit 51)	HAZ11130	SWIT	AIU	1968	11	24	2017	6	41	49
RENWICK PL (Unit 51)	HAZ9373	SWIT	AIU	1968	11	24	2017	6	41	49
RETREAT RD W (Unit 51)	HAZ11193	SWIT	AIU	1968	11	24	2017	6	41	49
RIVER RD NO.49 (Unit 51)	HAZ9385	SWIT	AIU	1968	11	24	2017	8	41	49
ROLLESTON AV MUSEUM T1 (Unit 51)	HAZ11188	SWIT	AIU	1968	11	24	2017	6	41	49
ROLLESTON AV N (Unit 51)	HAZ11131	SWIT	AIU	1968	11	24	2017	7	41	49
ROSEDALE PL (Unit 51)	HAZ9425	SWIT	AIU	1968	11	24	2017	6	41	49
RUSSELL ST NO.32 (Unit 51)	HAZ11118	SWIT	AIU	1968	11	24	2017	8	41	49
SEDDON ST T1 (Unit 51)	HAZ9429	SWIT	AIU	1968	11	24	2017	6	41	49
SHEFFIELD CR NO.15B (Unit 51)	HAZ9381	SWIT	AIU	1968	11	24	2017	5	41	49

SHEFFIELD CR NO.15C (Unit 51)	HAZNV003	SWIT	AIU	1968	11	24	2017	5	41	49
SHIRLEY INTERMEDIATE (Unit 51)	HAZ11159	SWIT	AIU	1968	11	24	2017	7	41	49
SHIRLEY RD EXCHANGE (Unit 51)	HAZ11157	SWIT	AIU	1968	11	24	2017	7	41	49
SHREWSBURY ST N (Unit 51)	HAZ9386	SWIT	AIU	1968	11	24	2017	7	41	49
SHREWSBURY ST S (Unit 51)	HAZ11103	SWIT	AIU	1968	11	24	2017	7	41	49
SOLWAY AV COLLEGE NO.4 (Unit 51)	HAZ11119	SWIT	AIU	1968	11	24	2017	5	41	49
SOMERS PL (Unit 51)	HAZ9377	SWIT	AIU	1968	11	24	2017	6	41	49
ST ANDREWS SQ (Unit 51)	HAZ11117	SWIT	AIU	1968	11	24	2017	6	41	49
ST JOHNS ST WW (Unit 51)	HAZ11190	SWIT	AIU	1968	11	24	2017	7	41	49
STACKHOUSE AV N (Unit 51)	HAZ9389	SWIT	AIU	1968	11	24	2017	6	41	49
STAFFORDSHIRE ST (Unit 51)	HAZ9374	SWIT	AIU	1968	11	24	2017	8	41	49
STANTON CR NO.6 (Unit 51)	HAZ11146	SWIT	AIU	1968	11	24	2017	6	41	49
STAPLETONS RD NO.96 (Unit 51)	HAZ11109	SWIT	AIU	1968	11	24	2017	7	41	49
STRATFORD ST NO.26 (Unit 51)	HAZ11104	SWIT	AIU	1968	11	24	2017	6	41	49
STRAVEN RD NO.13 (Unit 51)	HAZ8259	SWIT	AIU	1968	11	24	2017	6	41	49
STURROCKS RD NO.71 (Unit 51)	HAZ9430	SWIT	AIU	1968	11	24	2017	7	41	49
TANNER ST (Unit 51)	HAZ11111	SWIT	AIU	1968	11	24	2017	8	41	49
TATTERSALLS LN E SIDE (Unit 51)	HAZ9384	SWIT	AIU	1968	11	24	2017	6	41	49
TERRACE DOWNS LAKESIDE VILLAS (UNIT 51)	HAZ9419	SWIT	AIU	1968	11	24	2017	5	41	49
THORNYCROFT ST (Unit 51)	HAZ9404	SWIT	AIU	1968	11	24	2017	6	41	49
TREFFERS RD NO.66 (Unit 51)	HAZ9405	SWIT	AIU	1968	11	24	2017	6	41	49
TREFFERS RD NO.79 (Unit 51)	HAZ11153	SWIT	AIU	1968	11	24	2017	6	41	49
TUAM ST NO.340 (Unit 51)	HAZ11098	SWIT	AIU	1968	11	24	2017	7	41	49
WAI-ITI TR NO.52 (Unit 51)	HAZ11141	SWIT	AIU	1968	11	24	2017	6	41	49
WAIMEA TR NO.179 (Unit 51)	HAZ11108	SWIT	AIU	1968	11	24	2017	7	41	49
WAINONI RD NO.124 (Unit 51)	HAZ9435	SWIT	AIU	1968	11	24	2017	8	41	49
WAIRAKEI RD TAITs (Unit 51)	HAZ9431	SWIT	AIU	1968	11	24	2017	5	41	49
WALES ST NO.47 (Unit 51)	HAZ9354	SWIT	AIU	1967	11	24	2017	6	41	50
WARATAH ST NO.25 (Unit 51)	HAZ9395	SWIT	AIU	1968	11	24	2017	8	41	49
WATERLOO RD NO.148A (Unit 51)	HAZ7757	SWIT	AIU	1967	11	24	2017	5	41	50
WATTS RD NO.18 (Unit 51)	HAZ11145	SWIT	AIU	1968	11	24	2017	6	41	49
WEST WATSON AV W (Unit 51)	HAZ11107	SWIT	AIU	1968	11	24	2017	5	41	49
WICKHAM ST NO.67 (Unit 51)	HAZ11114	SWIT	AIU	1968	11	24	2017	8	41	49

WOODBURY ST NO.15 (Unit 51)	HAZ11106	SWIT	AIU	1968	11	24	2017	6	41	49
WORDSWORTH ST E (Unit 51)	HAZ11191	SWIT	AIU	1968	11	24	2017	7	41	49
YARMOUTH ST (Unit 51)	HAZ11139	SWIT	AIU	1968	11	24	2017	8	41	49
ALPORT PL (Unit 61)	HAZ3B053	SWIT	AIU	1970	11	24	2018	5	41	48
AVONDALE RD NO.129 (Unit 51)	HAZ3B147	SWIT	AIU	1970	11	24	2018	8	41	48
BELMONT ST (Unit 51)	HAZ11184	SWIT	AIU	1969	11	24	2018	8	41	49
BEXLEY RD NO.81 (Unit 51)	HAZC021	SWIT	AIU	1971	11	24	2018	5	41	47
BURWOOD RD NO.284 (Unit 51)	HAZE477	SWIT	AIU	1974	11	24	2018	5	41	44
CARMEN RD NO.84 (Unit 51)	HAZ3B088	SWIT	AIU	1970	11	24	2018	5	41	48
CASHMERE RD NO.34 (Unit 51)	HAZNR007	SWIT	AIU	1970	11	24	2018	5	#N/A	48
CUMNOR TR NO.23 (Unit 51)	HAZ11163	SWIT	AIU	1969	11	24	2018	8	41	49
DALLINGTON ZONE SUB (Unit 51)	HOL16907	SWIT	AIU	1999	11	24	2018	2	#N/A	19
EARNSLAW CR (Unit 51)	HAZ11173	SWIT	AIU	1969	11	24	2018	6	41	49
FREEBAIRN ST (Unit 51)	HAZ11169	SWIT	AIU	1969	11	24	2018	7	41	49
GAYHURST RD NO.186 (Unit 51)	HAZ11123	SWIT	AIU	1968	11	24	2018	8	41	50
GLANDOVEY RD NO.62 (Unit 51)	HAZ11183	SWIT	AIU	1969	11	24	2018	6	41	49
GRANTS RD W (Unit 51)	HAZ11186	SWIT	AIU	1969	11	24	2018	6	41	49
HAWKE ST NO.36 (Unit 51)	HAZ11170	SWIT	AIU	1969	11	24	2018	8	41	49
HILLS RD NO.130 (Unit 51)	HAZC357	SWIT	AIU	1971	11	24	2018	5	41	47
JECKS PL (Unit 51)	HAZ11180	SWIT	AIU	1969	11	24	2018	8	41	49
KILMORE ST NO.129 (Unit 51)	HAZ11165	SWIT	AIU	1969	11	24	2018	6	41	49
LAKE TERRACE RD NO.5 (Unit 17)	BRU64298-12	SWIT	FSW	1965	11	24	2018	8	0	53
LAKE TERRACE RD NO.5 (Unit 18)	BRU64298-26	SWIT	FSW	1965	11	24	2018	8	0	53
LAKE TERRACE RD NO.5 T1 (Unit 51)	HAZ9434	SWIT	AIU	1968	11	24	2018	6	41	50
LONSDALE ST NO.69 (Unit 51)	HAZ11168	SWIT	AIU	1969	11	24	2018	8	41	49
MANSFIELD AV NO.26 (Unit 51)	HAZ11177	SWIT	AIU	1969	11	24	2018	7	41	49
MAYS RD NO.107 (Unit 61)	HAZC032	SWIT	AIU	1971	11	24	2018	5	41	47
MOORHOUSE AV NO.74 (Unit 51)	HAZ11162	SWIT	AIU	1969	11	24	2018	7	41	49
ORCHARD RD AIR WORKSHOP (Unit 37)	L&CGF376390	SWIT	FSW	1975	11	24	2018	5	3	43
ORCHARD RD AIR WORKSHOP (Unit 38)	L&CGF376401	SWIT	FSW	1975	11	24	2018	5	3	43
ORCHARD RD AIR WORKSHOP (Unit 39)	L&CGF376403	SWIT	FSW	1976	11	24	2018	5	3	42
ORCHARD RD AIR WORKSHOP (Unit 41)	L&CGF376402	SWIT	FSW	1976	11	24	2018	5	3	42
ORCHARD RD AIR WORKSHOP (Unit 42)	L&CGF376404	SWIT	FSW	1976	11	24	2018	5	3	42
ORCHARD RD AIR WORKSHOP (Unit 43)	L&CGF376391	SWIT	FSW	1975	11	24	2018	5	3	43

RADBROOK ST NO.14 (Unit 51)	HAZD181	SWIT	AIU	1973	11	24	2018	4	41	45
REDGRAVE ST (Unit 51)	HAZ11175	SWIT	AIU	1969	11	24	2018	6	41	49
ROBERTA DR NO.55 (Unit 51)	HAZ11174	SWIT	AIU	1969	11	24	2018	7	41	49
ROBERTA DR W (Unit 51)	HAZ11185	SWIT	AIU	1969	11	24	2018	7	41	49
SAWYERS ARMS RD NO.310 (Unit 51)	HAZ11176	SWIT	AIU	1969	11	24	2018	6	41	49
STURROCKS RD E (Unit 51)	HAZ11172	SWIT	AIU	1969	11	24	2018	7	41	49
SUNNINGVALE LN SCHOOL (Unit 51)	HAZ11166	SWIT	AIU	1969	11	24	2018	6	41	49
WESTERLEIGH ST (Unit 51)	HAZ11182	SWIT	AIU	1969	11	24	2018	6	41	49
WICKHAM ST NO.17 (Unit 51)	HAZ11164	SWIT	AIU	1969	11	24	2018	8	41	49
WILLOW ST (Unit 51)	HAZ11181	SWIT	AIU	1969	11	24	2018	7	41	49
WOOLLEY ST (Unit 51)	HAZ11167	SWIT	AIU	1969	11	24	2018	8	41	49
DAMPIER ST (Unit 51)	HAZ3B004	SWIT	AIU	1970	11	24	2019	8	41	49
GAYHURST RD NO.172 (Unit 51)	HAZ3B168	SWIT	AIU	1970	11	24	2019	8	41	49
HALSWELL RD NO.18 (Unit 51)	HAZ3B237	SWIT	AIU	1970	11	24	2019	5	41	49
HALWYN DR NO.25 (Unit 51)	HAZ3B151	SWIT	AIU	1970	11	24	2019	5	41	49
HAREWOOD RD E (Unit 51)	HAZ3B159	SWIT	AIU	1970	11	24	2019	5	41	49
HARTLEY AV (Unit 51)	HAZ3B144	SWIT	AIU	1970	11	24	2019	6	41	49
HAWKE ST NO.59 (Unit 51)	HAZ3B003	SWIT	AIU	1970	11	24	2019	8	41	49
JUTLAND ST S (Unit 51)	HAZ3B007	SWIT	AIU	1970	11	24	2019	8	41	49
KELLER ST (Unit 51)	HAZ3B262	SWIT	AIU	1970	11	24	2019	8	41	49
KERRS RD NO.118 (Unit 51)	HAZ3B200	SWIT	AIU	1970	11	24	2019	5	41	49
KIDSON TR NO.50 (Unit 51)	HAZ3B260	SWIT	AIU	1970	11	24	2019	7	41	49
KIMBERLEY ST (Unit 51)	HAZ3B238	SWIT	AIU	1970	11	24	2019	6	41	49
KITEROA PL (Unit 51)	HAZ3B119	SWIT	AIU	1970	11	24	2019	7	41	49
KNIGHT PL NO.8 (Unit 51)	HAZ3B153	SWIT	AIU	1970	11	24	2019	6	41	49
LAMBETH CR S (Unit 51)	HAZ3B246	SWIT	AIU	1970	11	24	2019	7	41	49
LEAVER TR NO 68 (Unit 51)	HAZ3A021	SWIT	AIU	1970	11	24	2019	5	41	49
LIGGINS ST NO.25 (Unit 51)	HAZ3B167	SWIT	AIU	1970	11	24	2019	8	41	49
LITTLE RIVER ZONE SUB (Unit 51)	HAZ3B250	SWIT	AIU	1970	11	24	2019	5	41	49
LOCHEE RD (Unit 51)	HAZ3B275	SWIT	AIU	1970	11	24	2019	6	41	49
LONGRIDGE DR NO.4 (Unit 51)	HAZ3B247	SWIT	AIU	1970	11	24	2019	8	41	49
MACKENZIE AV E (Unit 51)	HAZ3B006	SWIT	AIU	1970	11	24	2019	8	41	49
MAFFEYS RD (Unit 51)	HAZ3B271	SWIT	AIU	1970	11	24	2019	8	41	49
MAJOR HORN BROOK RD NO.106 (Unit 51)	HAZ3B086	SWIT	AIU	1970	11	24	2019	5	41	49

MARCH PL NO.9 (Unit 51)	HAZ3B052	SWIT	AIU	1970	11	24	2019	7	41	49
MARY MCLEAN PL (Unit 51)	HAZ3B162	SWIT	AIU	1970	11	24	2019	8	41	49
MASON PL (Unit 51)	HAZ3B087	SWIT	AIU	1970	11	24	2019	6	41	49
MCDUGAL AV (Unit 51)	HAZ3B240	SWIT	AIU	1970	11	24	2019	7	41	49
MCINTYRE ST (Unit 51)	HAZ3B056	SWIT	AIU	1970	11	24	2019	7	41	49
MEMORIAL AV NO.17 (Unit 51)	HAZ3B105	SWIT	AIU	1970	11	24	2019	6	41	49
MEMORIAL AV NO.546 (Unit 51)	HAZ3B242	SWIT	AIU	1970	11	24	2019	6	41	49
MONOWAI CR (Unit 51)	HAZ3B051	SWIT	AIU	1970	11	24	2019	8	41	49
OFFICE RD NO.135 (Unit 51)	HAZ3B082	SWIT	AIU	1970	11	24	2019	5	41	49
OFFICE RD W (Unit 51)	HAZ3B203	SWIT	AIU	1970	11	24	2019	5	41	49
ORRICK CR NO.23 (Unit 51)	HAZ3B108	SWIT	AIU	1970	11	24	2019	8	41	49
OXFORD TR NO.211 (Unit 51)	HAZ3B236	SWIT	AIU	1970	11	24	2019	7	41	49
PAGES RD NO.475 (Unit 51)	HAZ3B146	SWIT	AIU	1970	11	24	2019	8	41	49
PAPANUI RD NO.127 (Unit 51)	HAZ3B279	SWIT	AIU	1970	11	24	2019	7	41	49
PARKER ST NO.36 (Unit 51)	HAZ3B235	SWIT	AIU	1970	11	24	2019	5	41	49
PARKSTONE AV COLLEGE NO.3 (Unit 51)	HAZ3B243	SWIT	AIU	1970	11	24	2019	6	41	49
PAULINE ST (Unit 51)	HAZ3B261	SWIT	AIU	1970	11	24	2019	8	41	49
PEMBROKE ST NO.8 (Unit 51)	HAZ3B156	SWIT	AIU	1970	11	24	2019	8	41	49
PHILPOTTS RD NO.65 (Unit 51)	HAZ3B099	SWIT	AIU	1970	11	24	2019	5	41	49
RUSSLEY RD NO.216 (Unit 51)	HAZ3B084	SWIT	AIU	1970	11	24	2019	5	41	49
RUTHERGLEN AV NO.7 (Unit 51)	HAZ3B239	SWIT	AIU	1970	11	24	2019	6	41	49
SEAGRAVE PL (Unit 51)	HAZ3B049	SWIT	AIU	1970	11	24	2019	6	41	49
SENIOR PL NO.9 (UNIT 51)	HAZ3B255	SWIT	AIU	1970	11	24	2019	8	41	49
SMITH ST (Unit 51)	HAZ3B061	SWIT	AIU	1970	11	24	2019	5	41	49
SNELL PL (Unit 51)	HAZC383	SWIT	AIU	1972	11	24	2019	8	41	47
SOLEARES AV NO.130 (Unit 51)	HAZ3B107	SWIT	AIU	1970	11	24	2019	8	41	49
SOLEARES AV S (Unit 51)	HAZ3B152	SWIT	AIU	1970	11	24	2019	8	41	49
SOLWAY AV N (Unit 51)	HAZC379	SWIT	AIU	1972	11	24	2019	5	41	47
SOMME ST NO.49A (Unit 51)	HAZC368	SWIT	AIU	1972	11	24	2019	6	41	47
SPRINGS RD NO.18 (Unit 51)	HAZ3B259	SWIT	AIU	1970	11	24	2019	6	41	49
STATION RD FELLMONGERY (Unit 51)	HAZ3B277	SWIT	AIU	1970	11	24	2019	7	41	49
STATION RD KAPUTONE (Unit 51)	HAZ3B103	SWIT	AIU	1970	11	24	2019	7	41	49
SUVA ST E (Unit 51)	HAZD299	SWIT	AIU	1973	11	24	2019	4	41	46
THORNDON CL NO.9 (Unit 51)	HAZ3B060	SWIT	AIU	1970	11	24	2019	5	41	49

TOWER ST SHOPS (Unit 51)	HAZ3B064	SWIT	AIU	1970	11	24	2019	5	41	49
UXBRIDGE ST S (Unit 51)	HAZ3B161	SWIT	AIU	1970	11	24	2019	6	41	49
VANADIUM PL (Unit 51)	HAZ3B234	SWIT	AIU	1970	11	24	2019	6	41	49
WADELEY RD (Unit 51)	HAZ3B158	SWIT	AIU	1970	11	24	2019	6	41	49
WAIRAKEI RD NO.501 (Unit 51)	HAZ3B058	SWIT	AIU	1970	11	24	2019	6	41	49
WAIRARAPA TR (Unit 51)	HAZ3A017	SWIT	AIU	1970	11	24	2019	7	41	49
WALES ST NO.144 (Unit 51)	HAZC001	SWIT	AIU	1970	11	24	2019	6	41	49
WARREN CR NO.119 (Unit 51)	HAZ3B155	SWIT	AIU	1970	11	24	2019	6	41	49
WASHBOURNES RD NO.11A (Unit 51)	HAZ3B263	SWIT	AIU	1970	11	24	2019	6	41	49
WESTBURN TR (Unit 51)	HAZ3B057	SWIT	AIU	1970	11	24	2019	6	41	49
WESTCOTT ST (Unit 51)	HAZ3B002	SWIT	AIU	1970	11	24	2019	8	41	49
WHITEHALL ST NO.3 (Unit 51)	HAZ3B248	SWIT	AIU	1970	11	24	2019	7	41	49
WILMOT ST (Unit 51)	HAZ3B001	SWIT	AIU	1970	11	24	2019	6	41	49
WOODHAM RD NO.271 (Unit 51)	HAZ3B005	SWIT	AIU	1970	11	24	2019	6	41	49
DARFIELD ZONE SUB (Unit 1002)	ASE0000001	CB	OCB	1965	33	270	2015	7	39	50
HAREWOOD ZONE SUB (Unit 202)	GEC697-0001	CB	OCB	1975	33	270	2015	6	62	40
HAREWOOD ZONE SUB (Unit 212)	ASE2151881	CB	OCB	1965	33	270	2015	6	36	50

TRANSFORMERS REPLACEMENT

CPP37

Programme Summary

1 April 2013 – 31 March 2019

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1 Programme Introduction

Programme Name	<i>Transformers (CPP37)</i>
Service Category	<i>Provide and operate network infrastructure</i>
Capex Category	<i>Replacement</i>

1.1 Description

The work undertaken in this programme involves the replacement of Orion's transformers. Within the CPP period the only assets that are being replaced are the distribution transformers. The programme is expected to continue in perpetuity.

1.2 Assets included

The assets that are included in this programme are voltage regulators, power and distribution transformers. These include:

Voltage regulators:

- 11kV oil filled voltage regulators, 550kVA to 20MVA

Power transformers:

- 20/40MVA (1969-1986)
 - Ferranti, 66/11kV, dual rated with a separate cooling tower, Oil Forced and Air Forced (OFAF)
 - Tyree, 66/11kV, dual rate with a separate cooling tower, OFAF
- 20/40MVA (2001-2007)
 - 34/40MVA, dual rated with integrated cooling tower, Oil Natural and Air Forced (ONAF)
 - 20MVA, dual rated with integrated cooling tower, Oil Directed and Air Forced (ODAF)
- 11.5/23MVA
 - 66/11kV, Pauwells, dual rated with integrated cooling tower, ODAF
 - 33/11kV, dual rated with separate cooling towers, except Larcomb, dual rated with integrated cooling tower
- 10/20MVA, Tyree, 33/11kV only, dual rated with integrated cooling tower
- 7.5/10MVA
 - 66/11kV, dual rated with integrated cooling tower
 - 33/11kV, dual rated with integrated cooling tower

- 7.5MVA, single rated with integrated cooling, no fans, Oil Natural and Air Natural (ONAN)
- 2.5MVA, single rated with integrated cooling, no fans, ONAN

Note: We haven't replaced any power transformers in the past 5 years and don't have any scheduled for replacement. Any new transformers will be purchased as part of a major project.

Distribution transformers:

- 11kV/400V
 - 5kVA to 200kVA, pole mounted
 - 250kVA to 1500kVA, ground mounted, outside (pad) or indoors (substation)

1.3 Aims and objectives

The main objectives of the programme are to:

- Ensure the safety of the public and our personnel and contractors around our assets.
- Replace on an annual basis high voltage regulators, and power and distribution transformers for which it has been determined that replacement is the cost effective way to ensure reliability of electricity supply and meeting service level targets (including safety).

1.4 Drivers

The main drivers for undertaking the programme are:

- That assets are replaced in a timely and cost effective manner to ensure the condition and performance of our assets are such that they:
 - meet acceptable target levels of safety to people and property
 - provide acceptable levels of network reliability
- The prudent cost effective management of our assets and associated risks.

2 Key assumptions

The project relies on the following key assumptions:

2.1 Forecasts of transformer utilisation levels

Transformer utilisation is measured as the ratio of maximum demand in kVA to installed nameplate rating. For individual transformers, this ratio typically ranges from below 30% to above 130%.

We monitor transformer utilisation for larger transformers however we do not attempt to forecast individual Transformer utilisation.

Small pole-mounted transformers usually serve only a small number of consumers. Capacities are normally only reviewed when significant new load is connected. Utilisation factors are typically low, with overall values in rural areas of around 30%.

Larger transformers are fitted with thermal maximum-demand meters which are read twice-yearly. Measured utilisation factors range up to about 140%. For typical cyclic loads, we have determined that maximum demands of about 130% of rated continuous ratings are acceptable, before upgrading action is required.

When distribution transformer maximum demand exceeds 130% of nameplate rating, a larger transformer is installed or load transferred to another substation if available. Where substation utilisation is low (<50% with no load growth predicted), the transformer will be changed or removed when this is economically justified.

2.2 Labour escalators

We estimate that 40% of the project cost is labour related and we have determined that it is not appropriate to use the standard New Zealand wide LCI in relation to this project.

We note that Statistics NZ has recently started to monitor construction costs in Canterbury due to the local pressures on construction resources as a result of the Christchurch rebuild, however their data time series is currently limited and unsuitable.

As local labour cost pressure is evident in our most recent contract tenders we have determined a proposed cost escalation index which we refer to as the Canterbury construction labour index based on estimates of labour.

We have sought external advice cost from two quantity surveyor firms on what we may expect in the market over the remainder of the CPP period in this respect. There is considerable uncertainty however this CPP process requires us to make appropriate estimates. The resulting labour escalators that we propose are:

Index	FY14	FY15	FY16	FY17	FY18	FY19
Canterbury construction labour	7.5%	7.5%	7.5%	5%	5%	5%

For further information on our derivation see section 9.26.4 to 9.26.6 of the CPP proposal.

2.3 Material escalators

We estimate that 60% of the project costs are material related. In order to create input cost escalators we have considered the most relevant input components for this project these are considered to be copper and steel. We have used World Bank commodity price forecasts in conjunction with the NZIER NZD/USD exchange rate forecast to convert the World Bank prices into NZD. The prices are weighted based on an estimate of the quantities of the relevant materials used in this case 45% Steel, 50% Copper and 5%Aluminium. The resulting material escalators for this project are:

Index materials	FY14	FY15	FY16	FY17	FY18	FY19
Transformers	3.36%	-4.90%	-1.38%	-2.78%	-5.52%	3.19%

For further information on our derivation see section 9.26.4 of the CPP proposal.

2.4 Age of the assets

The age of an asset is considered as a factor in assessing whether an asset has reached the end of its economic life.

2.5 When capex should be undertaken

We do not have a specific policy that determines when an asset should be replaced. We selectively run to failure i.e. rural pole mounted transformers with small loads. With pole mounted transformers we tend to replace these transformers in conjunction with line replacement as this it is more efficient and reduces customer outages.

For larger transformers and/or those serving more customers our preventative approaches to transformer spend is designed to ensure they are replaced before they fail. We are not planning to introduce any further testing above what is currently undertaken. We are anticipating an increased number of failures due to the aging of the assets and plan to use the CBRM model to target the higher risk (safety, lost load etc) units first.

As indicated in section 2.1 above when distribution transformer maximum demand exceeds 130% of nameplate rating, a larger transformer is installed or load transferred to another substation if available. Where substation utilisation is low (<50% with no load growth predicted), the transformer will be changed or removed when this is economically justified.

We have a number of older single phase Transformers in building substations which we replace with new, more reliable three phase units. This is usually carried out in conjunction with other work at the site.

2.6 Non network alternatives

We have not considered any non-network alternatives in relation to this project.

2.7 Cost benefit analysis

We have not undertaken any cost benefit analysis in relation to this project. However the programme is closely related to a number of Maintenance Programmes outlined in the Asset Management report. Also the transformers are purchased at various stages over the year, as required, on commercial terms which are renegotiated periodically with our supplier.

Our asset management policy NW70.00.46 outlines at a high level our approach to asset management, and our objective, which is to optimise the lifecycle costs for each network asset group (including creation, operation, maintenance, renewal and disposal) to meet agreed service levels and future demand. The asset management policy lists a large range of other documents that inform the asset management process.

2.8 Basis for Expenditure Forecast

Our transformer replacement programme is age based and will be informed to a greater degree in the future by the CBRM process. At present the CBRM model is still being developed to assist in this process. The CBRM models inherently include failure rates information on different types of transformers but does not include Orion specific transformer failure rate data.

Transformers for replacement, reinforcement and connections are purchased as a group. These purchases are made, when required, over the year. The purchase costs are apportioned to reinforcement, connection and replacement capital budgets. The historical transformer replacement costs have also been apportioned and may have been under reported. The forecast has been based on 50% of the estimated purchase cost for new distribution transformers which has been roughly derived from the historical disposal figures, as follows:

Year	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
No. Disposed	235	149	156	129	100	119	121	88

Year	FY08	FY09	FY10	FY11	FY12
No. Disposed	124	139	125	73*	226*

* There is a mismatch in 2011 and 2012 due to the paper trail lagging actual disposals.

We purchase a variety of different sizes and types of transformers and the forecast for all distribution transformer purchases (replacement, reinforcement and connections) is based on an average cost of:

Distribution Transformers	Cost \$000
Small	7
Large	25

Forecast number of distribution Transformers to be purchased for (replacement, reinforcement and connections) is:

Numbers of distribution transformers for replacement, reinforcement and connections	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Small	110	115	125	125	125	125	125
Large	80	120	120	120	120	100	100

At this point in time we haven't developed a replacement plan using the CBRM model for distribution transformers. We do not have an accurate expenditure forecast based on the CBRM model to comment on or to compare to the forecast in the CPP proposal. It can be seen from the above, we are forecasting a step up in large transformers at a proportionally higher rate than small transformers. This impacts our total forecast replacement cost as larger transformers are more expensive.

Transformer failures causing outages

We had a lot of transformers (pole and ground mounted) installed in the 1960s. Therefore the average age of the assets and failure rates are starting to increase. It can be seen from Figures 13 and 14 (showing the age profile of transformer assets) in the distribution transformer Asset Management Report YE 2012 that the number of aging ground mounted transformers (Large) is increasing. This has a number of potential impacts as we anticipate that this will lead to an increase in the replacement of higher cost large ground mounted transformers, and also potentially an increase in failure rates.

The following table shows the number of failures resulting in outages. This differs from Figure 5 in the Asset Management Report YE 2012 for distribution transformers which shows the “number of incidents” (not failures causing outages as shown below).

FYE	FY08	FY09	FY10	FY11	FY12	FY13
Failures resulting in outage	28	30	47	53	45	64*

*year to date (3/4 of year)

The “number of incidents” shown in the Asset Management Report YE 2012 for distribution transformers are primarily related to car v pole, lightning strikes, and other failures. As indicated in section 2.5 above, pole mounted transformers tend to be replaced in conjunction with line replacement/refurbishment as this is more efficient and reduces customer outages. Therefore relatively few would run to failure due to age. However, we have not analysed historical failure rates for transformers in further detail ie whether age related.

Power transformers

The forecast does not include any allowance for power transformers.

We have a CBRM model for our power transformers. The current CBRM model for power transformers shows 7 units with a score higher than 5. We have addressed 6 of these by carrying out ½ life maintenance on four units and scheduling the other two in the next financial year. The final transformer has a high health index due to the small size of the unit (2MVA). There is a proposal in place to move this unit to another part of the network when a larger transformer becomes available after the conversion of Kimberley zone substation to 66kV.

The other power transformer assets are in good condition and we do not intend to replace any of them. Overall the condition and health index for our zone transformers is very good.

Voltage transformers

The forecast includes an allowance for the replacement of one voltage regulator in FY14.

Preparation work on the site and the transformers

The forecast expenditure includes a nominal \$160k per annual allowance for preparation work on the site and the transformers including testing and putting identification tags/markings on the transformers.

Future developments

It is our goal to further refine and develop the transformer replacement programme going forward.

2.9 Obligations

Like all companies we are subject to the general provisions of a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

- Electricity Act
- Local Government Act
- Electricity Reform Act
- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act
- Electricity Industry Act
- Energy Companies Act.

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a *"lifeline"* utility, Orion must comply with the Civil Defence Emergency Management (CDEM) Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand's communities. The Act requires us to:

- Be able to function to the fullest possible extent during and after an emergency
- Have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- Help define the Crown's CDEM goals and objectives in a National CDEM Strategy

- Participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- Provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- Plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- Be capable of managing our own response to emergencies
- Develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- Establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary (NW70.00.14)
- Asset Risk Management (NW70.60.02).

3 Relevant Policies and Planning Standards

Relevant policies and planning standards for our replacement programmes are set out below:

Asset management policy (NW70.00.46)

- We have used condition, age and reliability information to forecast asset renewal.

Procurement policy (OR00.00.19) and Contract management (NW73.00.03)

- We follow our procurement and contract management policies to achieve value for money by competitively tendering our work with a value over \$20,000.

Delegations of authority policy (OR00.00.11)

- The overall budgeted expenditure for this programme is approved by the Board as part of the overall Asset management Plan. As and when the expenditure is incurred then approval for the actual expenditure is made in compliance with the delegations of authority policy.

Authorised contractors (NW73.10.15)

- We ensure only authorised contractors are allowed access to our network (such access may be subject to limits that can be specific to each contractor).

Health and Safety policy (OR00.00.01)

- We follow our health and safety requirements to ensure the safety of the public and our personnel and contractors around our assets.

Environmental Sustainability Policy (OR00.00.03)

- We work towards environmental sustainability in our operations.

Asset Management Lifecycle Budget Forecasting Process (NW70.60.15)

- This policy sets out our budgeting approach for our maintenance and replacement programmes in more detail.

Voltage Regulators – Asset Management Report YE 2012 (NW70.00.41), Power Transformers – Asset Management Report YE 2012 (NW70.00.23), Distribution Transformers – Asset Management Report YE 2012 (NW70.00.40).

- These asset management reports set out the assets included and processes followed in this programme in more detail.

4 Programme Description

4.1 Work to be undertaken

The work to be undertaken in this programme involves the replacement of voltage regulators and transformer assets that have reached the end of their economic lives. Due to the age profile of distribution transformers, some of these assets will be replaced during the CPP period. We have identified only one Voltage regulator that will be replaced in 2014 and no power transformer assets will need to be replaced within the CPP period.

Detail on this programme can be found in the attached Asset Management reports for 'Voltage Regulators', 'Power Transformers' and 'Distribution Transformers'. More detailed asset condition information is contained within the CBRM spreadsheet model.

4.2 Network constraints and service targets

There are no constraints expected due to forecast load.

Assets must be replaced in a timely manner. These assets are replaced to ensure they provide the required level of performance. The programme contributes to meeting Orion's overall service targets and safety by ensuring that assets are replaced as and when required by the programme and asset management policy.

4.3 Dependencies

The programme is closely related to the following:

- Transformers Scheduled Maintenance Programme (CPP108)
- Network Assets Non-Schedule Maintenance Programme (CPP114)
- Network assets Emergency Maintenance Programme (CPP119).

Orion's network architecture review may lead to a different configuration of assets being installed at the time replacements are needed.

4.4 Programme deliverability

The ongoing replacement programme can be carried out within normal contracting arrangements. The scheduling of the work is altered to some extent to take into account resource constraints and network loadings.

4.5 Prioritisation

Prioritisation is based on a number of factors including:

Safety to the public, our personnel and contractors

Replacement of assets as a result of immediate safety issues will be dealt with under our emergency works contracts.

Satisfying individual or collective consumer expectations:

We consider satisfying consumers reasonable expectations as a very influential prioritisation factor. We give priority to the constraints that are most likely to impact consumer supply through extended or frequent outages, or compromised power quality. This is in the context of the overall level of quality that we believe is reasonable to provide.

Managing contractor resource constraints:

We aim to maintain a steady work flow to contractors. The contractors have a diversity of skill sets covering different aspects of our assets and we seek to ensure that our mix of projects, in any given year broadly aligns with that diversity. This ensures that contractor personnel and equipment levels match our replacement programme year-on-year at a consistent level, reducing the risk of our contractors being over or under resourced.

Our asset replacement programme:

We determine our replacement priorities by following the general principle that the assets supplying the greatest number of consumers receive the highest priority. We extensively review areas of the network where scheduled asset replacement programmes occur to ensure the most efficient and cost-effective solution is sought to fit in with the current and long-term network development structure.

The risk with any type of replacement programme is that network switching or alternative supplies (generators) will be required to off-load the assets which are to be replaced. This leads to reduced reliability levels and increased risk of outages. We try to mitigate this by co-ordinating replacements with other work and where possible carry out the work at periods of lower network loading.

5 Earthquake Consequences

As a result of the earthquake activity experienced in Canterbury since September 2010, the reliability of the network has been reduced and in some areas the ability to transfer load has been restricted. This will continue to lead to a higher than normal possibility of outages as a result of switching the network to allow assets to be removed from service.

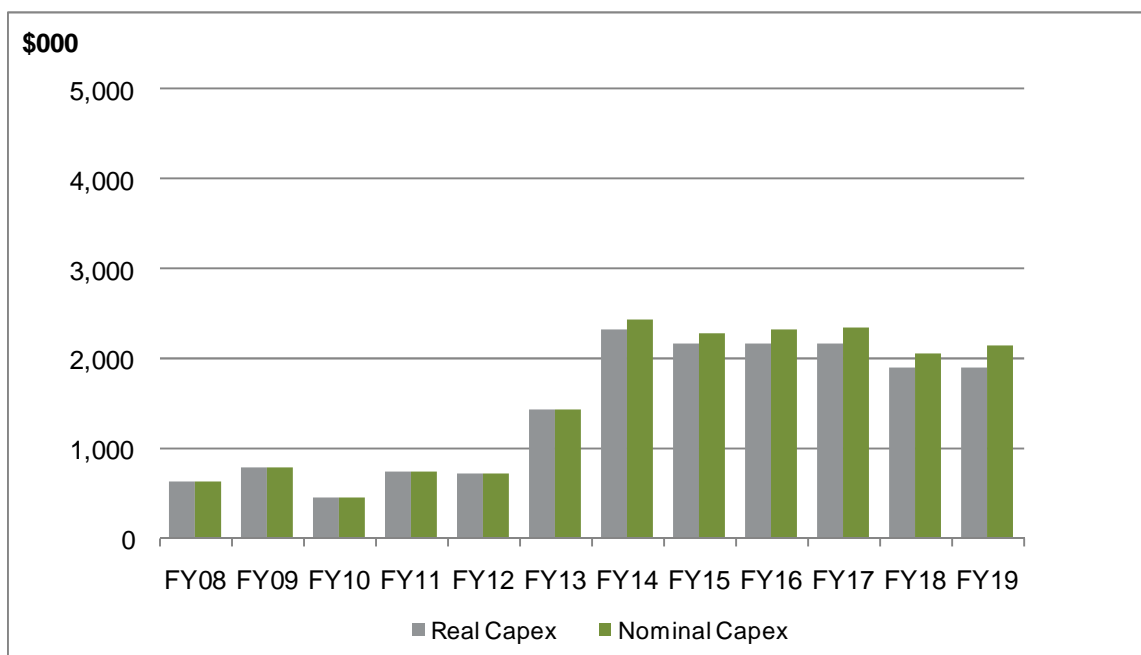
Our resources were constrained following the earthquakes as staff and contractors were diverted to deal with the immediate aftermath of the events. This resulted in a reduction in the planned replacement programme for those years.

6 Expenditure Plan

The following chart shows historical and forecast replacement expenditure for transformers in both real and nominal terms (\$000). Note that the historical and forecast replacement expenditure relates primarily to distribution transformers as the forecast expenditure allows for only one voltage regulator in FY14 and no replacement of power transformers. The real terms have been escalated as per methodology outlined in the CPP proposal to ascertain the nominal terms. The increase in expenditure was scheduled/predicted prior to the earthquakes.

These expenditure forecasts do not include any contingencies.

Historical and Forecast Expenditure



The following tables summarise our distribution transformers historical and forecast replacement expenditure in both real and nominal terms (\$000). As explained in section 2.8 above the forecast transformer expenditure is based on approximately 50% of the total annual purchase costs for distribution transformers this has been roughly derived from the historical disposal figures, this replacement capex is then split approximately 50% for pole transformer and 50% for pad mounted transformers. The step increase in expenditure from FY13 is due to a number of factors: the increase in the replacement of ageing distribution transformers particularly the large more expensive transformers and potentially the historical transformer replacement costs have also been apportioned and may have been under reported.

Historical expenditure (Nominal)

	Nominal \$000				
	FY08	FY09	FY10	FY11	FY12
Distribution transformers (pole, 1ph/2ph/3ph)	322	395	229	369	361
Distribution transformers (pad)	322	395	229	369	361
11kV voltage regulators	-	-	-	-	-
Total	643	790	459	739	722

Forecast expenditure (Real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Distribution transformers (pole, 1ph/2ph/3ph)	723	1,060	1,080	1,080	1,080	955	955
Distribution transformers (pad)	723	1,060	1,080	1,080	1,080	955	955
11kV voltage regulators	-	200	-	-	-	-	-
Total	1,445	2,320	2,160	2,160	2,160	1,910	1,910

Forecast expenditure (Nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Distribution transformers (pole, 1ph/2ph/3ph)	723	1,113	1,136	1,165	1,174	1,033	1,076
Distribution transformers (pad)	723	1,113	1,136	1,165	1,174	1,033	1,076
11kV voltage regulators	-	211	-	-	-	-	-
Total	1,445	2,437	2,272	2,330	2,348	2,067	2,152

7 References

Documents that should be read in conjunction with this project summary are:

- Voltage Regulators – Asset Management Report YE 2012 (NW70.00.41)
- Power Transformers – Asset Management Report YE 2012 (NW70.00.23)
- Distribution Transformers – Asset Management Report YE 2012 (NW70.00.40).

UNDERGROUND CONVERSIONS

CPP50

Project Summary

1 April 2013 – 31 March 2019

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1 Project introduction

Project Name	<i>Underground conversions (CPP50)</i>
Service Category	<i>Rearrangement of assets at 3rd party request</i>
Capex Category	<i>Underground conversions</i>

1.1 Description

The Christchurch City Council (CCC) policy via the City Plan is for all new reticulation in the urban area to be underground, Selwyn District Council (SDC) has similar policy in place for urban areas.

Of existing assets, almost all the upper network in built-up areas is underground except for the three 66kV tower line arteries out of Islington to Papanui, Addington and Bromley via Halswell. Some 33kV on the western fringes is overhead. About 15% of urban 11kV (300km) in Christchurch is overhead, once again mostly around the outer (low density) fringes. A little over half of the low voltage network in the urban area is overhead.

In the rural network almost all conductor is overhead, except in townships and on customer property.

Converting overhead reticulation to cable cannot be justified on an economic basis alone, although undergrounding does offer reliability and visual benefits. There is no programme to systematically remove all overhead assets from the urban network, it is largely driven by regulatory requirements. When reinforcement or replacement takes place in built-up areas, associated overhead assets (especially 11kV) will normally be undergrounded as part of the works where practical. Estimates of annual costs for this work are derived from historical trends and forecast reinforcement rates. For further information see:

- Non-Major Network Project Urban Reinforcement (CPP51)
- Non-Major Network Project Rural Reinforcement (CPP52)

Underground conversion takes place in the following circumstances:

- as required by New Zealand Transport Authority (NZTA) or local councils as part of roading upgrades.
- as required by local councils as part of neighbourhood planning and improvements.
- at the request of private individuals or property developers.

In these cases, our costs are partially or totally offset by a contribution from the other party. Our forecast of contributions towards underground conversions is tabled in section 6.1

Over the CPP period, several major NZTA projects involving new motorways and widening of existing roads will result in the removal of many kilometres of overhead reticulation. A developer-initiated undergrounding of some 66kV assets is also expected.

Our shareholders CCC and SDC have agreed that it is their responsibility to determine the priority for discretionary undergrounding projects and to pay for such work on an agreed basis. This is a commercially sound arrangement which puts the correct incentives on the parties and is appropriate for both shareholders and Orion.

1.2 Assets included

Undergrounding involves replacing overhead conductor with buried cable, and pole-mounted transformers and switchgear also need to be removed. This means acquiring title or easements for sites for ground-mounted distribution substations in kiosks, with transformers, switchgear, LV panels etc. Pad-mounted transformers are of greater capacity than pole-mounted, so where multiple pole substations are being removed they can typically be replaced by a smaller number of kiosks.

1.3 Aims and objectives

The objective of the undergrounding budget is to provide for the replacement of overhead assets as appropriate in our reinforcement and replacement programmes, and as required by external parties. We aim to ensure the safety of the public, our personnel and contractors around our assets.

1.4 Drivers

The key drivers for this project are:

- balancing the need for adequate future capacity with the need for cost effectiveness. This work is done in response to council, NZTA, developer or private applications. Budgets are set on the basis of historical trends and growth forecasts.
- meet acceptable target levels of safety to people and property.
- provide acceptable levels of network reliability.

2 Key Assumptions

The project relies on the following key assumptions:

2.1 Input cost mix

Input costs are assumed to be weighted as follows:

	Labour	Cables/ Lines
66kV overhead lines (wood pole)	100%	-
66kV overhead lines (towers)	100%	-
66kV underground cables (XLPE)	56%	44%
11kV overhead lines (wood pole)	75%	25%
11kV underground cables (XLPE)	72%	28%
LV overhead lines (wood pole)	75%	25%
LV underground cables (XLPE)	81%	19%

2.2 Labour escalators

For the labour component of the project cost we have determined that it is not appropriate to use the standard New Zealand wide LCI in relation to this project.

We note that Statistics NZ has recently started to monitor construction costs in Canterbury due to the local pressures on construction resources as a result of the Christchurch rebuild, however their data time series is currently limited and unsuitable.

As local labour cost pressure is evident in our most recent contract tenders we have determined a proposed cost escalation index which we refer to as the Canterbury construction labour index based on estimates of labour.

We have sought external advice cost from two quantity surveyor firms on what we may expect in the market over the remainder of the CPP period in this respect. There is considerable uncertainty; however this CPP process requires us to make appropriate estimates. The resulting labour escalators that we propose are:

Index	FY14	FY15	FY16	FY17	FY18	FY19
Canterbury construction labour	7.5%	7.5%	7.5%	5%	5%	5%

For further information on our derivation see section 9.26.4 to 9.26.6 of the CPP proposal.

2.3 Material escalators

For the various material component of the project costs we have considered the most relevant input components for this project e.g copper, aluminium, steel etc. We have used world bank commodity price forecasts in conjunction with the NZIER NZD/USD exchange rate forecast to convert the world bank prices into NZD. The prices are weighted based on an estimate of the quantities of the relevant materials used. The resulting material escalators for this project are:

Index materials	FY14	FY15	FY16	FY17	FY18	FY19
Underground cables	14.75%	9.18%	12.06%	7.03%	1.42%	0.95%
Overhead lines	14.75%	9.18%	12.06%	7.03%	1.42%	0.95%

For further information on our derivation see section 9.26.4 of the CPP proposal.

2.4 Capital contributions

The capital contributions are based on cost recoveries as negotiated with the local authorities and road controlling authorities. Section 6 of the “National Code of Practice for Utility Operators to Transport Corridors (October 2011)” sets out a governing set of principles on how capital contributions by affected parties are determined and references the underpinning legislation (for electricity is predominantly electricity act sections 24A, 33 and 34.).

2.5 Certainty of forecast

We believe that the assumed timing of the forecast work is reasonable. In particular for the developer-initiated project in FY14 to replace part of the Halswell-Heathcote 66kV double tower line with underground cable. A meeting with the developer's representative immediately prior to Christmas 2012 indicated that they wish to begin progressing the underground conversion design within the next 3 months. They have currently applied for final consents for the subdivision through the council which includes the undergrounding of the lines. (Note this is the final stages of the sub-division, other stages have been completed over a number of years).

The Selwyn District Council is not impacted significantly by the earthquake. However their rate base will be increasing due to the earthquake with subdivision development. They have indicated they are to continue with undergrounding projects.

2.6 Non-network solutions

We have not considered any non-network solutions for these projects.

2.7 Cost Benefit analysis

We have not carried out a cost benefit analysis on this project.

2.8 Basis for expenditure forecast

Our forecast expenditure is based on planned CCC, SDC, NZTA and developer projects that will require undergrounding. Provisions are made for ongoing annual expenditure as agreed with the local body councils for unspecified projects based on historical averages.

The project contains an allowance for the CCC of \$300k per annum this is for projects which occur as a consequence of other council activity, such as road safety and other undergrounding of assets requiring relocation which the CCC is continuing to fund. This does not include any allowance for projects which are driven by amenity objectives as we understand the CCC will not be undertaking specific undergrounding projects.

The project contains an allowance of \$500k per annum out to FY18 for work in the CBD. The CBD area (ie: within the four major avenues) has some LV overhead reticulation. In particular there is LV overhead reticulation located around the areas which have been identified for development within the new city blue print area known as "the Frame". In terms of the undergrounding in the CBD, the works are associated with "the Frame". This is a key "high profile" project in the CERA recovery plan for the city. Although there is no certainty regarding any undergrounding, the high profile nature of the project means there will be significant pressure to undertake the works.

The expenditure is expressed in gross terms (ie: before contributions have been deducted). We estimate that 90% of the private developer driven cost will largely be recovered through capital contribution.

2.9 Obligations

Like all companies we are subject to the general provisions of a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

- Electricity Industries Act
- Energy Companies Act
- Local Government Act
- Electricity Reform Act
- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act.

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a "lifeline" utility, Orion must comply with the Civil Defence Emergency Management (CDEM) Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand's communities. The Act requires us to:

- be able to function to the fullest possible extent during and after an emergency
- have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- help define the Crown's CDEM goals and objectives in a National CDEM Strategy
- participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- be capable of managing our own response to emergencies
- develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary NW70.00.14
- Asset Risk Management NW70.60.02

3 Relevant policies and planning standards

The nature of undergrounding work is very similar to that of urban reinforcement and connections and extensions. New underground assets, whether replacing overhead network or not, will be installed according to Orion's design standards, technical specifications and policies as summarised in NW 70.50.03 – Document Control. In particular this project will be implemented in compliance with the following sections:

- 9.2 Infrastructure
 - 9.2.1 Management
 - 9.2.3 Design Standards
 - 9.2.4 Technical Specifications
- 9.5 Contracts
 - 9.5.1 Management
- 9.7 Procurement & Stock Management
 - 9.7.2 Equipment Specifications

Most undergrounding projects are of a small scale, where there is little scope for altering the network topology according to current design principles; circuits are replaced on a like-for-like basis with no change to security of supply. If the need for reinforcement is identified, the extra cost does not come from the undergrounding budget. Non-network alternatives are rarely relevant.

Relevant other capex projects:

- Urban Reinforcement Capex Project (CPP51)
- Rural Reinforcement Capex Project (CPP52)
- Connections and Extensions Capex Project (CPP53)

This project is in line with the intentions and objectives set out in Orion's Statement of Intent for the three years FY12, FY13 and FY14.

4 Project description

4.1 Work to be undertaken

The work mostly involves the replacement of existing 11kV and/or low voltage overhead conductors with buried cable. Pole-mounted transformers and isolators are replaced by ground-mounted transformers and switchgear housed in kiosks. Poles are removed if there is no remaining infrastructure on them (electrical, telecommunications or street lighting).

For subtransmission works, there is one NZTA-initiated project in FY16 to replace part of the Springston-Larcomb pole line with 66kV underground cable.

There is one developer-initiated project in FY14 to replace part of the Halswell-Heathcote 66kV double tower line with underground cable.

4.2 Network constraints and service targets

Underground conversions are not driven by network constraints or reinforcement requirements, although load forecasting will be taken into account in selecting conductor size to avoid unnecessary future constraints. Reliability is improved so the effect on service targets is positive.

4.3 Dependencies

This work is usually initiated by external agencies, developers or co-ordinated with other Orion infrastructure works.

4.4 Project deliverability

The project can be carried out within our normal contracting arrangements.

4.5 Prioritisation of works

Undergrounding uses the same contracting resource as reinforcement and connection-extension work. Because work plans are usually determined by external requirements there is less flexibility. Schedules are known well in advance however, which assists efficient planning.

4.6 Tenure of distribution substation sites and cable routes

Where possible we install our underground reticulation in the berm of a public road. This does not require specific permission. We secure our kiosk substation sites by 'Title' or easement.

5 Earthquake consequences

The earthquakes have had no effect on the undergrounding programme. The two temporary 66kV lines been built from Bromley GXP will be replaced by cables but these projects are in the Urban North Major Capex Project (CPP1) and Dallington Major Capex Project (CPP2).

While cables are more susceptible to seismic damage and take longer to repair, there has been no change to the CCC City Plan's requirements for all new reticulation to be underground, or to the policy of undergrounding overhead assets where appropriate.

The earthquakes have influenced engineering aspects of cable laying. Geotechnical considerations are taken into account in selecting cable routes, particularly for higher capacity conductors. Ground conditions determine the type of civil works involved in 66kV cable installations.

6 Expenditure plan

6.1 Expenditure summary

These expenditure forecasts do not include any contingencies. The data shown in the following tables is gross expenditure (ie: before contributions have been deducted)

The following table summarises forecast annual expenditure (\$000).

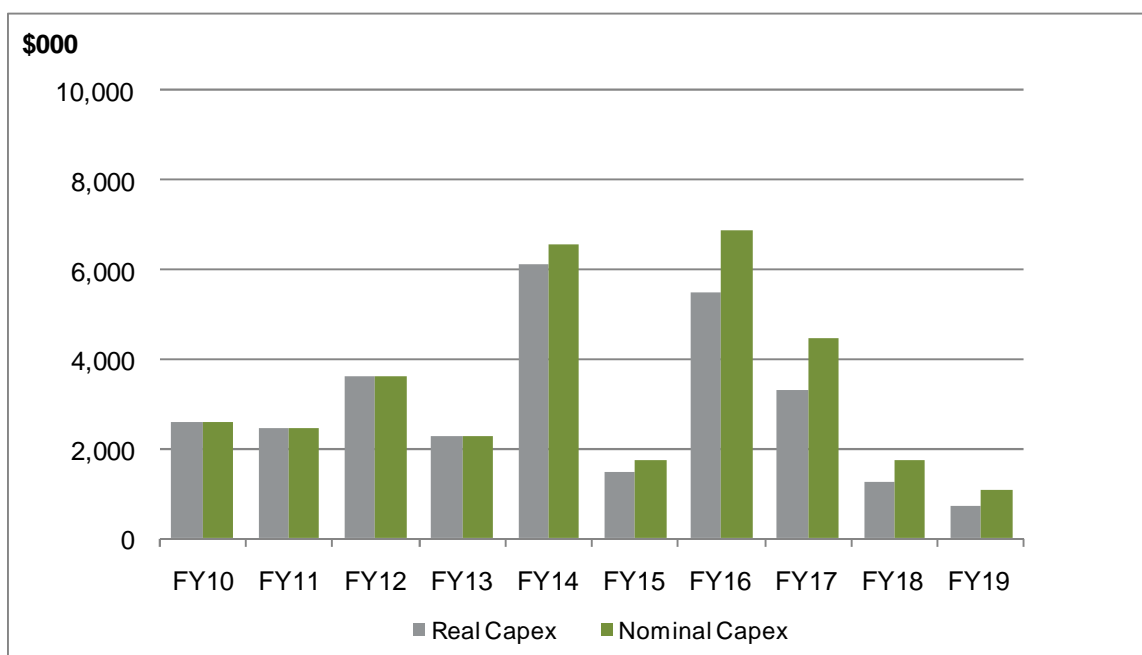
Category	FY13	FY14	FY15	FY16	FY17	FY18	FY19
NZTA	1,900	-	-	-	-	-	-
Southern Motorway Stage 2	-	-	-	1,900	-	-	-
Southern Motorway Stage 3	-	-	-	2,000	2,200	-	-
Western Bypass	-	1,700	300	-	-	-	-
Northern Arterial/QEII	-	-	-	500	-	-	-
Other	-	-	100	-	-	150	150
Christchurch City Council	-	300	300	300	300	300	300
CBD	-	500	500	500	500	500	-
Selwyn District Council	400	300	300	300	300	300	300
Private Developer	-	3,300	-	-	-	-	-
Totals	2,300	6,100	1,500	5,500	3,300	1,250	750

Majority of the forecast expenditure is for specific NZTA or developer projects. The remainder is the ongoing annual expenditure agreed with the local body councils for unspecified projects based on historical averages. We incur the expenditure for these projects initially, a large proportion is then recovered from the parties at a later date. There is a large development planned for FY13 for a private developer. The following table shows our forecast of contributions from other parties.

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Other party underground conversion contributions	1,400	4,700	1,080	3,080	1,980	955	555

The following chart shows our total underground conversions historical and forecast network expenditure in both real and nominal terms (\$000). The real terms have been escalated as per methodology outlined in the CPP proposal to ascertain the nominal terms.

Historical and forecast expenditure



The following tables summarise our total underground conversions historical and forecast network expenditure in both real and nominal terms (\$000).

Historical expenditure

	Nominal \$000		
	FY10	FY11	FY12
Sub-transmission network	-	-	-
Distribution lines and cables	-	-	-
Distribution substations including transformers	-	-	-
Switchgear (All voltages)	-	-	-
Low voltage distribution network	2,588	2,475	3,627
Supporting or secondary systems	-	-	-
Non system fixed assets	-	-	-
Total	2,588	2,475	3,627

Forecast expenditure (real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Sub-transmission network	-	3,300	-	1,200	-	-	-
Distribution lines and cables	1,211	1,475	790	2,265	1,738	658	395
Distribution substations including transformers	-	-	-	-	-	-	-
Switchgear (All voltages)	-	-	-	-	-	-	-
Low voltage distribution network	1,089	1,325	710	2,035	1,562	592	355
Supporting or secondary systems	-	-	-	-	-	-	-
Non system fixed assets	-	-	-	-	-	-	-
Total	2,300	6,100	1,500	5,500	3,300	1,250	750

Forecast expenditure (nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Sub-transmission network	-	3,511	-	1,355	-	-	-
Distribution lines and cables	1,211	1,615	934	2,915	2,362	930	579
Distribution substations including transformers	-	-	-	-	-	-	-
Switchgear (All voltages)	-	-	-	-	-	-	-
Low voltage distribution network	1,089	1,443	834	2,593	2,098	828	517
Supporting or secondary systems	-	-	-	-	-	-	-
Non system fixed assets	-	-	-	-	-	-	-
Total	2,300	6,570	1,768	6,862	4,460	1,758	1,096

URBAN REINFORCEMENT

CPP51

Project Summary

1 April 2013 – 31 March 2019

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1 Project introduction

Project Name	<i>Urban Reinforcement (CPP51)</i>
Service Category	<i>Provide and operate network infrastructure</i>
Capex Category	<i>Reinforcement</i>

As demand grows, the security of supply available on the network (which is provided by additional capacity above that normally required) is eroded and eventually normal supply capacity is exceeded. Investment is needed before the security of supply standard is violated by increased demand on existing circuits, or connecting new load which has no or insufficient network capacity nearby.

Investment on the upper network, or on 11kV projects of subtransmission magnitude, is made from individual Major Capex budgets. All other 11kV investment which is not part of the Connections and Extensions or Undergrounding budgets, is in the Reinforcement (non-major network) category. These consist of single-year projects mostly of less than \$1 million magnitude. For further information see:

- Major Network Capex Project Underground Conversions
- Major Network Capex Project Connections and Extensions
- Major Network Capex Project Rural Reinforcement

The Christchurch City Council policy via the City Plan is for all new reticulation in the urban area to be underground.

1.1 Assets included

Underground assets involve buried cable and ground-mounted distribution substations in kiosks. This means acquiring title or easements for sites for kiosks.

Communications and protection plant may be included where supervisory control and data application (SCADA) functional ring main units are installed.

All low voltage assets are installed from the Network Connections/Extensions budget. Distribution transformers and 11kV Magnefix switch unit (MSU) switchgear purchases¹ also come from this budget, but if they are installed as part of a reinforcement project the installation costs are found in the Reinforcement budget.

¹ These assets are normally connections driven, but some reinforcement work includes network rearrangement (such as replacing pole-mount transformers with ground-mounted distribution substations in kiosks).

Urban reinforcement is required as a result of load growth that is remote from the network constraint; when capacity or security of supply on a feeder is eroded and new assets are required to relieve the constraint. This may involve replacing all or part of a circuit with a higher capacity cable, or a new circuit with cable and switchgear.

This differs from extensions to the network to allow for new connections. The expenditure to connect customers or subdivisions to adjacent network comes from the Connections & Extensions budget (CPP53), but if there is no adjacent network or it cannot support the new load, then the necessary works come under reinforcement.

1.2 Aims and objectives

The objective of the urban reinforcement budget is to increase the capacity of the 11kV urban network to provide for projected increases in load, and to extend network reach as new areas are developed.

1.3 Drivers

The key drivers for urban reinforcement works are:

- as general demand grows on the established network, the security of supply is reduced. The updating of load-flow models for feeder or substation outages identifies the areas of constraint within the network, usually due to the thermal rating of cables.
- new connections involving large point loads, which cannot be supplied on the existing network.
- to provide distribution assets for new connections such that they:
 - meet acceptable target levels of safety to people and property
 - provide acceptable levels of network reliability.
- development of vacant land often requires the 11kV network to be extended.
- balancing the need for adequate future capacity with the need for cost effectiveness.

Urban reinforcement is carried out in response to customer or developer applications, or modelling general load growth on the existing network to identify constraints. Budgets are set on the basis of historical trends and growth forecasts.

1.4 Obligations

Like all companies we are subject to the general provisions a wide range of legislation of particular note are the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations the Electricity Industry Act and the Building Act.

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

- Electricity Act
- Local Government Act
- Electricity Reform Act
- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act
- Electricity Industry Act
- Energy Companies Act.

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a *"lifeline"* utility, Orion must comply with the Civil Defence Emergency Management (CDEM) Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand's communities. The Act requires us to

- be able to function to the fullest possible extent during and after an emergency
- have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- help define the Crown's CDEM goals and objectives in a National CDEM Strategy
- participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- be capable of managing our own response to emergencies

- develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary NW70.00.14
- Asset Risk Management NW70.60.02

2 Relevant policies and planning standards

The nature of urban reinforcement work is very similar to that of connections-extensions and underground conversions and uses the same policies and planning standards.

These projects include a large variety of work and the detailed design and construction will be in line with our design standards, technical specifications and policies as summarised in NW 70.50.03 – *Document Control*. In particular urban reinforcement works will be implemented in compliance with the following sections:

- 9.2 Infrastructure
 - 9.2.1 Management
 - 9.2.3 Design Standards
 - 9.2.4 Technical Specifications
- 9.5 Contracts
 - 9.5.1 Management
- 9.7 Procurement & Stock Management
 - 9.7.2 Equipment Specifications

Regarding non-network alternatives, Orion does not provide off-grid solutions (which may be investigated independently by customers). However non-network solutions may form part of the discussion around the cost/security of supply trade-off, for example in the use of customer-owned generation.

2.1 Prioritisation of works

11kV reinforcement uses similar contracting resources as connection and undergrounding work and is managed as part of the contracting workflow. Work on the winter-peaking urban network is typically done in the summer, which balances naturally with rural works undertaken in winter.

More detail about how we prioritise projects is described in section 5.3.4 of our 2012 Asset Management Plan and expanded further in NW 70.60.14 – *Project Prioritisation and Deliverability Process*.

Orion has a successful history in managing a succession of multi-million dollar civil and electrical works which demonstrates a proven institutional ability to predict and manage contractor workstreams.

2.2 Tenure of distribution substation sites and cable routes

Where possible we install our underground network in the berm of a public road; this does not require specific permission.

We secure our kiosk substation sites by 'Title' or easement. Where new cables or lines are required to be installed on private property an easement is negotiated with the land owner.

3 Project description

3.1 Work to be undertaken

The work mostly involves the installation of 11kV cable, ground-mounted transformers and switchgear housed in kiosks.

The installation of capacitors and regulators for voltage support is included in this budget.

3.2 Network constraints and service targets

The reinforcement budgets cover dozens of small projects varying in cost from ~\$10,000 to ~\$1 million. Each project addresses a current or imminent constraint in security or capacity of supply, or power quality.

3.3 Dependencies

Reinforcement is co-ordinated with other civil works such as roading, water and telecommunications, especially in new subdivisions. It may be co-ordinated with other Orion infrastructure works especially if connection-extension or undergrounding is also involved.

Relevant other capex projects:

- Underground Conversions Capex Project (CPP50)
- Rural Reinforcement Capex Project (CPP52)
- Connections and Extensions Capex Project (CPP53).

4 Earthquake consequences

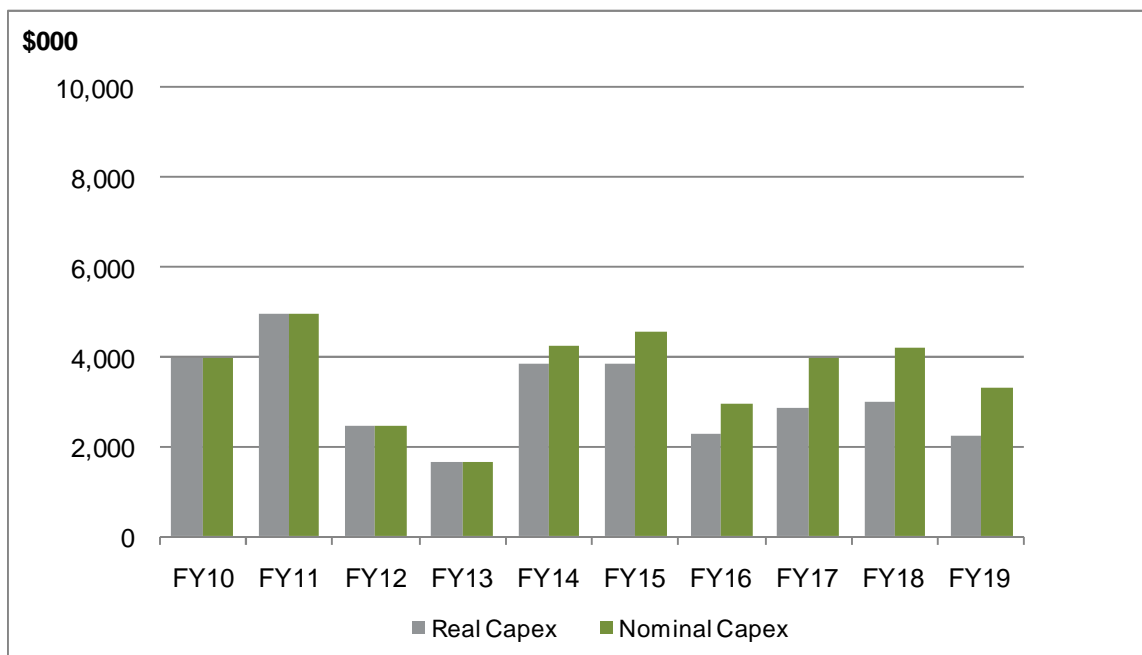
The earthquakes have influenced engineering aspects of cable laying. Geotechnical considerations are taken into account in selecting cable routes, in particular for higher capacity conductors. Urban reinforcement work planned is relatively unchanged following the earthquakes as forecast budgets are determined by network growth and the security of supply required to handle forecast demand.

5 Expenditure plan

5.1 Expenditure summary

The following chart shows our total urban reinforcement historical and forecast network expenditure in both real and nominal terms (\$000). The real terms have been escalated as per methodology outlined in the CPP proposal to ascertain the nominal terms.

FY11 has increased reinforcement expenditure as the earthquakes occupied contractor resources and meant a premium had to be paid for any contractors required for this work during this time. For FY12 and FY13, new developments in urban areas because of residential and commercial relocation, has resulted in decreased reinforcement expenditure. The current pipeline of work is reflected in the FY14 and FY15 forecast expenditures, although this may change as Orion is made aware of new developments. For FY16-19, it is difficult to predict the exact expenditure so an average of FY12-13 (the best estimate of post-earthquake development levels) has been used.



The following tables summarise our total urban reinforcement and forecast network expenditure in both real and nominal terms (\$000).

Historical expenditure information is not available disaggregated by asset category, only a total figure is available.

Historical Expenditure (Nominal)

	Nominal \$000		
	FY10	FY11	FY12
Total	3,996	4,949	2,466

Forecast Expenditure (Real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Sub-transmission network	-	74	-	13	50	13	-
Distribution lines and cables	1,343	3,217	3,367	1,999	2,509	2,520	2,018
Distribution substations including transformers	315	387	394	214	326	184	232
Switchgear (All voltages)	-	-	60	43	-	268	-
Low voltage distribution network	15	-	10	-	-	5	-
Supporting or secondary systems	-	187	-	-	-	-	-
Non system fixed assets	-	-	-	-	-	-	-
Total	1,673	3,865	3,831	2,269	2,885	2,990	2,250

Forecast Expenditure (Nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Sub-transmission network	-	78	-	15	65	16	-
Distribution lines and cables	1,343	3,562	4,037	2,628	3,493	3,625	2,992
Distribution substations including transformers	315	414	448	261	415	245	324
Switchgear (All voltages)	-	-	66	50	-	333	-
Low voltage distribution network	15	-	11	-	-	7	-
Supporting or secondary systems	-	196	-	-	-	-	-
Non system fixed assets	-	-	-	-	-	-	-
Total	1,673	4,249	4,563	2,954	3,973	4,225	3,316

5.2 Basis for Expenditure forecast

These projects involve infrastructure which Orion installs regularly and for which there is recent history. Upward movements in the cost of civil works and skilled labour which have followed the earthquakes have been factored in to estimates.

The main budgeted asset is distribution conductors for 11 kV underground cables. This is necessary because council plans stipulate that all new reticulation be underground. The budget for this was prepared on the basis of forecast growth. Urban reinforcement forecast expenditure is sometimes related/linked to underground conversions and connections and extensions expenditure. During projects driven by developers, local authorities and NZTA we often take the opportunity to reinforce the 11kV network at the same time. This reduces costs through the use of shared trenches or by simply increasing cable or line sizes to relieve existing or emerging constraints. The total reinforcement budget (combined urban and rural (CPP52) is capped at \$4.5m. Prior to 2006, the inflationary pressures of increased constructions costs, safety and traffic management compliance had lead to year on year increases to our total reinforcement budget. Despite further inflationary pressures we have been able to maintain downward pressure on our total reinforcement budget of \$4.5m per annum since 2007 through the switch to radial (but interconnected) 11kV network design.

The apparent up-swing in urban reinforcement is offset by a decrease in the rural budget. \$800k of the \$4.5m total is allocated for unscheduled work which comes up during the financial year.

As reinforcement is more tactical than major capex we typically don't have firm plans for projects more than 2-3 years out. So for FY17 onwards most of the budget is considered unidentified and projects will be specified closer to the time.

We expect that the total reinforcement budget of \$4.5m + escalation will be correct throughout the CPP period. However, the split between urban and rural reinforcement cannot be reliably estimated more than 2-3 years out. We have made our best estimate on what this split will be for FY16 onwards based on historical averages. This has resulted in a reduction in the urban reinforcement for this period. As we get closer to FY16 and the projects we will undertake become more certain there may be an increase in the urban reinforcement budget, however this would be offset by a corresponding decrease in the rural reinforcement budget.

There are no contingencies included in this programme.

No cost benefit analysis has been provided as part of this project as the project consists of multiple smaller projects.

The planned reinforcement projects undertaken in this project are very tactical in nature and when compared to project specific non network alternatives they are very cost effective. Our network wide DSM strategy has significantly reduced peak demand on our 11kV network feeders and as a consequence has deferred or avoided the need to reinforce many parts of our 11kV network.

CONNECTIONS AND EXTENSIONS

CPP53

Project Summary

1 April 2013 – 31 March 2019

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1 Project introduction

Project Name	<i>Connections and extensions (CPP53)</i>
Service Category	<i>Provide connection services</i>
Capex Category	<i>Customer Connection/Network Extension</i>

1.1 Description

As potential customers apply to be supplied by the Orion network, work is required to connect them. Where the connection is not directly adjacent to existing assets or there are multiple connections (e.g. residential subdivisions) then new infrastructure is needed to extend the network.

If the capacity of the existing subtransmission and backbone 11kV network is sufficient to provide for the new load with the appropriate security of supply, then the new assets come entirely from the Connection-Extensions budget. If not, then separate investment in the existing network is made from the Urban and/or Rural Reinforcement budgets. The cost of any reinforcement required to upgrade the Low Voltage 400V (LV) network to connect new customers is included in the 'Connections and Extensions' budget.

The Christchurch City Council policy via the City Plan stipulates that all new reticulation in the urban area is to be underground. The same applies in the Selwyn District for rural townships and residential subdivisions of urban-type densities. With the exception of a small number of major customers all these connections are made to the low voltage network.

Other rural connections are made to the overhead 11kV network, with distribution transformers close to the load. There is no interconnected LV network in these areas. The short LV conductors are typically on customers' property and may be line or cable.

Our network connections and extensions process is largely a customer managed 'design build' approach. Orion provides a list of approved design build contractors for the customer to choose. The contractors work for the customer to meet their needs in a manner that is compliant with Orion's technical and commercial requirements. During the design and pricing stage, the customer may choose to work with more than one contractor to create a competitive environment.

Customers seeking a new or upgraded connection are required to make a capital contribution. This capital contribution will be either a direct payment to Orion for a connection or in the case of new extensions (subdivisions) the contribution is made by the gifting of assets.

1.2 Assets included

Around 13% of the forecast expenditure is for low voltage assets. The remainder is very similar to that of reinforcement work: 11kV overhead or underground conductors and distribution substations with transformers and switchgear. Title or easements for kiosk sites must be obtained and are negotiated with developers at an early stage of planning.

1.3 Aims and objectives

The objective of the connections-extensions budget is to provide distribution assets for new connections. We aim to ensure the safety of the public, our personnel and contractors around our assets.

1.4 Drivers

The key drivers for this project are:

- customer or developer applications. Budgets are set on the basis of historical trends and growth forecasting.
- to provide distribution assets for new connections such that they:
 - meet acceptable target levels of safety to people and property
 - provide acceptable levels of network reliability.

2 Key assumptions

The project relies on the following key assumptions:

2.1 Input cost mix

Input costs are weighted as follows:

	Labour	Cables	Transformers	Switchgear	Other
11kV overhead lines (wood pole)	60%	40%	-	-	-
11kV underground cables (XLPE)	60%	40%	-	-	-
Distribution transformers (pole, 1ph/2ph/3ph)	50%	-	50%	-	-
Distribution transformers (pad)	-	-	100%	-	-
Distribution substations mount (pad)	60%	-	-	-	40%
Distribution substation mount (building & in customer building)	60%	-	-	-	40%
Indoor circuit breakers and switchgear (66/33/11kV)	-	-	-	100%	-
LV underground cables (XLPE)	60%	40%	-	-	-
Link pillars and LV customer service connections	60%	-	-	-	40%

2.2 Labour escalators

For the labour component of the project cost we have determined that it is not appropriate to use the standard New Zealand wide LCI in relation to this project.

We note that Statistics NZ has recently started to monitor construction costs in Canterbury due to the local pressures on construction resources as a result of the Christchurch rebuild, however their data time series is currently limited and unsuitable.

As local labour cost pressure is evident in our most recent contract tenders we have determined a proposed cost escalation index which we refer to as the Canterbury construction labour index based on estimates of labour.

We have sought external advice cost from two quantity surveyor firms on what we may expect in the market over the remainder of the CPP period in this respect. There is considerable uncertainty, however this CPP process requires us to make appropriate estimates. The resulting labour escalators that we propose are:

Index	FY14	FY15	FY16	FY17	FY18	FY19
Canterbury construction labour	7.5%	7.5%	7.5%	5%	5%	5%

For further information on our derivation see section 9.26.4 to 9.26.6 of the CPP proposal.

2.3 Material escalators

For the various material component of the project costs we have considered the most relevant input components for this project e.g copper, aluminium, steel etc. We have used world bank commodity price forecasts in conjunction with the NZIER NZD/USD exchange rate forecast to convert the world bank prices into NZD. The prices are weighted based on an estimate of the quantities of the relevant materials used. The resulting material escalators for this project are:

Index materials	FY14	FY15	FY16	FY17	FY18	FY19
Underground cables	14.75%	9.18%	12.06%	7.03%	1.42%	0.95%
Overhead lines	14.75%	9.18%	12.06%	7.03%	1.42%	0.95%
Transformers	3.36%	-4.90%	-1.38%	-2.78%	-5.52%	3.19%
Switchgear	4.13%	-4.89%	-2.65%	-2.83%	-5.71%	2.57%
Other PPI	3.04%	3.32%	3.65%	3.20%	3.20%	3.20%

For further information on our derivation see section 9.26.4 of the CPP proposal.

2.4 When capex should be undertaken

Connection works are not driven by network constraints or reinforcement requirements, although network planning and load forecasting will be taken into account in selecting 11kV conductor size to avoid unnecessary future constraints.

2.5 Non-network solutions

Regarding non-network alternatives, we do not provide off-grid solutions (which may be investigated independently by customers). However non-network solutions may form part of the discussion around the cost/security of supply trade-off, for example in the use of customer-owned generation.

2.6 Cost benefit analysis

We have not undertaken any cost benefit analysis in relation to this project. However the transformers and switchgear are purchased on Commercial terms which are renegotiated periodically with our supplier.

2.7 Demand forecast

The demand forecast has an influence on the expected location and level of required new connections. Our forecast expenditure is based on estimates of local population growth, subdivision applications and commercial developments flowing from the Council Urban Development Strategies. The increase in expenditure for FY14 through to FY17 is due to the expected relocation of approximately 9,000 households to new subdivisions and businesses relocating to new sites. This is made up of an expected 5,000 of the approximately 6,500 Orion red zone households relocating from the eastern suburbs to other parts of the Orion network – the rest are expected to relocate in other network areas. In addition the UDS quick scenario provides for approximately 1,000 more dwellings per year in the Orion area over the four years 2014 to 2017, or 4,000 more in total. There will also be a number of businesses relocating. We expect the forecast expenditure to remain higher than historically for the CPP period as these households and premises relocate. Note the relevant forecasts are not just the CCC forecasts. Orion covers CCC and SDC.

2.8 Basis for expenditure forecast

Equipment purchases

While connections and extensions work is customer driven we purchase a variety of different size and type of transformers and the forecast for all distribution transformer purchases (replacement, reinforcement and connections) is based on an average cost of:

Distribution transformers	Cost \$000
Small	7
Large	25

Forecast number of distribution transformers to be purchased for (replacement, reinforcement and connections) is:

Numbers of distribution transformers for replacement, reinforcement and connections	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Small	110	115	125	125	125	125	125
Large	80	120	120	120	120	100	100

Transformers for replacement, reinforcement and connections are purchased as a group. These purchases are made when required over the year the purchase costs are apportioned to reinforcement, connection and replacement capital budgets. The connections and extensions forecast has been based on 50% of the purchase cost for new distribution transformers is assigned to this project.

2.9 Switchgear standard

Orion has for many years installed Magnefix switching units (MSU) on the 11kV network. Developments in safety standards have resulted in a review of this technology in FY12 and a decision to adopt an improved solution which will satisfy compliance requirements around arc flash containment and safe working clearances for the foreseeable future.

The MSU will be replaced in new installations by a fully enclosed ring main unit (RMU) with full arc containment and vacuum interrupters. This will result in improved operator and public safety margins. In addition, operational savings will result from the fact that (unlike the MSU) individual cables may be worked on without isolating the complete unit and all connected circuits.

The commercial arrangements for supply are yet to be finalised, but the RMU technology will involve an increase in capital cost per unit. The transition will begin in FY14 and the switchgear budgets take into account the estimated cost increase.

2.10 Obligations

Like all companies we are subject to the general provisions of a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

- Electricity Act
- Energy Companies Act
- Local Government Act
- Electricity Reform Act
- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act.

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a "lifeline" utility, Orion must comply with the Civil Defence Emergency Management (CDEM) Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand's communities. The Act requires us to:

- be able to function to the fullest possible extent during and after an emergency
- have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- help define the Crown's CDEM goals and objectives in a National CDEM Strategy
- participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- be capable of managing our own response to emergencies
- develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary NW70.00.14
- Asset Risk Management NW70.60.02

3 Relevant policies and planning standards

The nature of connections-extensions work is very similar to that of reinforcement and undergrounding. Assets will be installed according to Orion's design standards, technical specifications and policies as summarised in NW 70.50.03 – Document Control. This project will be implemented in compliance with the following sections:

- 9.2 Infrastructure
 - 9.2.1 Management
 - 9.2.3 Design Standards
 - 9.2.4 Technical Specifications
- 9.5 Contracts
 - 9.5.1 Management
- 9.7 Procurement & Stock Management
 - 9.7.2 Equipment Specifications

See in particular the Orion document NW70.00.45 – Network Connections and Extensions. Other policies that are followed for compliance are the CDEM and the Health and Safety policy OR00.00.01.

If a need for reinforcement to supply the new load is identified, the extra cost comes from the reinforcement budgets which are found in the following capex projects:

- Urban Reinforcement Major Capex Project (CPP51)
- Rural Reinforcement Major Capex Project (CPP52)

This project is in line with the intentions and objectives set out in Orion's Statement of Intent for the three years ending 31 March 2012, 2013 and 2014.

3.1 Prioritisation of works

11kV connection works use the same contracting resource as reinforcement and undergrounding work and are managed as part of the contracting workflow. LV works have a wider pool of contracting businesses available.

Connection work is by nature customer related and as such has a high priority. More detail about how we prioritise projects is described in section 5.3.4 of our Asset Management Plan and expanded in more detail in NW 70.60.14 – Project Prioritisation and Deliverability Process.

3.2 Tenure of distribution substation sites and cable routes

Where possible we install our underground reticulation in the berm of a public road. This does not require specific permission. We secure our kiosk substation sites by 'Title' or easement. Cables laid on private property are secured by easement.

4 Programme Deliverability

The new connections programme can be carried out within normal contracting arrangements

5 Project description and forecast expenditure

5.1 Work to be undertaken

The work mostly involves the installation of 11kV and low voltage overhead conductors and pole substations (rural areas), and 11kV and low voltage cable, ground-mounted transformers and switchgear housed in kiosks (urban areas). Street lighting assets are included in new subdivisions.

5.2 Dependencies

This work is initiated by customers. It is co-ordinated with other civil works such as roading, water and telecommunications, especially in new subdivisions. It may be co-ordinated with other Orion infrastructure works especially if reinforcement or undergrounding is also involved.

6 Earthquake consequences

The effect of the earthquakes on the budgets is centre around economic activity and growth, and relocation of existing residential and commercial customers. The relocation of businesses to the Addington/Airport area and the increasing residential development in the north-east, Rolleston and west of Christchurch is expected to increase connection and extension volumes.

The earthquakes have influenced engineering aspects of cable laying. Geotechnical considerations are taken into account in selecting cable routes, in particular for higher capacity conductors.

7 Expenditure plan

These expenditure forecasts do not include any contingencies.

7.1 Connection categories

For the budget categories 6.1.1 - 6.1.9 the forecast expenditure includes all works and materials required to connect new customers or upgrade existing connections. This work typically involves trenching and civil works, laying of cable, installing poles and overhead lines, kiosks with their sites and concrete pads, low voltage distribution hardware, plus livening agent work. Capital contributions made by customers will offset these budgets. A forecast of capital contributions has been included in section 7.2.

For subdivisions, the budgets are 'net' of developer contributions. That is, the developer of the subdivision will meet the cost (directly to the contractor) of any works that is over and above Orion's contribution to the subdivision as described in our 'Connections and Extensions policy'.

11kV switchgear and distribution transformers are provided to contractors by Orion there are no customer capital contributions applied to this budget category.

Where existing 11kV assets are of insufficient capacity or are not nearby, reinforcement budget projects will be created to extend the 11kV network.

7.1.1 Urban 400V- Connection Up to 100A

This covers the majority of connection applications in numerical terms, for single households, infill townhouse developments, shops and small to medium commercial premises. These connections are mostly single-phase and connect to existing 400V assets.

7.1.2 Urban 400V- Street Lights / Other

New streetlighting or traffic controller circuits due to council or NZTA upgrading projects or new subdivisions.

7.1.3 Urban Large Connection - 400V

Medium to large commercial or industrial installations, typically requiring dedicated low voltage circuits from an existing distribution substation.

7.1.4 Urban Large Connection- Kiosk

Medium to large commercial or industrial installations, requiring a new outdoor pad-mount distribution substation on an existing 11kV circuit. A kiosk site is required, and the 11kV cable may need to be extended to the kiosk.

See the Orion specifications NW70.53.01 – Distribution Substation design.

7.1.5 Urban Large Connection - Building Substation

Medium to large commercial or industrial installations, requiring a new indoor distribution substation on a customer's premises. An existing 11kV cable will typically need to be extended to the building. The increase in the building substation expenditure reflects the expected increase which will result from businesses moving back into the CBD in the next five years.

See the Orion specifications NW70.53.01 – Distribution Substation design and NW70.53.02 - Substations on Consumers' Premises.

7.1.6 Connection Agent Costs

Orion uses accredited Livening Agents on a contract basis to verify that our connection procedures and requirements have been satisfied before installations are connected to our network.

7.1.7 Rural 400V - Up to 100A Connection only

For connections to existing low voltage assets, typically in rural townships. They include single households or farms without significant load (such as dairy sheds or irrigation pumps), shops and small to medium commercial premises, plus infill townhouse developments etc.

7.1.8 Rural 400V - Up to 100A Connection New Line / Substation

As in 6.1.7, but in areas where there is no LV network. If adjacent to existing 11kV lines a pole-mount transformer and dedicated LV circuits (underground, overhead or both) are supplied. Minor 11kV extensions to the customer's property are included as necessary. Major extensions are considered reinforcement projects.

7.1.9 Rural Large Connection

All other rural connections. The infrastructure depends on the circumstances, but may include large ground- or pole-mount transformers, 11kV switchgear, LV circuits, irrigation interruption relays, and time-of-use metering. 11kV extensions (line and/or cable) may be required.

7.1.10 Subdivisions

Concentrations of multiple new residential or commercial sections fall into the subdivision category. In these cases the developer arranges roading and reticulation of utilities in advance of selling the properties so that individual connection applications are not received from tenants or landowners on occupation. Subdivisions take 30-50% of the connections and extensions budget. The forecast expenditure for subdivision connections/extensions is increased for most of the CPP period due to creation of new subdivisions for displaced Christchurch residents to move into. The longer term trend will see the number of subdivisions slow down by FY19.

7.2 Expenditure summary

The following table summarises forecast annual expenditure.

Forecast expenditure (real)

Category	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Urban 400V- Connection Up to 100A	950	950	950	950	750	750	750
Urban 400V- Street Lights / Other	15	20	20	20	20	20	20
Urban Large Connection - 400V	380	500	500	500	500	400	360
Urban Large Connection- Kiosk	650	750	750	750	750	600	500
Urban Large Connection - Building Substation	150	1200	1200	1200	1200	1200	750
Connection Agent Costs	40	50	50	50	50	50	50
Rural 400V - Up to 100A Connection only	25	25	25	25	25	25	25
Rural 400V - Up to 100A Connection New Line / Substation	40	40	40	40	40	40	40
Rural Large Connection	100	150	150	150	150	150	150
Subdivisions	5250	5250	5250	5250	4350	3750	3750
Switchgear purchase	700	1020	2160	2500	2500	2250	2250
Distribution transformer purchase	1350	1960	2000	2000	2000	1750	1750
Total	9,650	11,915	13,095	13,435	12,335	10,985	10,395

The expected trend in connections work is to exceed the recent average for the next few years. Connections work will be influenced by post-earthquake rebuilding and relocation is forecast to increase until FY16 and then gradually return to pre earthquake levels.

The recent change to our equipment standard, for switchgear will drive an increase to the Switchgear budget.

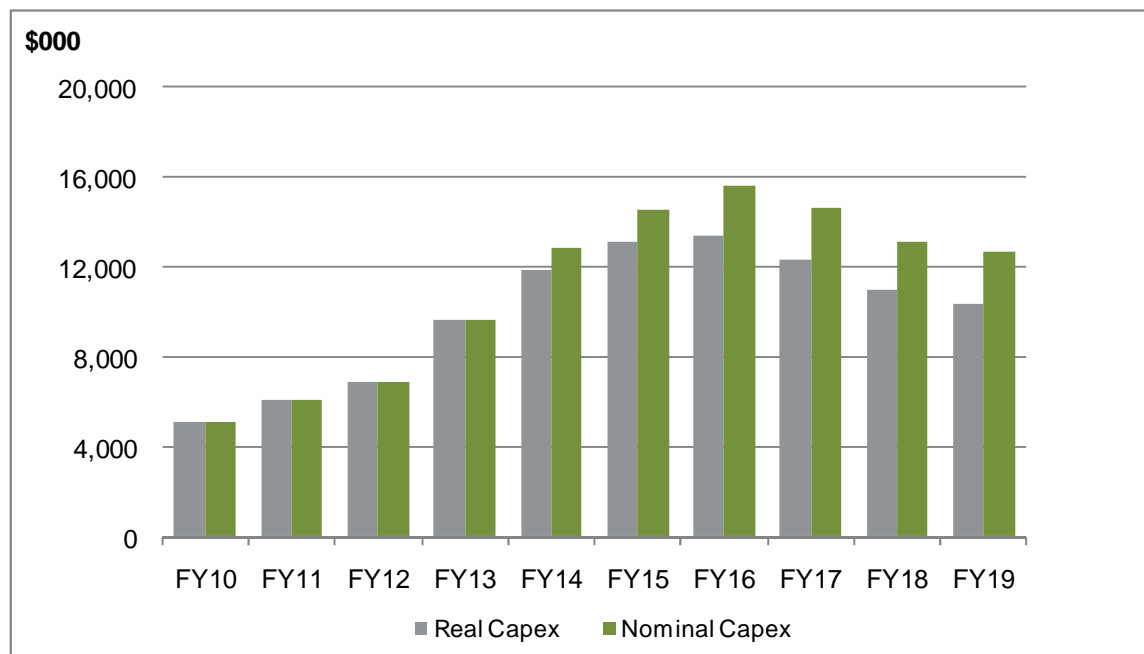
Ground- and pole-mount 11/0.4kV distribution transformers of various capacities are ordered as required from this dedicated budget category. Commercial terms of supply are renegotiated periodically with our supplier. The increase in forecast expenditure reflects the increase in subdivision developments expected in the next four years, the longer term trend sees this decreasing by FY19 as the initial growth balances out.

The following chart shows the forecast customer capital contributions for connections to our network. It excludes 'asset' contributions made by developers for subdivisions.

Category	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Forecast customer capital contributions	800	1,831	1,831	1,831	1,595	1,406	1,349

The following chart shows our total connections and extensions historical and forecast network expenditure in both real and nominal terms (\$000). The real terms have been escalated as per methodology outlined in the CPP proposal to ascertain the nominal terms.

Historical and forecast expenditure



The following tables summarise our total connections and extensions historical and forecast network expenditure in both real and nominal terms (\$000).

Historical expenditure

	Nominal \$000		
	FY10	FY11	FY12
Sub-transmission network	-	-	-
Distribution lines and cables	88	70	198
Distribution substations including transformers	1,835	1,805	2,266
Switchgear (All voltages)	876	1,088	1,579
Low voltage distribution network	2,313	3,095	2,854
Supporting or secondary systems	-	-	-
Non system fixed assets	-	-	-
Total	5,113	6,058	6,898

Forecast expenditure (real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Sub-transmission network	-	-	-	-	-	-	-
Distribution lines and cables	1,836	2,159	2,159	2,159	1,893	1,687	1,545
Distribution substations including transformers	3,316	4,271	4,311	4,311	4,026	3,557	3,404
Switchgear (All voltages)	700	1,020	2,160	2,500	2,500	2,250	2,250
Low voltage distribution network	3,798	4,466	4,466	4,466	3,916	3,491	3,196
Supporting or secondary systems	-	-	-	-	-	-	-
Non system fixed assets	-	-	-	-	-	-	-
Total	9,650	11,915	13,095	13,435	12,335	10,985	10,395

Forecast expenditure (nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Sub-transmission network	-	-	-	-	-	-	-
Distribution lines and cables	1,836	2,383	2,578	2,820	2,618	2,415	2,283
Distribution substations including transformers	3,316	4,465	4,485	4,572	4,258	3,721	3,674
Switchgear (All voltages)	700	1,062	2,144	2,415	2,347	1,992	2,043
Low voltage distribution network	3,798	4,919	5,317	5,809	5,389	4,972	4,704
Supporting or secondary systems	-	-	-	-	-	-	-
Non system fixed assets	-	-	-	-	-	-	-
Total	9,650	12,829	14,523	15,616	14,612	13,100	12,703

SPUR ASSET ACQUISITIONS

CPP54

Project Summary

1 April 2012 – 31 March 2019

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1 Project introduction

Project Name	<i>Spur Assets Acquisitions (CPP54)</i>
Service Category	<i>Provide and Operate Network Infrastructure</i>
Capex Category	<i>Asset Acquisitions</i>

Orion purchased the Papanui GXP and associated spur asset lines in August 2012. This project is a continuation of that initiative and includes the purchase of eight Transpower spur asset GXPs and associated spur asset lines.

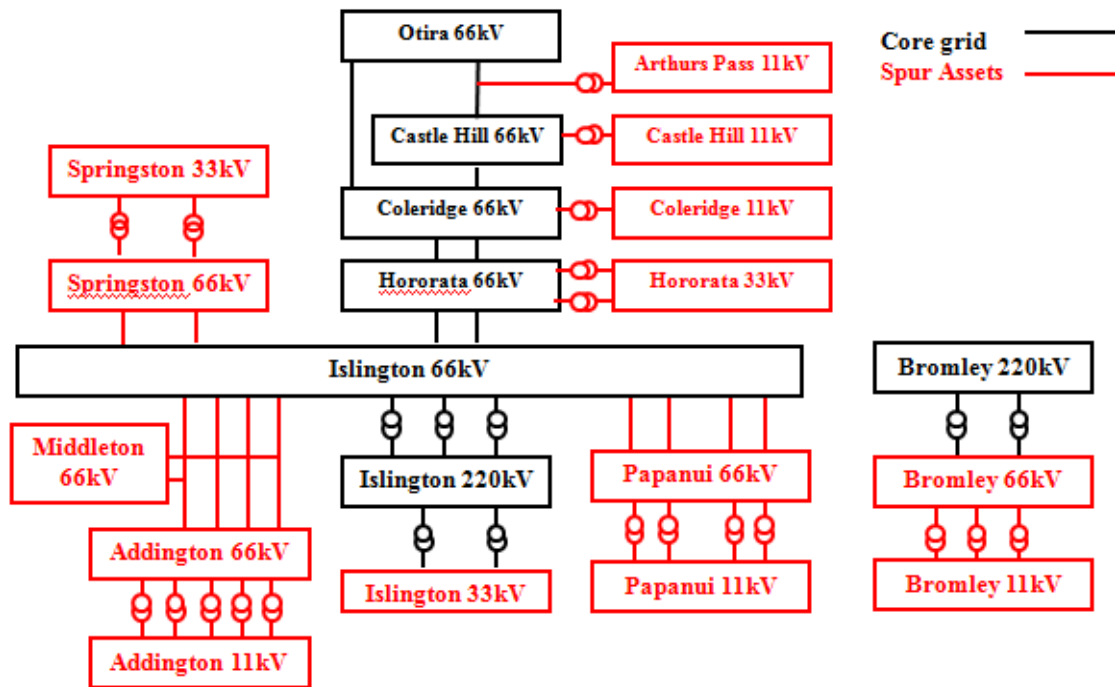
1.1 Assets included

The proposed spur assets to be purchased include the:

- Islington to Springston 66kV lines and Springston 66kV and 33kV GXPs
- Islington to Addington 66kV lines and Addington 66kV and 11kV GXPs
- Middleton 66kV GXP
- Arthurs Pass 11kV GXP including the 66/11kV transformer – the new change of ownership boundary will be at 66kV
- Castle Hill 11kV GXP including the 66/11kV transformer – the new change of ownership boundary will be at 66kV
- Hororata 33kV GXP – Hororata 66kV to remain in Transpower ownership
- Bromley 66kV and 11kV GXP – Bromley 220kV to remain in Transpower ownership
- Islington 33kV GXP – Islington 220/33kV transformers to remain in Transpower ownership

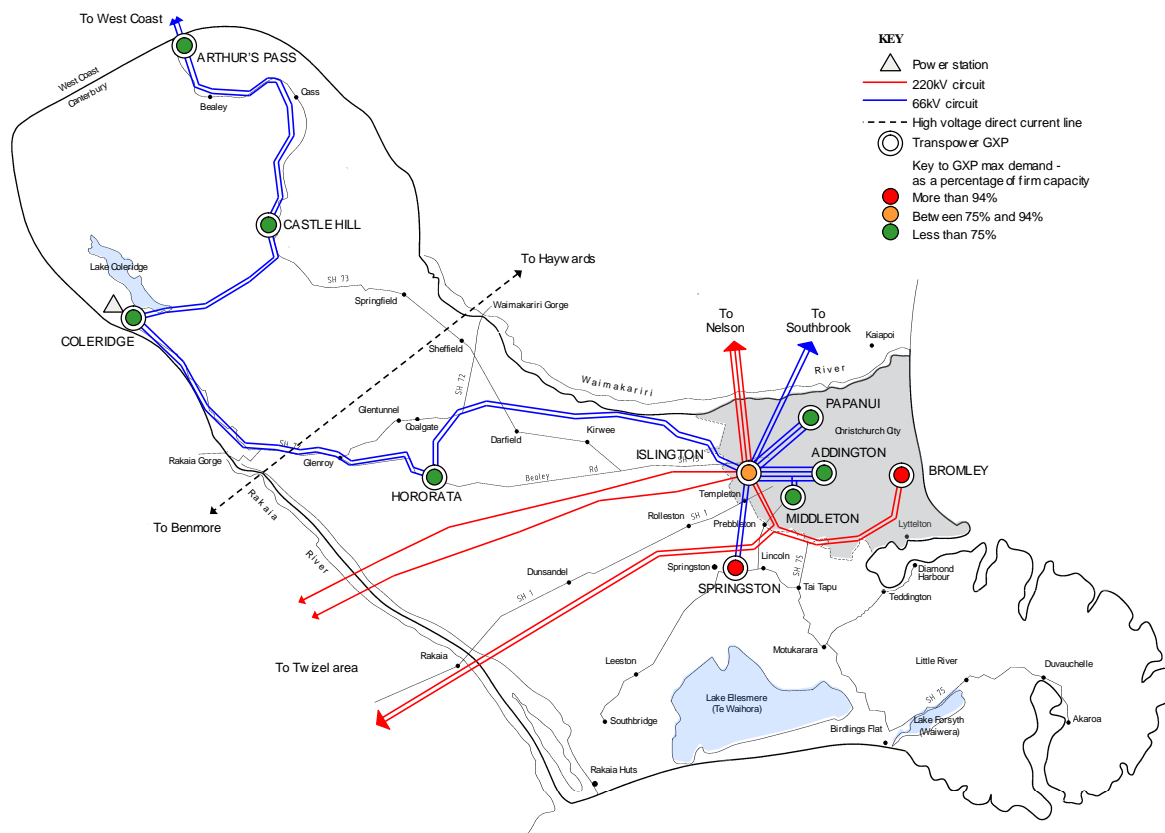
Spur assets are a subset of the connection assets and are typically 110kV or less. They supply only one customer (distributor, generator or direct connect customer) and do not form part of the Transpower interconnected network. The following block diagram shows (coloured red) the Transpower spur assets in the Orion area. The core grid assets are shown in black.

Please see Appendix A for single line diagrams showing the proposed change of ownership boundary.



Transpower core grid versus spur assets in the Orion network area

The Transpower grid in our area is shown in the diagram below.



Geographical map of Transpower assets in Orion network area

1.2 Aims and objectives

The possibility of Transpower selling New Zealand wide spur assets has been discussed in industry several times over the last 25 years. The main thrust of these discussions and investigations can be attributed to the recognition that these assets serve the purpose of local distribution rather than national transmission. A change of ownership would therefore enable synergy and efficiency benefits to be achieved through integration into local distribution network asset planning, management, maintenance and operations.

The current Transpower senior management group views spur assets as a distraction to their major core grid expansion projects and they also recognise that customer benefits will flow from a change of ownership.

The main aim of this project is secure a change of ownership of spur assets so that future network efficiency and synergy gains will ultimately flow through as benefits for our customers. For example, Orion ownership and replacement of the Papanui 11kV switchgear lead to 20% saving (approximately \$1m) to Orion. This saving was then able to be passed on to customers by reducing the annual operating expenditure of the Papanui switchgear by approximately 14% (\$140,000). The recent purchase of the 66kV at Papanui will enable us to defer¹ the replacement of the 66/11kV transformers and have greater flexibility in the architecture of our subtransmission network which is expected to lead to an NPV saving of more than \$5m. Similar benefits are expected across all spur assets purchase projects.

The capital funding, maintenance and operations costs associated with Transpower ownership of the spur assets is charged to Orion as 'Connection Charges'. Orion passes these charges through to consumers. When the spur asset change of ownership occurs, Transpower will discontinue the associated 'Connection Charges'.

The purchase cost of the spur assets will increase the Orion 'Regulatory Asset Base' (RAB) and our operations and maintenance costs will increase to reflect the lifecycle costs of owning the assets. Over the lifetime of the assets, the synergy and efficiency benefits associated with Orion ownership of these assets will mean that the increase in Orion revenue (to make a return on RAB and cover operations and maintenance) will be lower than the equivalent Transpower ownership charges. This will be a real benefit to consumers.

¹ The transformers are in reasonable condition and do not require immediate replacement but Transpower was proposing to change them as part of their single phase transformer retirement program which needed to make progress to achieve their long term objective/strategy. Orion has greater flexibility to manage the replacement date around other work programs.

1.2 Cost benefit analysis

When making the decision to purchase the Papanui spur assets we considered the business case for Orion and also the outcome for our consumers. The regulatory arrangements for this transaction create uncertainty for our shareholders and the business case to proceed was marginal. However, we recognised the long term benefits to our customers and NZ electricity consumers in general. As outlined below, there is clearly a dynamic efficiency benefit for NZ but the regulatory arrangements create allocative issues for our shareholders. A copy of our Papanui spur asset board paper is included in Appendix B.

When considering the option to purchase the Papanui spur assets we gave consideration to Transpower's proposed asset replacement plans and the reinforcement options for managing the constrained transformers and the 11kV network in the area. It was necessary for this review to consider the wider 66kV subtransmission requirements and the options going forward.

There are two main aspects to the cost savings to Orion and our customers:

- Growth capital savings through simplified design and efficient contracting arrangements
- Asset lifecycle savings through deferred asset replacement

Our review included significant correspondence between Transpower and Orion to better understand the asset replacement drivers and the upgrade options. We also requested a 'high level response' from Transpower in 2010 to extend their Papanui subtransmission network to meet our growth expectations in the area (see Appendix C). While the response from Transpower does not directly compare with the proposed 'post earthquake' works, there were clearly higher costs associated with a Transpower solution that did not need to be revisited post earthquake. NPV savings from greater design flexibility and more efficient contracting arrangements are clearly in the millions.

The main asset replacement saving was related to the four 66/11kV transformers at Papanui. Transpower has a proactive single phase transformer replacement program which required early replacement of the Papanui transformers to smoothly manage the replacement of their national fleet of transformers. Given the reasonable condition of the transformers and recognising the ability to use our network as backup, Orion considers that the replacement of these transformers can be deferred to a time when other network reinforcement will enable replacement with two 40MVA transformers only. The other two transformers with a replacement cost in excess of \$1M each will be retired.

We have seen numerous examples of higher Transpower costs than ours for the same works and for other spur asset projects we have 'moved on' from requesting Transpower cost estimates for works that we can undertake ourselves.

1.3 Drivers

The key drivers for this project are:

- returning our network to a state that meets our Security of Supply Standard (SoSS) in the most cost-effective way possible (as set out in our subtransmission architecture review).
- completing the spur asset transfers in a timeframe that prevents Transpower investment in replacing assets that can occur more cost-effectively by Orion rationalising the assets e.g. from contracting and design efficiency, and no need to comply with the Electricity Participation Code – Grid Reliability Standards.
- in the case of the Springston GXP, the spur asset purchase will facilitate parallel operation of assets with an existing Orion 66kV line and therefore deliver an N-1 security of supply to the wider Rolleston area – see Urban Major Project – Rolleston (CPP7).

1.4 Obligations

Like all companies we are subject to the general provisions of a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

- Electricity Act
- Energy Companies Act
- Electricity Industries Act
- Local Government Act
- Electricity Reform Act
- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act.

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a “lifeline” utility, Orion must comply with the Civil Defence Emergency Management (CDEM) Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand’s communities. The Act requires us to:

- be able to function to the fullest possible extent during and after an emergency
- have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- help define the Crown’s CDEM goals and objectives in a National CDEM Strategy
- participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- be capable of managing our own response to emergencies
- develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary NW70.00.14
- Asset Risk Management NW70.60.02

2 Relevant policies and planning standards

This project involves the purchase of new assets only and is therefore slightly less involved than a more traditional design and build project. However, the ownership of these assets requires Orion to consider compliance with our planning standards and also, how they will be incorporated into our asset lifecycle management including maintenance, replacement, stock management etc.

Rationalising these assets into the network over time will be done in a manner consistent with our design standards, technical specifications and policies as summarised in NW 70.50.03 – Document Control. In particular this project will be implemented in compliance with the following sections:

- 9.2 Infrastructure
 - 9.2.1 Management
 - 9.2.3 Design Standards
 - 9.2.4 Technical Specifications
- 9.5 Contracts
 - 9.5.1 Management
- 9.7 Procurement & Stock Management
 - 9.7.2 Equipment Specifications

HV and Low Voltage Switchgear – Asset Management Report YE 2012 (NW70.00.24)

High Voltage Circuit breakers – Asset Management Report YE 2012 (NW70.00.33)

Substations – Asset Management Report YE 2012 (NW70.00.44)

Network Related Property – Asset Management Report YE 2012 (NW70.00.43)

Protection Systems – Asset Management Report YE 2012 (NW70.00.22)

Subtransmission Overhead Lines – Asset Management Report YE 2012 (NW70.00.26)

11kV Overhead Lines – Asset Management Report YE 2012 (NW70.00.27)

Low Voltage Overhead Lines – Asset Management Report YE 2012 (NW70.00.25)

The following sections provide a summary of the most relevant high level reports, policies, standards and specifications.

2.1 Security of supply standard

Our major urban and rural projects outlined in other supporting CPP reports have been developed in the knowledge that Orion would be purchasing the spur assets outlined in this project. The purchase of these spur asset facilitates a more economically efficient development of our subtransmission network that is compliant with our SoSS.

Our SoSS is published in Section 5.3.1 of our 2012 Asset Management Plan. This standard was originally introduced shortly after the 1998 Auckland CBD blackout and modified slightly following an urban architecture review in 2006. The structure of our SoSS is based on the UK P2/6 standard and the 2006 update process included a national and international benchmarking component. Our 2006 review process and recommendations were reviewed by SKM before consulting with Retailers, Canterbury Manufacturers Association, Major Electricity Users Group and Grey Power.

2.2 Network architecture reviews

To make sure that our network architecture and resulting SoSS is keeping pace with changes to our modelling inputs (VoLL, asset failure rates, new technologies, DSM, etc) we have recently completed² a review of our urban 66kV and 11kV architecture³. This has also provided an opportunity to take account of the resiliency learnings during the Christchurch earthquakes. The review has largely supported our current SoSS and we do not expect any changes to the existing categories or thresholds although additional criteria to capture our planned resilience to GXP or zone sub 'site' contingencies will be required.

Our architecture review supports the addition of the spur assets to our network, and allows for the development of more secure, lower cost subtransmission network architecture.

2.3 Prioritisation of works

This project mainly requires the use of asset management staff at both Orion and Transpower and therefore does not affect the workload of our contractors.

The proposed spur asset transfer dates have been agreed by Transpower and Orion after taking account of the trade-off between available internal resource and the need to progress spur asset transfers soon to avoid unnecessary asset replacement investment in the meantime. In some cases Transpower has agreed to delay replacement works. The purchases have been staggered across the period FY13 to FY17 to even the workload for asset management staff at both Orion and Transpower.

The Springston spur asset transfer has become the immediate priority so that the subtransmission network in the wider Rolleston area can be improved to N-1 security.

2.4 Tenure of substation sites, line corridors and cable routes

We secure the tenure of our zone substation sites by 'Title'. Where possible we install our underground and overhead reticulation in the berm of a public road (either formed or a paper road). Where a line or cable crosses private land we secure the route by easement.

This project will involve the purchase of land associated with existing GXPs and we envisage that 'Title' will simply transfer to Orion in most cases. In some cases, we will continue to share a site with Transpower and we envisage that our occupancy of that site will continue as per the Access and Occupation schedule of the Transpower 'Transmission Agreement'.

² Technical analysis complete, reports at draft stage

³ See our Urban architecture review papers NW70.60.05 Subtransmission and NW70.60.06 11kV

We envisage that most of the Transpower spur asset line routes are secured by existing rights⁴ (as was the case for the Papanui 66kV lines) as they were installed prior to 1992.

Other land issues will be addressed at the detailed project management phase of each project in turn.

3 Network constraints and service targets

Urban subtransmission currently is not consistent with Orion's SoSS. The most cost-effective way to meet the SoSS is set out in the architecture review and requires the purchase of spur assets from Transpower.

As stated in earlier sections of this report, our major urban and rural projects outlined in other supporting reports have been developed in the knowledge that Orion would be purchasing the spur assets outlined in this project. This facilitates efficient development of a subtransmission network that is compliant with the results of our 66kV architecture review and security of supply standard.

3.1 Forecast load

This project is not a load driven initiative and therefore no load forecasts are provided.

3.2 Non network alternatives

This project is for the purchase of existing Transpower assets and these assets are considered the most cost-effective way to continue to provide an appropriate level of service for our customers. We do not consider that non network alternatives are viable in this case.

4 Project description and forecast expenditure

4.1 Work to be undertaken

There are no material works to be undertaken as part of this project. There will be incidental works/costs associated with purchase of the spur assets but these are included in our lifecycle management costs. See section 7 for a summary of the forecast purchase cost of the Transpower spur assets.

⁴ As per the Electricity Act 1992

4.2 Timing

As stated previously, the proposed spur asset transfer dates have been agreed by Transpower and Orion after taking account of the trade-off between available internal resource and the need to progress spur asset transfers soon to avoid unnecessary asset replacement investment in the meantime. In some cases Transpower has agreed to delay planned replacements.

The Springston spur asset transfer has become the immediate priority so that the subtransmission network in the wider Rolleston area can be improved to N-1 security.

5 Dependencies

The purchase of these Transpower spur assets is fundamental to many of our major urban and rural subtransmission proposals outlined in other major project reports including upgrading our network to ensure it meets our SoSS. If this project was unsuccessful it would lead to changes including decreased cost-effectiveness to our major project designs and budgets, and may delay our compliance with our SoSS for parts of our network.

6 Earthquake consequences

This project is not largely affected by the earthquake but some remedial earthquake work is required at some of the Transpower GXPs being purchased. These costs will be either met by Transpower (which increases the purchase price) prior to purchase or are assumed to be included in Orion's lifecycle management budgets. These costs are expected to be modest and more detail will unfold as we undertake due diligence for each spur asset purchase.

However, through the damage to our network and impacts to security of supply, the earthquakes have necessitated our improvement of the subtransmission network, for which the spur assets are an important element.

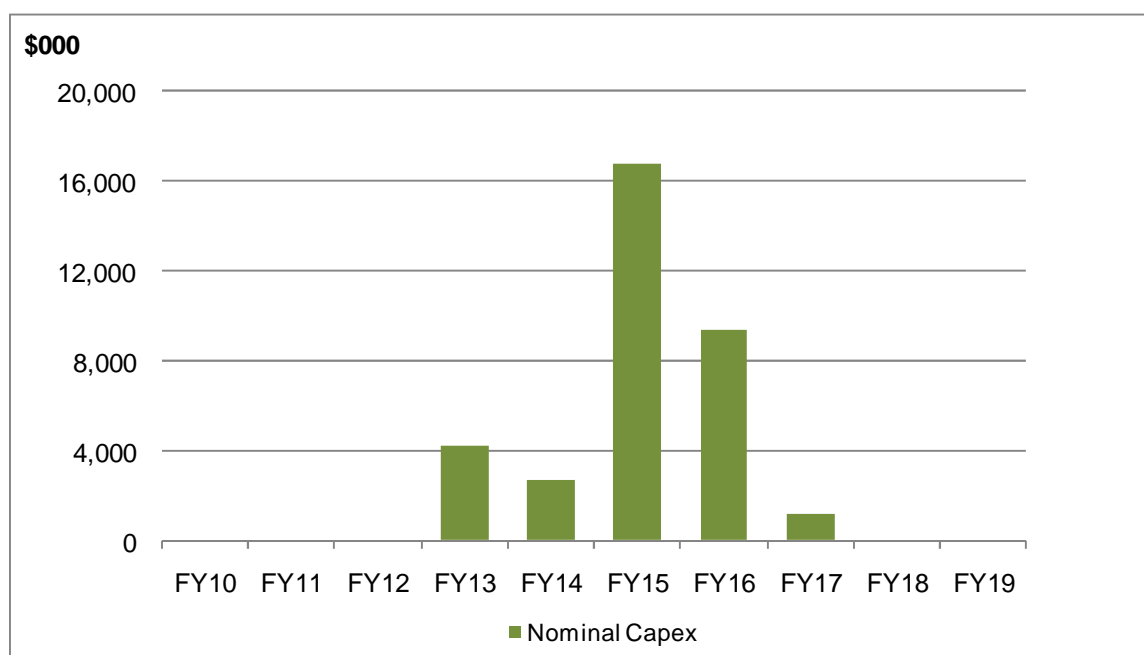
7 Expenditure plan

7.1 Expenditure summary

The following table provides the date and estimated purchase price of each of the spur asset purchases in this project.

	Description	Forecast Budget (\$000)
FY14	Springston GXP and 66kV lines	2,700
FY15	Addington GXP and 66kV lines	13,809
FY15	Middleton GXP	340
FY15	Arthurs Pass 11kV and 66/11kV transformer	1,977
FY15	Castle Hill 11kV and 66/11kV transformer	658
FY16	Hororata 33kV and 66/33kV transformers	593
FY16	Bromley 66kV and 11kV	8,827
FY17	Islington 33kV	1,198
	Total	30,102

The following chart shows our total spur assets transfers forecast network expenditure in nominal terms (\$000).



The following table summarises forecast expenditure related to spur asset transfers in nominal terms (\$000).

Forecast expenditure (nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Sub-transmission network	3,620	2,339	14,448	6,232	948	-	-
Distribution lines and cables	-	-	-	-	-	-	-
Distribution substations including transformers	-	-	-	-	-	-	-
Switchgear (All voltages)	531	358	1,898	3,134	152	-	-
Low voltage distribution network	-	-	-	-	-	-	-
Supporting or secondary systems	37	2	438	54	98	-	-
Non system fixed assets	-	-	-	-	-	-	-
Total	4,188	2,700	16,784	9,419	1,198	-	-

7.2 Basis for expenditure forecast

The estimated spur asset purchase costs are based on the forecast Transpower 'Regulatory Book Value' of the assets at the time of forecast purchase. These forecasts include the forecast value of Transpower planned replacement or enhancement work prior to the purchase date.

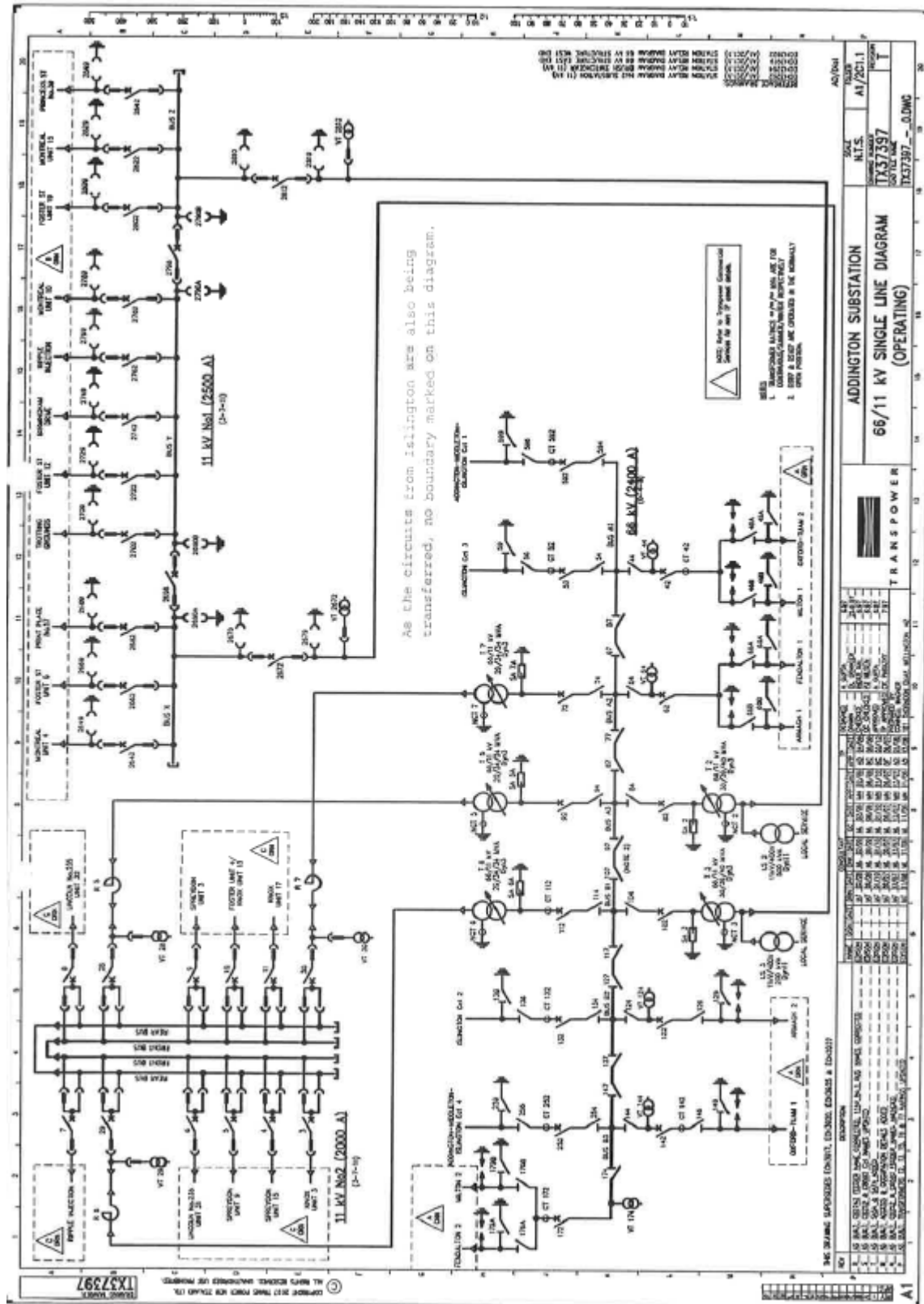
These expenditure forecasts do not include any contingencies.

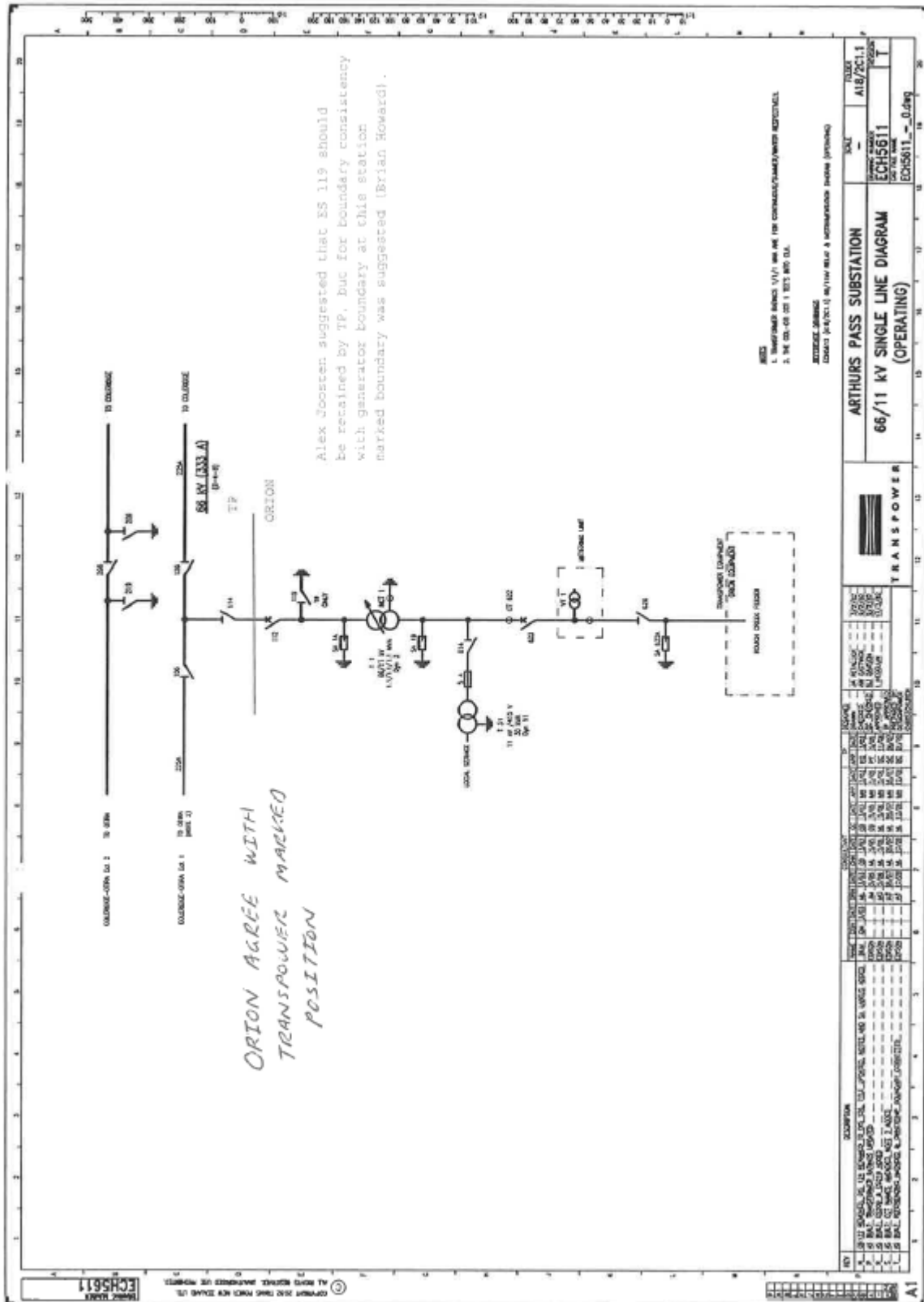
Orion ownership of the spur assets also increases our replacement capex budget and our forecast maintenance opex budgets. The forecasts and assumptions supporting them are detailed in the relevant asset management reports:

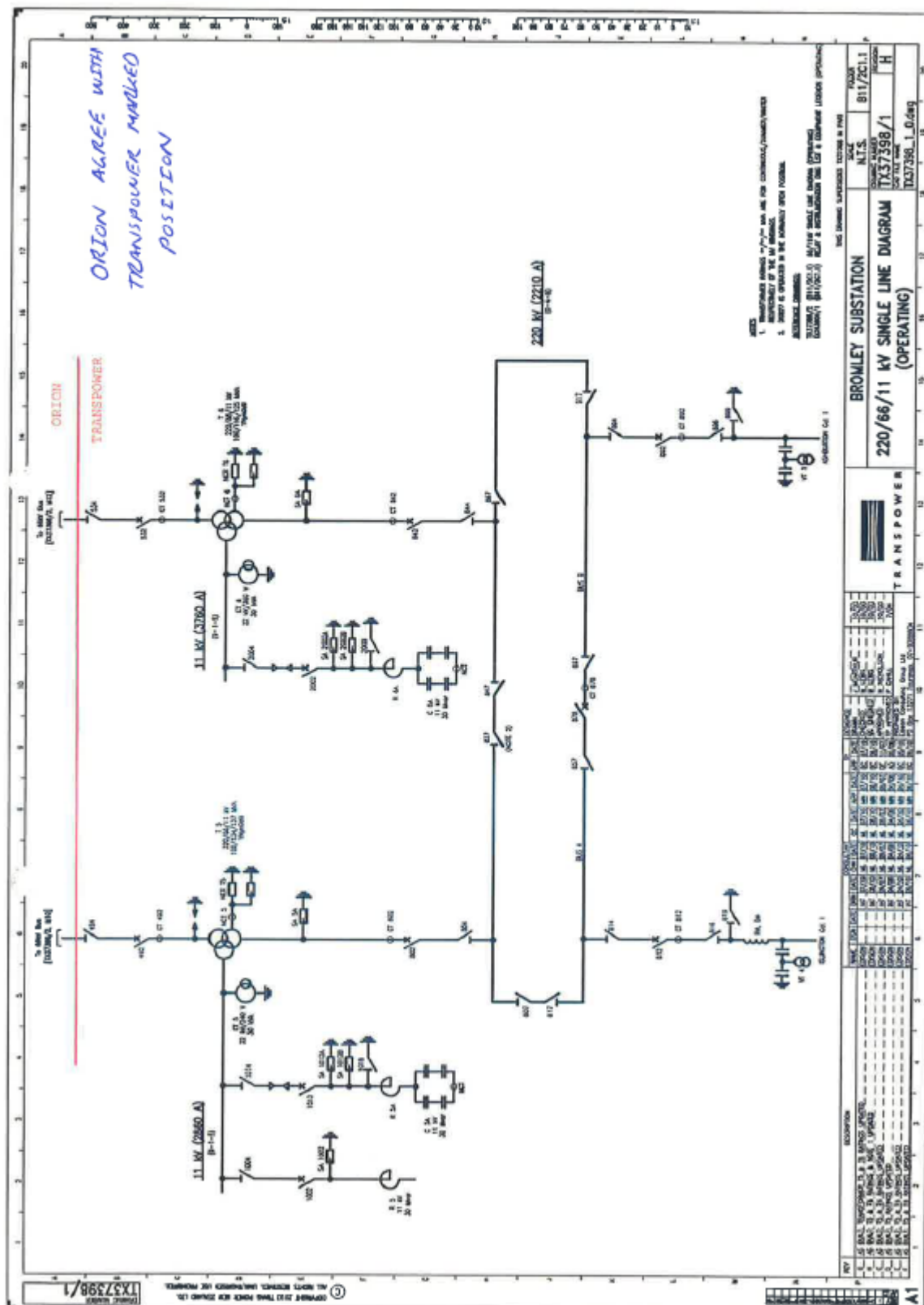
- HV and Low Voltage Switchgear – Asset Management Report YE 2012 (NW70.00.24)
- High Voltage Circuit breakers – Asset Management Report YE 2012 (NW70.00.33)
- Substations – Asset Management Report YE 2012 (NW70.00.44)
- Network Related Property – Asset Management Report YE 2012 (NW70.00.43)
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- Subtransmission Overhead Lines – Asset Management Report YE 2012 (NW70.00.26)
- 11kV Overhead Lines – Asset Management Report YE 2012 (NW70.00.27)
- Low Voltage Overhead Lines – Asset Management Report YE 2012 (NW70.00.25)

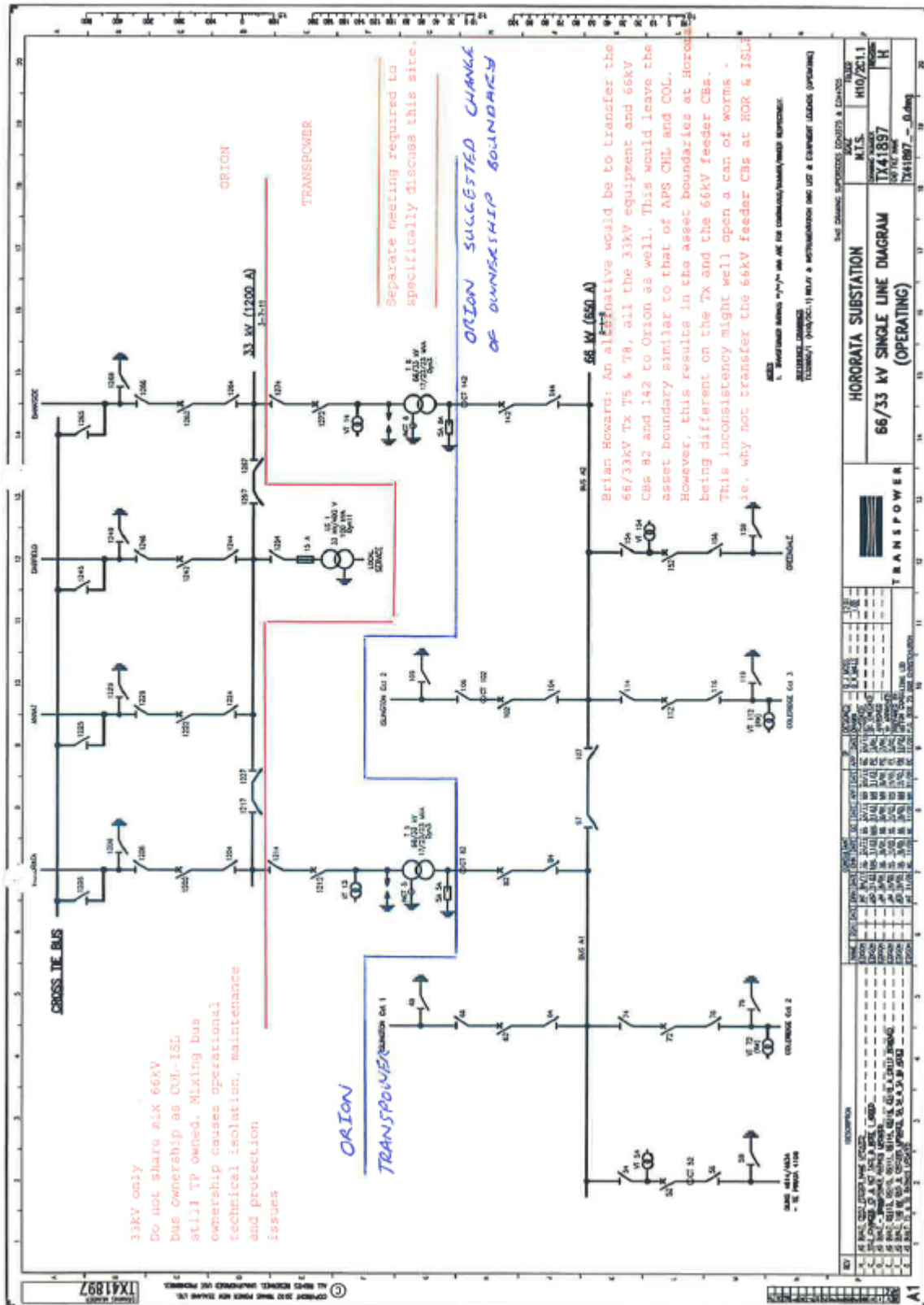
There is additional detail in the documents "Replacement 10 year plan and the Maintenance 10 year plan.

Appendix A – Proposed spur asset change of ownership boundaries

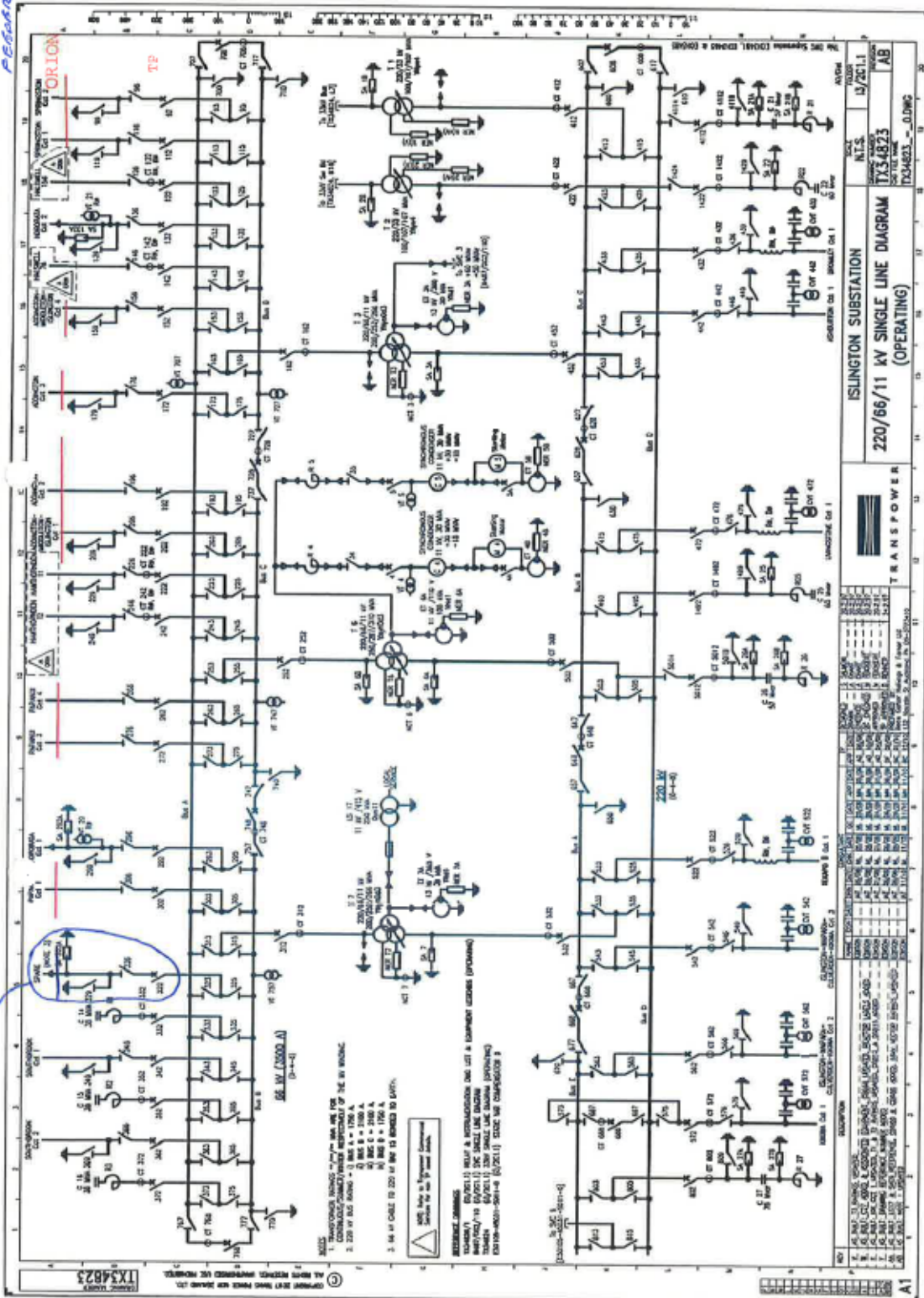


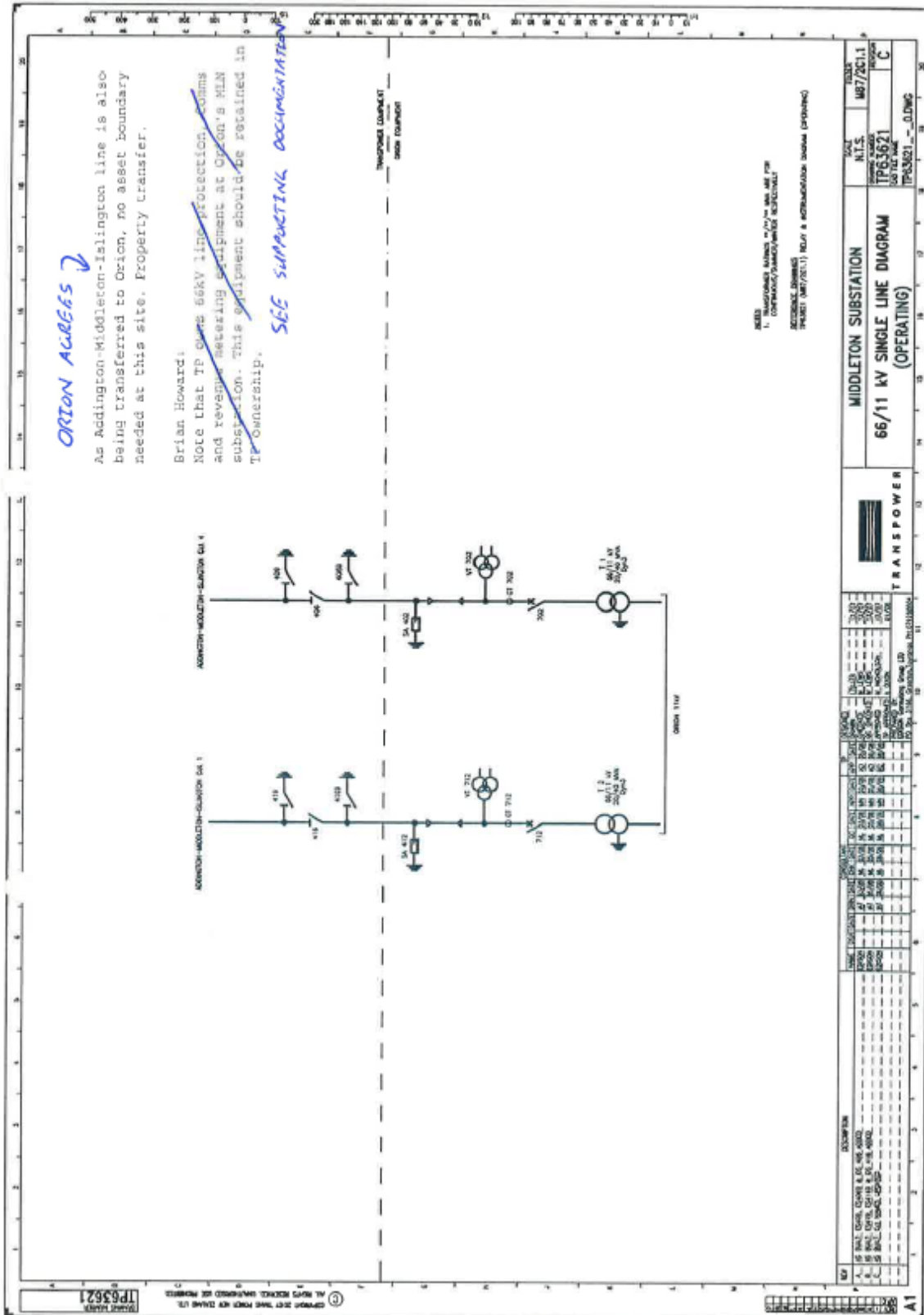


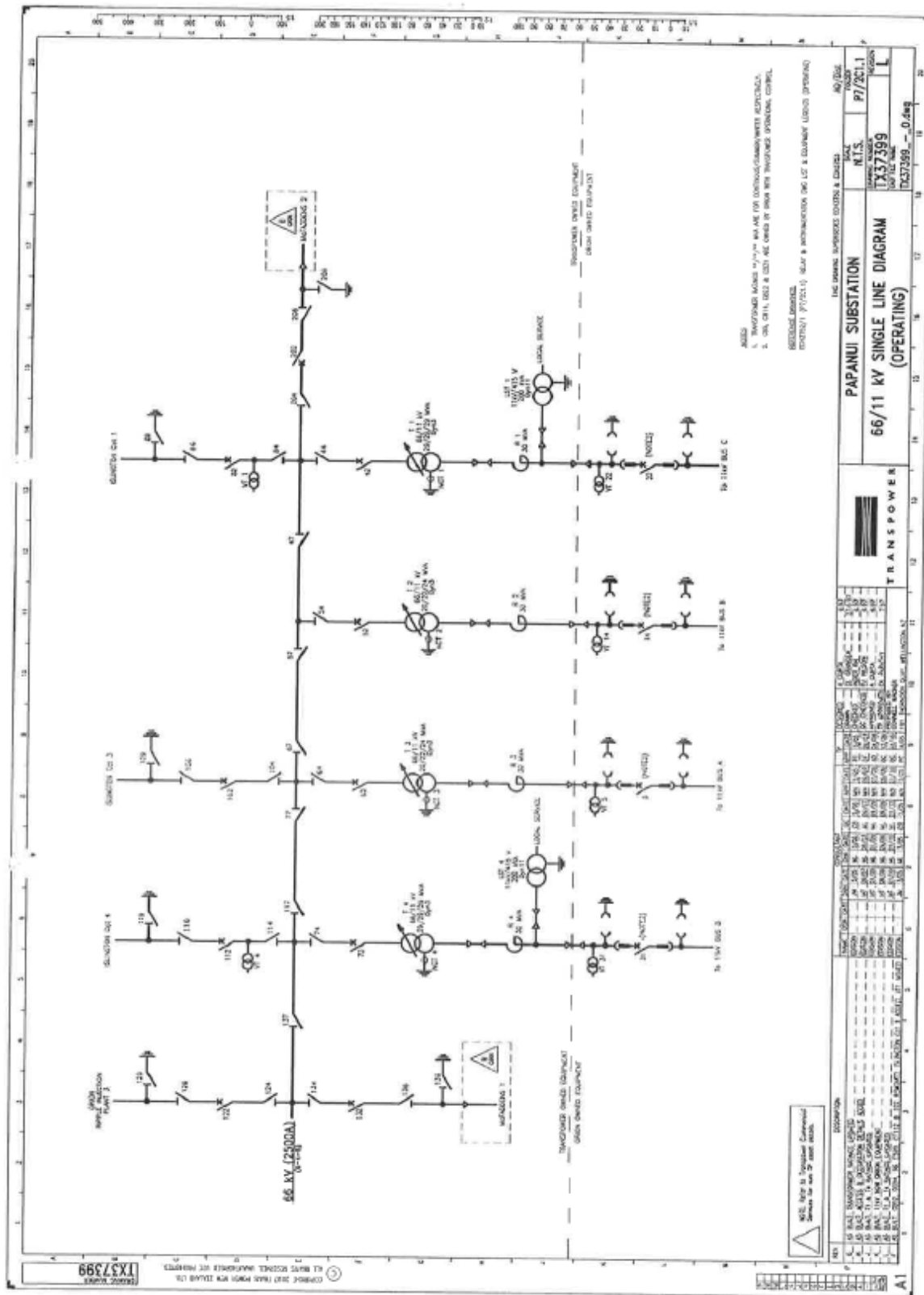




WEEBONS BAY ORION AGREE WITH TRANSPOWER MARKED POSITION - NOTE NEW WEEBONS' PEGS







Appendix B – Proposed spur asset change of ownership boundaries

MEMORANDUM

Date: 15 February 2012

To: Rob Jamieson

From: Tas Scott

Subject: **Papanui spur asset transfer from Transpower to Orion**

Purpose

The purpose of this paper is to achieve board approval to purchase the Papanui spur assets from Transpower as soon as practical following 1 April 2012 and at Transpower's regulatory net book value of approximately \$4.4m including a residential property at 472 Greers Road.

The actual transfer value will be determined at the date of transfer and will be based on the regulatory asset value.

Background

The current Transpower senior management group views spur assets as a distraction to their major core grid expansion projects and they also recognise that customer benefits will flow from a change of ownership. This has not always been the case and there is no guarantee that future Transpower management will continue to have the same view. The Transpower board has agreed to progress the transfer of Papanui spur assets. Transpower have appointed a project manager for the Papanui spur asset transfer project.

Transfer Agreement

The 'transfer agreement' between Transpower and Orion is conditional on Orion being able to compulsorily acquire the land through provisions in the Resource Management Act including approval from the Minister of Land Information (Hon Maurice Williamson). Whilst this should be straight forward it is thought to be the first occurrence of a compulsory acquisition of land that was previously acquired by Transpower as a compulsory acquisition under the Public Works Act. The requirement for Minister approval is likely to delay the transfer date beyond 1 April 2012.

Transpower and Orion require at least 4 weeks notice to transfer the assets to ensure that it can meet all market notification requirements, etc and incorporate the necessary changes in their connection asset charging schedules. The final transfer date will be on the 1st of a month not less than 4 weeks following Minister approval to transfer the land. A realistic transfer date at this stage is 1 June 2012.

The Papanui business case

The following points provide a summary of a very complex regulatory environment. There is regulatory uncertainty at present as the electricity industry makes the transition from one form of regulation to another and the earthquake has further complicated the Orion position.

1. Current rules – ‘Avoided transmission’

Until the new Input Methodologies are implemented (estimated to be 1 April 2013) we are able to claim all of our spur asset transfer related costs including, WACC return, depreciation, operations and maintenance (avoided transmission).

2. Proposed rules – ‘Recoverable Cost’

For the first 5 years (or at least up to the next Po reset) following the transfer of spur assets (each group of assets) Orion is able to continue to charge our customers the same amount that Transpower previously charged Orion. This is called a ‘Recoverable Cost’ and sits outside the WACC and RAB discussed below. We call this an ‘incentive’ because the spur assets are typically old (and therefore cheap to buy) but Transpower charges are based on average NZ age so continuing to charge customers the Transpower equivalent charge achieves a good level of return in the first 5 years. To claim/charge Recoverable Costs requires Commerce Commission approval and this cannot be achieved until the new Input methodologies take effect (estimated to be 1 April 2013).

3. 5 year P_0 regulatory price reset

The 5 year P_0 reset is the mechanism (still to be developed) by which the Commerce Commission sets prices to achieve a forward looking regulated WACC on RAB. The first reset is anticipated to be 1 April 2015. The purchase value of the spur assets and any associated replacement or upgrade investment will be added to our RAB.

The detail of the Papanui business case for our shareholders is attached in Appendix B. Assuming an NPV post tax discount rate of 8% and ignoring any benefits or costs that may occur through tax depreciation shields (any costs could be mitigated through a modified accounting treatment) etc, the financial analysis concludes the following:

1. The transfer of Papanui spur assets becomes NPV neutral in 10 years
2. The ability to claim ‘Avoided Transmission’ for one year and ‘Recoverable Costs’ for 2 years provides a slightly higher than WACC return for the first 3 years – this allows the business case to be NPV neutral in 10 years rather than over the life of the assets
3. In the context of regulatory uncertainty, there is a possible extra incentive of continuing to claim ‘Recoverable Costs’ beyond 2015 for the remainder of any 5 year period following the transfer date (2 years of approximately \$1.2m).

In addition to the Papanui substation assets, Transpower proposes to sell a residential property bordering the Papanui substation. This property was purchased by Transpower to achieve a noise buffer on the south side of the substation. We propose to purchase the property for \$175,000 to maintain this noise buffer. The property is currently rented for \$310 per week and has a Rateable Value of \$425,000.

Strategically the transfer of Papanui makes the threat of bypass by large customers or potential embedded network owners more difficult. It also enables greater flexibility in the design of the network which should lead to an improvement in security and reliability of supply for our customers.

The transfer of Papanui spur assets to Orion is expected reduce the future replacement and upgrade capex, maintenance and operations costs by 20%. This will place downward pressure on electricity delivery costs to our customers and thereby deliver real benefits to our community.

Progress on the Papanui purchase process

Transpower and Orion are currently working on a project plan to transfer the assets no sooner than 1 April 2012 but recognising that the earliest transfer date will be 4 weeks following approval of the land transfer from the Minister of Land Information..

We have largely completed the following aspects of the transfer process:

- due diligence information with a particular focus on understanding the impact of the earthquake on the Papanui spur assets
- confirm the new demarcation point for the change of ownership
- establish the engineering handover arrangements (maintenance contracts, etc)
- understand the GXP metering and protection changes required to facilitate a change of ownership.

A final draft of the 'transfer agreement' is expected to be completed by late February and we are focusing on our compulsory land acquisition application to the Minister.

Summary

In summary we consider that a positive business case exists to go ahead with the purchase of the Papanui GXP spur assets from Transpower. We believe we can at least make a regulated return on the investment with a potential upside (subject to Commerce Commission approval) through extending the 'Recoverable Cost' component of revenue for 2 years beyond the price reset date.

Based on our interpretation of the current and proposed regulatory revenue regimes the NPV analysis of cash flows shows a break even in 10 years. The purchase of these spur assets will deliver material benefits to our customer base and community and we therefore conclude that we should proceed as outlined in the following recommendations.

Recommendations

1. *That the board delegates authority to the CEO to approve the purchase of Transpower's Papanui spur assets – approximate purchase price \$4.2m plus GST*
2. *That the board approves the purchase of the adjacent residential property to the south of the Papanui substation for \$175,000 so that the noise buffer zone can be maintained.*

Tas Scott

General Manager Network Development

Approved for board submission

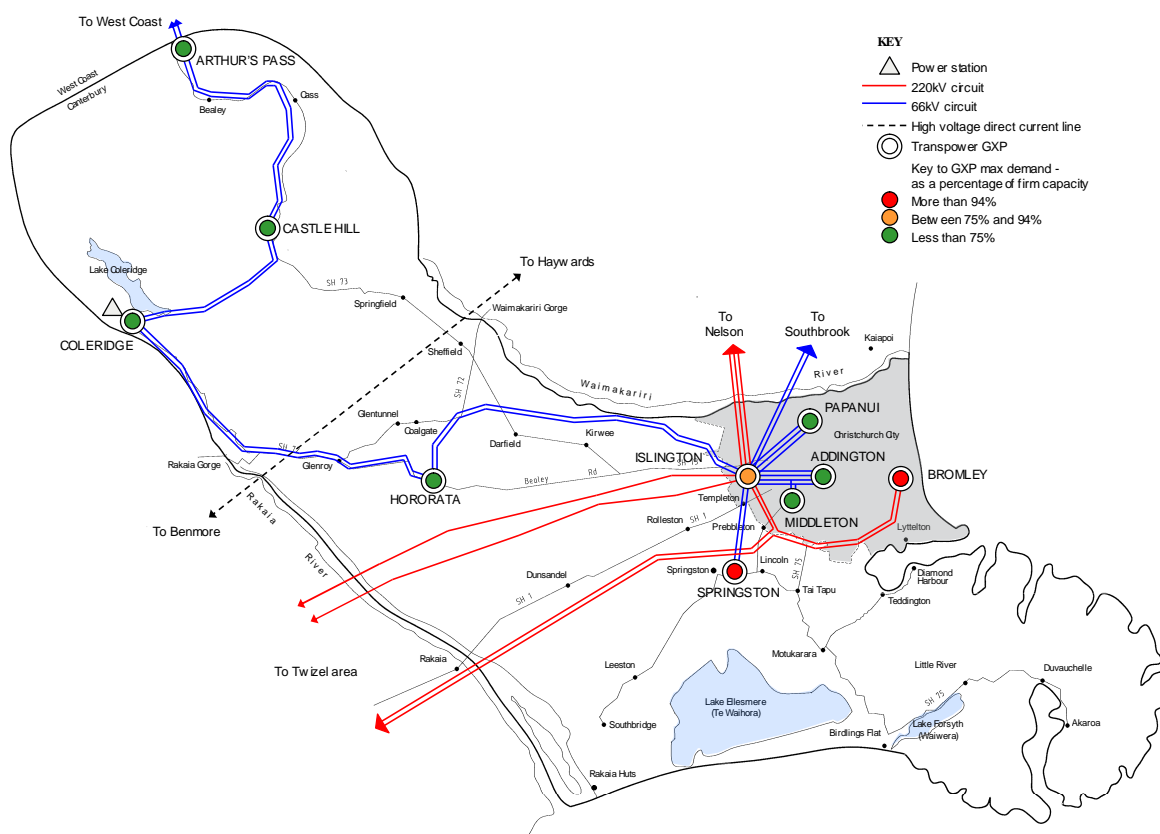
Rob Jamieson

Appendix A: Wider spur asset project

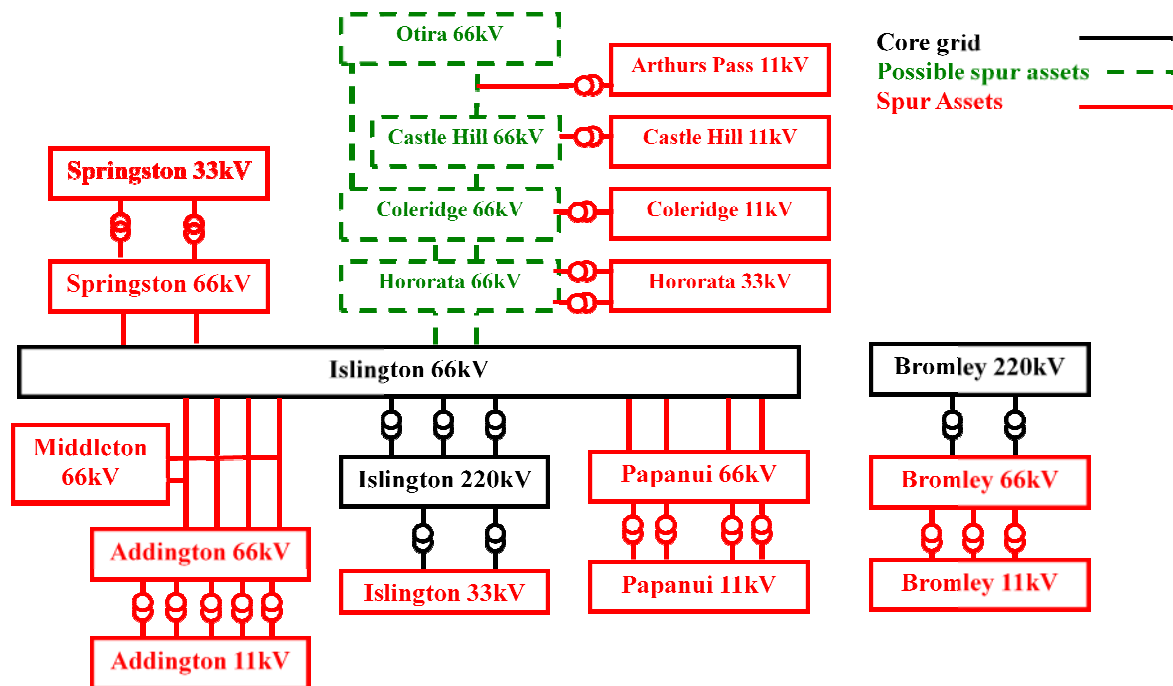
Background

Transpower owns and operates the New Zealand transmission grid which includes HVDC, 'core grid' and 'connection' assets. The HVDC is currently funded by charges to South Island generators and the core grid is funded by interconnection charges allocated (by contribution to peak demand) to distributors and direct connect customers. The connection assets are more directly funded by charges to the specific users of the assets; generators, distributors and direct connect customers.

The Transpower grid in our area is shown in the diagram below.



Spur assets are a subset of the connection assets and are typically 110kV or less. They supply only one customer (distributor, generator or direct connect customer) and do not form part of the Transpower interconnected network. The following block diagram shows (coloured red) the Transpower spur assets in the Orion area. The core grid assets are shown in black and assets that are currently core grid but may become spur assets are shown in green.



The possibility of Transpower selling New Zealand wide spur assets has been the topic of discussion (and at times serious investigation) off and on over the last 25 years. The main thrust of these discussions and investigations can be attributed to the recognition that these assets serve the purpose of local distribution rather than national transmission. A change of ownership would therefore enable synergy and efficiency benefits to be achieved through integration into local distribution network asset planning, management, maintenance and operations.

The current Transpower senior management group views spur assets as a distraction to their major core grid expansion projects and they also recognise that customer benefits will flow from a change of ownership. This has not always been the case and there is no guarantee that future Transpower management will continue to see it that way. The Transpower board has agreed to progress the transfer of Papanui spur assets and have also agreed that Transpower resource should be allocated to assessing the merits of further spur asset transfers in the Orion area. Transpower have appointed a project manager for the Papanui spur asset transfer project.

Proposed spur asset purchases

Although the transfer of Papanui spur assets is the immediate focus, a project plan is to be developed by Transpower and Orion for the transfer of all spur assets by April 2015. This 3 year plan is more manageable from a Transpower perspective whilst still being fast enough to achieve a transfer of assets before inefficient replacement and upgrade work occurs at these sites.

The following table summarises the proposed transfer dates and the purchase price (transfer value). The total transfer value is the sum of the net book value and the outstanding balance of any New Investment Agreements (NIAs) or Customer Investment Contracts (CICs), at these sites. I emphasise that the timetable is a first draft between Orion and Transpower and the purchase price is approximate only. The actual purchase price will be 'net book value' at the time of the transaction and will change to reflect the final agreed transfer assets and any depreciation applied or replacement work undertaken in the meantime.

The order/priority of asset transfers outlined in the table below is more or less consistent with the value that can be achieved for our customers through more efficient replacement and upgrade investment – that is, the best asset transfers are at the top of the table.

April	Description of assets	Net book value \$m	Balance of NIA and CIC \$m	Total purchase price \$m	Replacement cost excl NIAs \$m
2012	Papanui GXP and 66kV lines	4.3	NA	4.3	27.3
2013	Springston GXP and 66kV lines	1.9	2.7	4.6	6.2
2014	Addington and Middleton GXP and 66kV lines	11.7	1.4	13.1	18.6
	Bromley 66kV and 11kV	6.3	0.8	7.1	9.3
2015	Islington 33kV	4.7	0.2	4.9	6.2
	Hororata 33kV	0.9		0.9	1.5
	Castle Hill transformer and 11kV	0.9		0.9	1.6
	Arthurs Pass transformer and 11kV	1.0		1.0	1.5
	Total	31.7	5.1	36.8	72.2

The spur assets will need to be managed using our normal lifecycle management processes and will need to be replaced and maintained accordingly. The replacement cost column indicates the 'as new' value of the spur assets and the approximate long term life cycle financial commitment we make when purchasing these spur assets.

When we consider new investment in our 66kV subtransmission network we have the alternative option of asking Transpower to invest in an extension to their grid (spur assets). Historical enquiries of this nature have identified that the Transpower grid extension option incurs additional costs of up to 20%. We see the development of our 66kV subtransmission network as a natural extension to our core business that provides long term benefits to our customers.

When considering the option to purchase spur assets it is in the context that we will continue to invest in our rural and urban 66kV subtransmission network to the value of more than \$50m over the next 10 years. That is, the spur asset business case assumes that the board agrees to continue to grow our core business assets and the counterfactual option to have Transpower extend their grid is not something that the board wishes to pursue.

The high level spur assets business case

The spur asset project requires significant investment by Orion on the purchase dates (approximately \$37m in total) and moreover commits Orion to managing assets with associated replacement costs approaching \$80m. Orion is recognised in the electricity industry as a reputable network asset manager and this proposal provides us with an opportunity to grow our core business in an otherwise difficult merger/acquisition environment. The project should enable some economies of scale within our business.

However, such purchases and follow-on replacements and upgrades increase our ongoing capex over the next 10 years and so inevitably involve an increase in our interest bearing debt and therefore reduce our financial flexibility. If we purchase all of these spur assets then, relative to our current (approved SOI) financial forecasts, over the next 10 years our capex and opex would increase by:

- the purchase of spur assets \$37m
- ongoing related asset replacement \$12m (subject to a more detailed review)
- operations and maintenance \$3m

The transfer of spur assets will enable greater engineering flexibility when designing the architecture of our distribution network leading to better cost versus security and reliability of supply outcomes. The application of more appropriate design standards and the more competitive contracting environment has in recent examples (Papanui 11kV switchboard) lead to cost reductions of up to 20%. So, from a customer and NZ incorporated perspective the project delivers significant synergy and efficiency benefits and as a result will place downward pressure on electricity prices.

This proposal/investment and our return will be regulated (with the possible exception of the 372 Greers Road property). Our spur asset business case is therefore dependent on the regulatory environment and rules.

The earthquake has resulted in an increase in Orion costs and a reduction in our revenue. The regulatory framework/process for establishing our revenue is still being worked through.

Prior to the earthquake we made progress with the Commerce Commission in establishing the regulatory rules around the purchase of spur assets and the new drafting of the rules (Input Methodologies). The rules have been gazetted but Vectors challenge (judicial review) was upheld and although this has been appealed by the Commerce Commission it has delayed the implementation of the new Input Methodologies. The relevant (to spur asset transfers) sections of the Input Methodologies are not the subject of judicial debate. A subsequent merits review may include a challenge to the relevant spur asset transfer sections of the Input Methodologies although this is considered unlikely.

With respect to the purchase of spur assets, the following aspects of the current and proposed rules are important:

1. Current rules - Avoided transmission

Until the new Input Methodologies are implemented (estimated to be 1 April 2013) we are able to claim all of our spur asset transfer related costs including, WACC return, depreciation, operations and maintenance (avoided transmission).

2. Proposed rules - The incentive

For the first 5 years (or at least up to the next P_0 reset) following the transfer of spur assets (each group of assets) Orion is able to continue to charge our customers the same amount that Transpower previously charged Orion. This is called a 'Recoverable Cost' and sits outside the WACC and RAB discussed below. We call this an 'incentive' because the spur assets are typically old (and therefore cheap to buy) but Transpower charges are based on average NZ age so continuing to charge customers the Transpower equivalent charge achieves a good level of return in the first 5 years. To claim/charge Recoverable Costs requires Commerce Commission approval and this cannot be achieved until the new Input methodologies take effect (estimated to be 1 April 2013).

3. 5 year P_0 regulatory price reset

The 5 year P_0 reset is the mechanism (still to be developed) by which the Commerce Commission sets prices to achieve a forward looking regulated WACC on RAB. The first reset is anticipated to be 1 April 2015. The purchase value of the spur assets and any associated replacement or upgrade investment will be added to our RAB.

In this context we believe that the high level spur asset business case for Orion is:

- Until the new Input Methodologies are implemented we claim Avoided Transmission costs
- When the proposed Input Methodologies are implemented and subject to Commerce Commission approval we claim the Transpower connection charges that would have applied as Recoverable Costs for up to 5 years (the incentive period)
- The revenue from claiming Recoverable Costs will fund (make an acceptable return on) the purchase value of the spur assets, maintenance and any replacement or upgrade costs between the purchase date and 1 April 2015.
- From 2015, any spur asset related maintenance, replacement or upgrade investment is accepted as part of running a regulated distribution network business and the P_0 reset process is intended to reflect the forward costs and revenues of our business.
- There is a possible extra incentive of continuing to claim 'Recoverable Costs' beyond 2015 for the remainder of any 5 year period following the transfer date.

Appendix C – Transpower High Level Response

Jin Phoon
Senior Planning and Development Engineer
Tel: (04) 495 7186

Email: Jin.Phoon@ transpower.co.nz

Date 19th October 2010
Glenn Coates
Network Business Development and Planning Manager
Orion New Zealand Limited

Dear Glenn,

High level response to Orion New Zealand Limited to facilitate Orion's 66 kV network developments within the wider Papanui area.

Thank you for your application of 26 July 2010 requesting that Transpower investigate options to facilitate Orion's 66 kV network developments within the wider Papanui area. At your request Transpower has conducted an initial high level investigation, the results of which are contained in this letter.

The studies for this high level response have been carried out at no cost to Orion. The aim of the initial study was to ascertain whether such a project is both technically feasible and acceptable to Transpower, and to provide Orion with enough information to decide whether they wish to enter into a Detailed Solution Development (DSD) contract to advance the project to the next stage.

Please note that all comments in this high level response are preliminary - based on a desk-top study only. All cost estimates and time-frames are tentative, and must be confirmed by a full solution study.

Background

Orion have requested that Transpower undertake a high level investigation on the feasibility of facilitating Orion's 66 kV network developments within the wider Papanui area. This investigates four stages of upgrades that include tee connections off the Islington-Papanui A and B lines, new grid exit points (GXPs) and new transformers at Papanui substation.

As agreed, our study considered the technical, property and environmental feasibility, including indicative costs.

The following items are not considered in this high level response in great detail. These would need to be covered in detailed studies:

Primary systems

Communications / SCADA connections

Revenue metering systems

Protection systems

Detailed timeframes

HOW WILL IT BE CONNECTED

Please find attached Single Line Diagrams of Transpower's proposed plan for Stage 1 to 4 (Orion ISL-PAP proposal.pdf). Essentially, these plans are similar to Orion's Stage 1 to 4. The main difference is in Stage 3 where:

(1) The Transpower owned Waimakiriri (WMK) substation will have a solid bus not a ring bus like Orion's plan.

(2) The cable from WMK to Orion's McFadden zone sub (McF), will be normally open.

WHAT ARE THE ISSUES & SHOW STOPPERS

Consents for new 66 kV cables and property for the new grid exit points (GXPs) will need to be arranged and property rights obtained in the form of easements.

WHAT WILL IT COST

In summary, high level costs for the different stages are as follows:

Stage 1 = \$600,000 (engineering, environmental and property costs);

Stage 2 = \$12,660,000 (engineering, environmental and property costs);

Stage 3 = \$22,020,000 (engineering, environmental and property costs);

Stage 4 = \$14,300,000 (engineering, environmental and property costs);

Also, an additional sum of approximately **\$20,000** should be added across all four stages for time/administration/legal costs for **property**.

This comes to an indicative total costs for **all** stages of **\$49,600,000**.

See sections below for details of costs:

Engineering

High level engineering costs for each of the different stages are as follows:

Stage 1 = \$500,000

This stage includes:

Tee Connection from ISL-PAP 1 to Hawthornden (HAW), ISL-PAP 1 circuit is assumed to be approximately 50m from HAW;

Revenue Metering at HAW;

Protection upgraded on the ISL-HAW-PAP 1 circuit; and

Note that the circuit breaker at HAW is normally left open.

Stage 2 = \$12,100,000

This stage includes:

Tee connection with cable of 5.5km from ISL-PAP 3 to Waimakiriri (WMK);

New 66/11kV 20 MVA Transformer at WMK;

Revenue Metering at WMK; and

Protection upgraded to a 3 Terminal scheme for ISL-PAP-WMK 3 circuit.

Stage 3 = \$21,900,000

This stage includes:

A second connection from WMK to Orion's McFadden zone substation (McF) with cable of 6.5km, note that the circuit breaker at McF is normally open;

2 terminal protection scheme for cable between WMK and Orion's McF;

Second 66/11kV 20 MVA Transformer at WMK;

Revenue Metering at WMK;

Revenue Metering at the 66kV CB at McF, note that the Revenue Meter at McF will be uni-directional (looking towards McF); and

The 4 existing 66/11 kV transformers at PAP are decommissioned and replaced with two new 66/11kV 40 MVA transformers at PAP.

Stage 4 = \$13,800,000

This stage includes:

Re-instatement of the ISL-PAP 2 circuit, with new circuit breakers at ISL and PAP;

Tee connection from ISL-PAP 2 to Yaldhurst (YAL), ISL-PAP 2 circuit is assumed to be approximately 50m from YAL;

Protection upgraded to a 3 terminal scheme for ISL-PAP-YAL 2 circuit;

Second tee connection from ISL-PAP 3 to YAL;

Two new 66/11kV 20 MVA transformers at YAL including revenue metering on incomers;

Second tee connection from ISL-PAP 4 to HAW including revenue metering at HAW;
Decommission of the CBs at ISL to Orion's HAW zone substation;
Decommission the ISL-PAP 3 and 4 circuits between PAP and the WMK Tee;
Re-configuration of the 3 terminal scheme from ISL-PAP-WMK 3 to ISL-WMK-YAL 3 circuit;
Re-configuration of the 2 terminal scheme from ISL-PAP 4 to ISL-HAW 4 circuit.

The costs above are only for the engineering – materials, design and build.
The costs are accurate to -15%/+40%

Environmental

Even though the Tee connection cabling works will be located in roadways, designations are still required to secure appropriate provisions for any future maintenance and repair etc. The designation process also ensures that the cable locations will be recorded on the District Plan maps and this should provide a mechanism to flag their existence and so help to prevent their damage. Designations are invaluable for substations, because once designated, it is easier to gain approval for any changes to these assets.

High level environmental cost estimates for each stage are as follows:

Stage One –\$90,000.

Stage Two – \$110,000.

Stage Three – \$120,000.

Stage Four – \$130,000.

Please see attached document "Orion HLR consent cost summary.pdf" for more details.

Property

High level property cost estimates for each stage are as follows:

Stage One – \$10,000. For approximately 25m2 of freehold land for new 66kV connection at HAW.

Stage Two – \$450,000. For the new Grid Exit Point (GXP) at WMK.

Stage Three – No property being acquired at this stage.

Stage Four – \$370,000. For the new GXP at YAL.

There will also be an additional \$20,000 across all 4 stages for time/administration/legal costs.

These high level costs are based on the following assumptions:

This is a desktop assessment. If formal negotiations were to be entered into, registered valuers would be engaged to make a market assessment.

There is talk of costs at the termination spans, however it appears that the lines pass over the relevant properties so there won't be property costs if the work is contained within those properties.

Finally, where cable/line routes can be located in road reserve there will be no easement costs.

Next Step – Detailed Solution Development (DSD)

The next step in the process is for Orion to sign a Detailed Solution Development (DSD) Contract. Under this Contract Orion would fund the development of a Solution Study Report (SSR).

Transpower's standard DSD contract is attached.

Transpower's suggested scope of the DSD investigation would be:

1. assessment of the works required in Stages 1 to 4 of the development in the wider Papanui area;
2. assessment of secondary asset requirements;
3. development of a construction methodology;
4. development of cost estimate and project plan;
5. development of relevant SLD and R&I diagrams and drawings;
6. development of the designations / consents and land acquisition process;

Based on similar recent studies we have had carried out, we expect the cost of this investigation work to be approximately \$550k, and take approximately 26 weeks to complete.

The final scope for the DSD would be agreed with you. Once we have an agreed scope for this investigation we would then go out with an RFP to Transpower's preferred consultants for a cost estimate and time-frame for completion.

Once you have assessed the contents of this letter please contact me to let me know if Orion would like to proceed.

Sincerely

Jin Phoon

(Attachments: Orion ISL-PAP proposal.pdf and Orion HLR consent cost summary.pdf,)

HEAD OFFICE BUILDING AND SUNDRY LAND AND BUILDINGS CAPEX

CPP60 and CPP62

Project Summary

1 April 2013 – 31 March 2019

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1 Project introduction

Project Name	<i>Head Office Building (CPP60) and Sundry Land and Buildings Capex (CPP62)</i>
Service Category	<i>N/a</i>
Capex Category	<i>Non System Fixed Assets</i>

This project involves:

- construction of a new office building in west Christchurch. Our new office building will be at 565 Wairakei Road and we aim to move there by June 2013
- any other capex required on the above site and the current head office at 200 Armagh St.

1.1 Aims, objectives and drivers

The objective of our new office building is to ensure the long term resiliency of our operations, by moving to a new “lifelines standard” (Importance Level 4, IL4) building. This would enable compliance with Civil Defence Emergency Management (CDEM) Act requirements.

Orion's (1939 and 1984) office buildings were severely damaged in the 22 February 2011 earthquakes and have never been occupied since. Some key records and personal possessions and some key equipment (especially computer and network communications equipment) were able to be recovered from the office buildings post earthquake.

Estimated earthquake repair costs were around \$14m. The standard of accommodation was low grade and the buildings were not IL4 standard. They were clearly uneconomic to repair by a very wide margin. So in calendar 2012 the company successfully reached insurance cash settlements (for over \$20m) with its material damage insurers on those buildings (and their non-recoverable contents) and the buildings were demolished in the several months ending 30 Sep 2012. A minor part of the demolition (foundations and basement) will occur once Orion leaves the site in calendar 2013.

Orion currently operates from another IL2 standard building location on its CBD site - at 200 Armagh St. This building was previously occupied by Cii – a technology company incubator. To ensure the safety of our employees we have improved the resiliency of the 200 Armagh St with short term measures. For example, based on independent expert engineering advice, we have installed bracing to parts of the building and we have removed some heavy cranes.

In addition to needing a new office building we also need a new office location. This is because CERA wishes to purchase our CBD site as part of its “priority one” CBD recovery plan.

In June 2012, prior to the CERA announcement, we purchased land at 565 Wairakei Road. We have started construction of our new building on this site – Apollo Projects is the key build contractor. Opus was our key independent engineering and architectural advisor on the build contract and was heavily involved with specifying our build requirements – especially with regard to the new building's resiliency.

We aim to move to our new office building at Wairakei Road in June 2013.

Our preference is to eventually move back into the CBD – however we have not forecast any expenditure in the CPP period (to FY19) to achieve this. Any such move back into the CBD would be subject to meeting Orion's operational objectives, such as traffic management, parking for operational vehicles and general resiliency requirements.

As an aside, three weeks prior to the first earthquake on 4 September 2012, the Orion board resolved on 10 August 2010 as follows:

“RESOLVED that the board approve in principle the building of a new building on the existing site and that management firms up on costings, overall size of the building and siting.”

This board resolution followed over two years of study (in conjunction with Opus) on options to refurbish and upgrade the existing (1939 and 1984) offices to IL4 standard in light of CDEM Act requirements. It was decided that it was not economically feasible to do so.

Our other (non Wairakei Road build) corporate property capex aims to ensure that our office buildings continue to meet our ongoing (and changing) needs.

1.2 Obligations

Like all companies, we are subject to the general provisions of a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

We aim to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

- Electricity Act
- Energy Companies Act
- Electricity Industry Act
- Local Government Act
- Electricity Reform Act
- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act

- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act.

Our main obligations under these Acts are contained in our statutory compliance manual.

As a “lifeline” utility, we must comply with the CDEM Act. The CDEM Act stipulates the responsibilities and roles of lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity and resiliency planning and how we relate to other utilities, emergency services, local government and New Zealand’s communities.

For example, the CDEM Act requires us to:

- be able to function to the fullest possible extent during and after an emergency
- have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

This means that we must:

- plan for and ensure continuity of service, particularly in support of critical CDEM activities
- manage our own response to emergencies
- develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- establish relationships with CDEM groups across regions
- operate from an IL4 building.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary NW70.00.14
- Asset Risk Management NW70.60.02

2 Relevant policies and consultants reports

The following consultants’ reports have been considered in the development of this project:

1. “Categorisation of Post-Disaster Facilities – A Guidance Note for use with AS/NZS 1170: Part 0 Table 3.2”. SESOC Journal Volume 20 No.2, September 2007. Developed by a working group convened by David Brunsdon and supported by the DBH.
2. “Orion Communications Network Resiliency Report”, Dr Murray Milner, Milner Consulting Ltd, May 2011
3. “Christchurch Central Recovery Plan”, Christchurch Central Development Unit, 30 July 2012

The following policies are particularly relevant:

1. Procurement policy OR00.00.19 and Contract management NW73.00.03
We follow our procurement and contract management policies to achieve value for money by competitively tendering our work with a value over \$20,000.
2. Delegations of authority policy OR00.00.11
The overall budgeted expenditure for this programme is approved by the Board as part of the overall Asset Management Plan. As and when the expenditure is incurred then approval for the actual expenditure is made in compliance with the delegations of authority policy.
3. Authorised contractors NW73.10.15
We ensure only authorised contractors are allowed access to our network (such access may be subject to limits that can be specific to each contractor).
4. Health and Safety policy OR00.00.01
We follow our health and safety requirements to ensure the safety of the public and our personnel and contractors around our assets.
5. Environmental Sustainability Policy OR00.00.03
We work towards environmental sustainability in our operations.

3 Project description

3.1 Work to be undertaken

Our new head office building to the west of the city will be constructed in FY13 and part of FY14. We:

- purchased 7,700m² of land at 565 Wairakei Road for \$5.2m in June 2012
- are building a two storey IL4 building on site with a 1,550m² footprint. This provides around 3,100m² of floor space.

3.2 Rationale for the project

As noted in Section 1.1 above, the Orion board had already (on 10 August 2010) resolved to pursue a new fit-for-purpose office build – albeit on our current CBD site.

The 22 Feb 2011 earthquake resulted in the permanent loss of our 218 Manchester Street (1939 and 1984) office buildings. These two buildings housed all of our 150 employees and they were located at the west end of our CBD site, facing Manchester Street (on the corner with Armagh Street).

In FY07 we had set up a “back up” network control room and back up “hot site” for our computer servers and our network comms systems at the east end of the site (in our Armagh substation).

We immediately relocated to our “hot site” on 22 Feb 2011. Our “hot site” formed the hub of our earthquake response, where we co-ordinated employee and contractor teams and remote control systems to restore power supply. Our customer contact centre was also relocated here.

We also stored emergency generators and portacabins on our site – some were located on the site of our old “Whisper Tech” building at the centre of the CBD site (the Whisper Tech building was demolished under emergency Civil Defence authorisation in March 2011).

In the weeks and months following the earthquake, our employees gradually moved from our hot site and portacabins to our 200 Armagh St building. All Orion employees are now based in the 200 Armagh St building.

To ensure the safety of our people we have improved the resiliency of the 200 Armagh St building – in particular its earthquake strength level. These improvement projects have been based on independent expert engineering advice from Elmac and Opus. We have also implemented some minor “make-do” improvements to the appearance and services (for example heating and lighting) of these office spaces.

In his independent report, Dr Murray Milner stated that we should diversify the geographical locations from which we can work and operate the network. For example, instead of having our primary and back up control centres located in nearby buildings, distance separation is more appropriate.

Consequently, in June 2012 we purchased land at 565 Wairakei Road, to the west of the city, to construct a new office building. This location is on non-liquefiable land and is around 9km away from our current CBD site.

Our decision to purchase outside the CBD was partly based on relieving the stress on our employees – our offices only came out of the CBD red zone cordon in mid 2012 and it is not fair to ask our employees to remain here in what was likely to be a large CBD construction zone (following over two years of nearby ongoing demolitions).

CERA subsequently announced that it will purchase the vast majority of our current CBD site. So, in hindsight, our commitment to Wairakei Road foreshadowed CERA’s announcement and is consistent with it.

Our CBD site is in the “east frame” of CERA’s CBD recovery plan. The east frame will be parkland and is considered “*priority one*” land which CERA wishes to purchase. CERA will eventually demolish our 200 Armagh St building.

CERA will not purchase our Armagh zone substation on our current CBD site as it’s too expensive to move it – perhaps over \$20m. So this means that we’ll be should be able to retain our control centre and computers and comms systems “hot site” in our Armagh substation buildings for the foreseeable future and at the same time achieve Dr Milner’s recommended separation from our Wairakei Road offices.

Our search for suitable land for the new head office site took over six months, before Wairakei Road was secured. The search was difficult because of our particular requirements and because so many CBD occupants had already vacated to the west of the city meaning land was relatively scarce.

Our requirements included:

- a relatively large area, ideally 10,000m² plus
- correct business zoning within the Christchurch City Council City Plan (a resource consent application to change zoning of land to suit us would have taken too long to achieve given our desire to move reasonably quickly, and a positive consent hearing is never guaranteed)
- dual road access at a minimum for risk-management purposes
- dual fibre communication access for risk-management purposes.

Wairakei Road met most of these requirements, but it is only 7,700m². We are currently attempting to increase this area by purchasing a 2,000m² piece of land at the back of the site. If the negotiations to purchase this land are unsuccessful we will attempt to find another similar parcel of land in the near vicinity, however this is unlikely as this area has become more popular following the earthquakes.

Our recent purchase of Papanui GXP assets from Transpower also potentially gives us some options, which we will assess over the coming several months. One option which could be explored if the land purchase does not occur is moving some operations to the Papanui site. However, this option is not the preferred option as it would incur additional costs in relation to ensuring the site is suitable for use (e.g. a security fence would need to be built). Also there is some question about whether the consents and zoning of this site allow for the proposed increase in commercial use.

3.3 Programme deliverability

We have a successful history in managing a succession of multi-million dollar works, which demonstrates a proven institutional ability to manage property projects and contractors. The contract with Apollo has been signed and construction is well underway.

4 Earthquake consequences

We have described these in previous sections of this paper.

In addition, our pre-earthquake work on our lifelines head office requirements up to FY11 (in conjunction with Opus), and the consequences of the earthquakes themselves, have given us some lessons in how we should design our new office building.

5 Expenditure plan

5.1 Expenditure summary

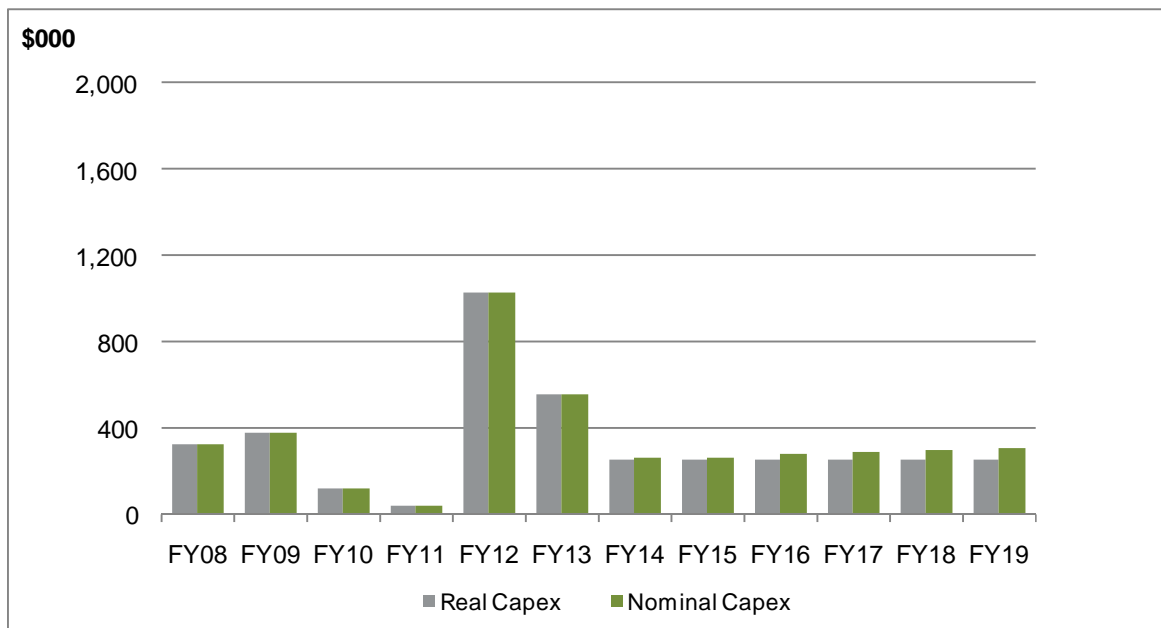
The following chart shows our corporate property forecast and historical capital expenditure in both real and nominal terms.

The increase in the other corporate property capex for FY12 and FY13 relates to “make do” emergency improvements and earthquake strengthening of our 200 Armagh St building following the 22 February 2012 earthquake and “colonisation” of that building by Orion employees.

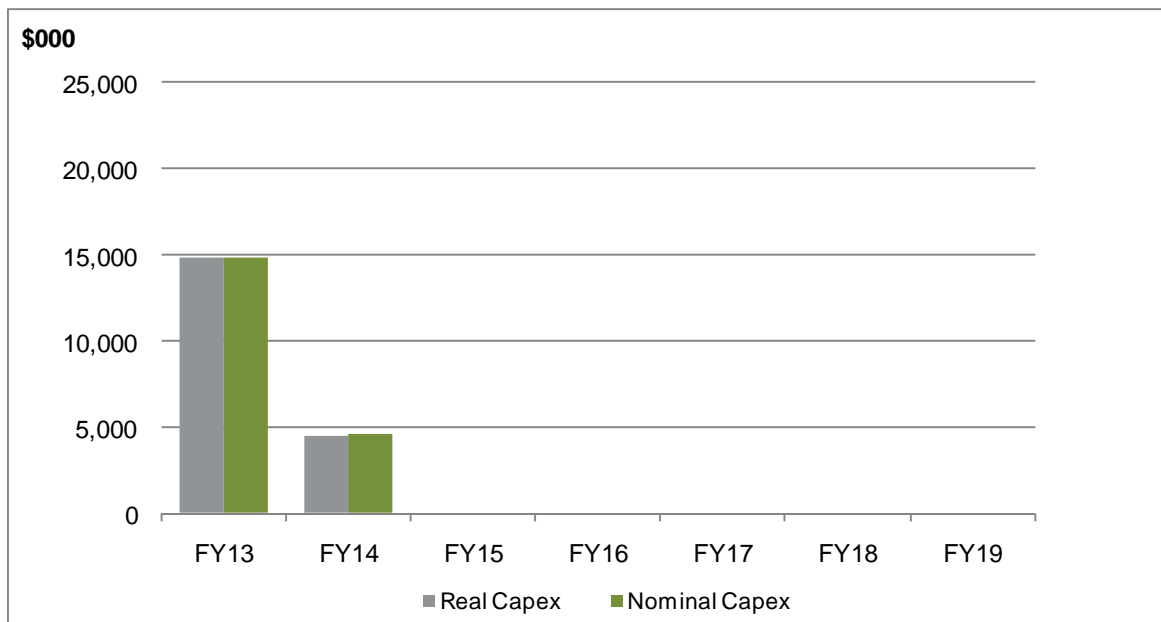
There is no capex for the Wairakei Road build costs before FY13 as the land was purchased in June 2012.

From FY14 to FY19 other corporate capex is all related to minor changes and improvements on the Wairakei Road property to make sure it continues to meet our ongoing requirements. These costs are basically for any “fine-tuning” that is required on the building. It is difficult to determine exactly what changes this expenditure will be required for, as the issues it will fix are currently unknown, however as described in section 5.2 the forecast expenditure has been based on our historical spend.

Other corporate property capex



Wairakei Road capex



The following table sets out our other corporate property historical capital expenditure in nominal terms (\$000).

Corporate property historical capex

	Nominal \$000				
	FY08	FY09	FY10	FY11	FY12
Office Buildings, Depots and Workshops	323	375	119	35	1,032
Total	323	375	119	35	1,032

The following tables summarise our Wairakei Road head office and other corporate property forecast capital expenditure in real terms (\$000).

Wairakei Road forecast capex (real FY13)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Office Buildings, Depots and Workshops	8,100	1,900	-	-	-	-	-
Non Network Land	5,200	1,200	-	-	-	-	-
Office Furniture and Equipment	1,600	1,400	-	-	-	-	-
Total	14,900	4,500	-	-	-	-	-

Other corporate property forecast capex (real FY13)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Office buildings, depots and workshops	560	250	250	250	250	250	250
Total	560	250	250	250	250	250	250

Total corporate property capex (real FY13)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Office buildings, depots and workshops	8,660	2,150	250	250	250	250	250
Non network land	5,200	1,200	-	-	-	-	-
Office furniture and equipment	1,600	1,400	-	-	-	-	-
Total	15,460	4,750	250	250	250	250	250

The following tables summarise our other corporate property forecast capital expenditure in nominal terms (\$000).

Wairakei Road forecast capex (nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Office Buildings, Depots and Workshops	8,100	1,958	-	-	-	-	-
Non Network Land	5,200	1,236	-	-	-	-	-
Office Furniture and Equipment	1,600	1,443	-	-	-	-	-
Total	14,900	4,637	-	-	-	-	-

Other corporate property forecast capex (nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Office Buildings, Depots and Workshops	560	258	266	276	285	294	303
Total	560	258	266	276	285	294	303

Total corporate property capex (nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Office buildings, depots and workshops	8,660	2,216	266	276	285	294	303
Non network land	5,200	1,236	-	-	-	-	-
Office furniture and equipment	1,600	1,443	-	-	-	-	-
Total	15,460	4,895	266	276	285	294	303

5.2 Basis for expenditure forecast

The forecast cost of the Wairakei Road build has been calculated using the following:

	Cost (\$000)	Source
Initial land cost	5,200	Actual cost of purchase
Subsequent land purchase	1,100	Expected cost based on current negotiations
Building cost	10,000	Per contract signed with Apollo Projects Limited
Costs to shift to new site	500	Estimate – approved by the Board
Furniture	600	Estimate – approved by the Board
Communications systems and equipment	400	Estimate – approved by the Board
External advice (legal, consultants etc.)	700	Estimate – approved by the Board
Other sundry costs (generator fuel tank, signage etc)	100	Estimate – approved by the Board
Contingency	800	Estimate – approved by the Board
Total	19,400	

Other corporate property capex for FY14 – FY19 has been forecast based on the average of our FY08 – FY10 expenditure, less a small adjustment to recognise that the Wairakei Road building will be new and has been designed specifically for Orion's current requirements so will not require the same amount of ongoing capex as the current building. The FY08 – FY10 figures have been used as pre-earthquake expenditure is the best basis we have for the ongoing capex costs on a building.

INFORMATION AND TECHNOLOGY CAPEX

CPP64

Programme Summary

1 April 2013 – 31 March 2019

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1 Programme introduction

Programme Name	<i>Information and Technology Capex (CPP64)</i>
Service Category	<i>N/a</i>
Capex Category	<i>Non System Fixed Assets</i>

1.1 Description

This document covers our corporate business information systems and productivity software, and details the criteria and asset management practices used to ensure we obtain effective performance and acceptable service life from these systems. This programme is expected to continue in perpetuity.

1.2 Aims and objectives

The main objectives of the programme are to:

- Support cross-organisational processes and systems, including financial systems, employee management systems and personal productivity software
- Maintain the computer infrastructure, including client devices, individual physical servers, virtual servers, attached storage and corporate data network devices
- Ensure that the IT infrastructure that supports our business as a critical infrastructure provider that needs to be operating continuously (24 x 7 x 365)

1.3 Drivers

As part of its obligations in the Civil Defence Emergency Management (CDEM) Act Orion must be able to function to the fullest possible extent during and after an emergency. An important part of ensuring we can function is ensuring we have a robust and up-to-date IT system that can continue to support our business during and after an emergency. This obligation means that we need to ensure our IT system is high quality so that it is able to handle the stresses that an emergency would put on it. Further details about these requirements are set-out in the obligations section.

1.4 Obligations

Like all companies, we are subject to the general provisions of a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

- Electricity Act
- Energy Companies Act
- Electricity Industry Act
- Local Government Act
- Electricity Reform Act
- Building Act

- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act.

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a *"lifeline"* utility, Orion must comply with the CDEM Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand's communities. The Act requires us to:

- be able to function to the fullest possible extent during and after an emergency
- have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- help define the Crown's CDEM goals and objectives in a National CDEM Strategy
- participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- be capable of managing our own response to emergencies
- develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary NW70.00.14
- Asset Risk Management NW70.60.02

1.5 Relevant policies and planning standards

The forecasted capital expense has been prepared in compliance with the policies and standards set out below.

Delegations of authority policy OR00.00.11

- The overall budgeted expenditure for this programme is approved by the Board as part of the overall Asset Management Plan. As and when the expenditure is incurred then actual expenditure is covered under the delegations of authority policy.

Health and Safety policy OR00.00.01

- This sets out our health and safety requirements to be followed.

Information systems OR00.00.13

- This policy sets out the rules for proper use of information systems and deals with the obligations of users.

Communication systems equipment specification NW74.23.21

- This sets out the requirements for service levels for voice and SCADA data radio networks, identifies key third party service providers and identifies the most significant network "nodes" that comprise the network.

All of Government Contract for Computing

- This establishes a single supply agreement between the Crown and suppliers for certain goods. Orion is able to purchase all computer equipment under this contract. The prices from this agreement are significantly lower than what we could obtain through a tender process.

As part of planning, major changes to information systems (software or hardware) are subject to a project approval process. The process involves the following stages; proposal, business case, business requirements and formal project management. This is outlined in our IT project process model in Appendix A.

2 Assets included

2.1 General

Our corporate business information systems and productivity software support cross-organisational processes within Orion. They include financial systems, employee management systems (e.g. HR, Payroll, Health and safety) and personal productivity software (desktop applications, email, web and document management).

This document also covers our computer infrastructure including client devices, individual physical servers, virtual servers, attached storage, and corporate data network devices. It also includes mobile and fixed communications (telephony and voice radio). It details the criteria and asset management practices used to ensure we obtain effective performance and acceptable service life from these systems.

Our computer infrastructure hosts, connects and provides the physical tools for access to our information systems. It is our policy to own and manage computer infrastructure rather than outsource to third parties because of the critical nature of some of our information systems and the need for them to be continuously connected in real time to equipment on the electricity network.

The equipment that is the subject of this policy document supports the “office” end of our computer and data networks. The demarcation point between Office and Engineering systems (eg SCADA) is typically the firewall between field networks and those in the office buildings.

2.2 Corporate financial management system – Microsoft Dynamics Nav

Our financial system focuses mainly on delivering basic accounting functions. Aside from the obvious (general ledger, job costing, debtors, creditors, accounts payable, fixed assets etc.) the system is also used to manage fixed-assets, accounting, taxation, some works and our vehicle fleet. Detailed asset information is not held in the financial system but is instead recorded in the most appropriate asset management system (GIS or asset register).

There is an interface between the works management system and the financial system to link project activities to jobs.

2.3 HR / payroll (PayGlobal)

Our HR and Payroll system is a “cloud” application hosted by PayGlobal. This system supports all payroll functions including remuneration, shift rosters and leave (requests, approvals and reporting) and also holds records relating to individual contracts and changes of conditions of employment.

The system has recently been extended to include

- Incident management: incident-related payroll and leave management including ACC claim management and rehabilitation plans
- Hazard recording and management
- Personnel training records, qualifications and competencies
- PPE issues to staff and retest alerts
- In-house Course management

Access to the PayGlobal system is available to staff through a secure login, from any internet connected computer.

2.4 Document management – Microsoft SharePoint

Our engineering drawings and standard documents are controlled using a custom built system. This system is used to process the release of CAD drawings to outsourced contractors and return them as “as-built” drawings at the completion of works contracts. Standards and policies maintained in-house are also controlled using this system.

Standard drawings and documents are then posted directly on our ‘restricted’ website and the relevant contractors/designers are advised via an automated email process.

Over the next three years we will implement a formal document management system based around Microsoft’s SharePoint Server. The first phase of the project deals with all

“unstructured data” (documents, spreadsheets, drawing etc) currently residing on file servers, on the hard drives of local machines, in email databases and on paper documents.

2.5 Orion internet website

Our website has two distinct areas. One part which is open to the general public and another that is restricted to those parties that have a business requirement to use our drawings and specifications.

2.6 Email system – Microsoft exchange server

Our email system (Microsoft Exchange Server) supports a range of personal communications and productivity tools including standard email messaging, calendaring/appointments and tasks.

All mobile devices provided to staff Orion synchronise messages, appointments and tasks and access to Mailboxes is also enable through secure connections from public computers.

Our new document management system will enable the publishing of personal email messages into a centralised document repository.

2.7 Desktop software

Our client devices (desktop and laptops) are delivered with a standard configuration including operating system (Microsoft Windows 7) and set of desktop applications including the Microsoft Office suite. We also have a many smaller software solutions for more specific applications.

2.8 Replicated computer rooms

We operate two computer facilities, both of which is capable of delivering a full suite of Operational, Asset Management and Corporate information systems. Following the February 2011 earthquake one of these is housed in our Armagh St substation and the second is a built-for-purpose transportable data centre. (See Reference 1)

Each facility has an Uninterrupted Power Supply (UPS) capable of supporting the equipment for two hours and is connected to a standby generator.

2.9 VM and SAN

Our VMware Virtual Server infrastructure, which is built around a HP Server Cluster and a HP high availability SAN, hosts over 30 virtual servers. This environment allows an instance of any server to run in either of our computer facilities.

A high capacity, high availability network links the two computer facilities together and also links our main offices to each of the facilities.

2.10 Physical servers

Mirrored server “peers” are used to support PowerOn and telephony systems. The PowerOn servers are HP branded devices and the telephone switch proprietary Nortel equipment.

2.11 Desktops and laptops

It is our policy to offer a limited range of desktop and laptops based on the profile of the role undertaken by an employee. Our desktops are currently sourced from HP and our laptops from Toshiba.

2.12 Network

Several data networks are supported in our information system infrastructure which uses CISCO switches and firewalls and provides Gigabit network speeds to desktops and between servers.

Our policy is to separate Corporate and Engineering networks by providing access to each on a least privilege basis.

2.13 Telephone switch

Our telephony infrastructure supports all land based calling including, general calls, Call Centre functions, voice mail, call recording and general/emergency recorded messages for callers. We expect a significant upgrade of equipment will be required in FY16.

2.14 Mobile handsets

We recently adopted a single mobile handset/PDA (iPhone) for the business to reduce support costs and create opportunities for the deployment of business applications to holders of Orion phones. The lifecycle of handsets is two years and we expect to upgrade our equipment in FY15 and FY17.

3 Programme description

3.1 Work to be undertaken

3.1.1 Information systems

Most of the software described in this document is subject to standard lifecycle changes which includes periodic upgrades associated with major version releases. This ensures that this software:

- remains current and supported by vendors
- continues to operate in dynamic environments including frequently changing operating systems
- provides opportunities through new features and functions available in new releases

The exception is Document Management which is in the early stages of implementation and will be delivered in three stages over the next three years. This project is committed.

3.1.2 Computer and telephony infrastructure

The computer infrastructure described in this document is subject to standard lifecycle changes. We generally plan to upgrade desktops, laptops and server equipment on a three year cycle. This reflects IRD rules regarding depreciation and our intention to deliver high performance and resilient systems.

During 2014 an upgrade is planned for our racks and air conditioners in our alternative computer room this year in preparation for our exit from Armagh St.

During 2016 capacity upgrades are also planned to our Virtual Server infrastructure environment in both CPU and storage.

3.2 Network constraints and service targets

Service targets governing the software and computer infrastructure include satisfying the requirements of the Civil Defence Emergency Management Act and the needs of a business that operates 24 hours a day, 7 days a week, 365 days a year.

3.3 Dependencies

The programme is closely related to the IT maintenance programme.

3.4 Programme deliverability

We do not anticipate difficulty in planning or executing the work discussed in this document. The ongoing programme can be carried out within normal contracting arrangements.

3.5 Prioritisation

Most of the expenditure is on a fixed cycle which is relatively short (every two-five years), so wherever possible expenditure is deferred until the scheduled time. If it is not possible to defer the expenditure priority is given to any items which will affect the electricity network's reliability or performance.

4 Earthquake consequences

There have been few negative consequences for the information systems discussed in this document except that some changes were deferred following the earthquakes e.g. the implementation of the document management system. This was due to the focus of the business changing from "business as usual" to recovery.

One of our two data centres was compromised by the February 2011 earthquake and this was replaced in August 2011 with a Rittal Transportable Data Centre. We were successful in recovering and relocating all server and network equipment to the new facility and it has not been necessary to replace core equipment or to significantly change equipment lifecycles. Some additional equipment was purchased to increase system resilience and capacity to support the business during initial recovery activities.

5 Expenditure plan

5.1 Expenditure summary

This programme includes expenditure on licensing agreements for information systems. 80% of licensing agreements are attributed to capital because they are considered to represent prepayment for upgrades. The licensing fee for each year is as follows:

	\$000
FY08	104
FY09	104
FY10	96
FY11	123
FY12	123
FY13	140
FY14	212
FY15	213
FY16	213
FY17	213
FY18	213
FY19	213

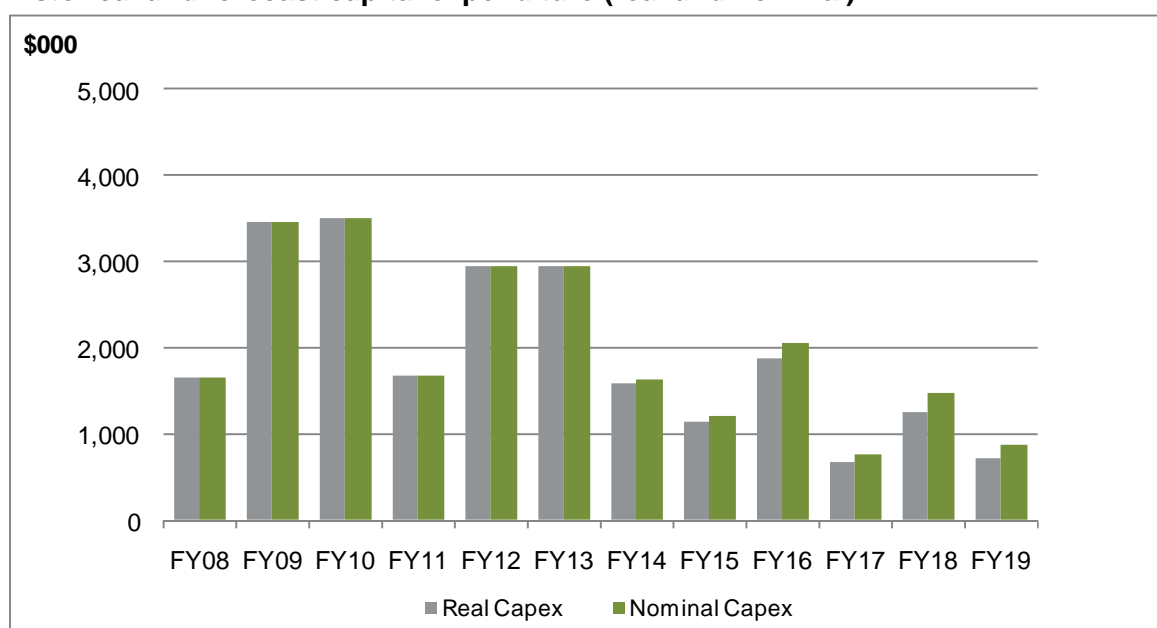
Licensing fees are payable on a range of business, engineering, administrative, security and productivity software which includes;

- Our Microsoft enterprise agreement (Office, client and server Windows operating systems, Email etc)
- Virus / Malware protection
- Data network management
- Building security
- Telephony
- Oracle databases

The step change in FY14 reflects the addition of fees for our new SharePoint document system, Microsoft “true up” costs associated with licenses for new employees and new system management software (Microsoft System Server).

The following chart shows our historical and forecast replacement expenditure in both real and nominal terms. The real terms have been escalated as per the input methodologies’ requirements to ascertain the nominal term.

Historical and forecast capital expenditure (real and nominal)



The above chart shows a significant drop in expenditure in FY14 which reflects specific network related IT reallocated to their own cost centres (in line with AMP reporting) from this point on. Therefore for FY14 to FY19, our IT expenditure relating to specific network functions (e.g. system development enhancements, GIS, PowerOn, USI load management and Foxboro management) have been allocated directly to the relevant programmes (Load management replacement programme (CPP35) and the Control systems replacement programme (CPP34)). Our capex up to FY13 has not been adjusted to reflect this.

A table has been included below which shows the IT capex expenditure from FY08 – FY12 excluding the specific network expenditure which has been reallocated from FY14 onwards.

There are a number of significant one-off expenditure items which account for the expenditure peaks. These include a refurbishment of our second computer facility in FY14. From FY08 – FY12 we have not had completed any project which is a direct equivalent of this refurbishment. However, to give some indication of the expected costs, in FY08 moving a computer room between buildings cost \$590k and setting up a transportable data centre in FY12 cost \$750k.

In FY15 it is expected that there will be an upgrade of the client devices. The client devices were scheduled to be upgraded in FY11, but this was delayed due to the earthquakes. It is expected that the future upgrades will involve the introduction of new types of client devices such as dockable tablet computers to replace our existing desktops and laptops.

Another significant one-off expenditure item is a planned capacity upgrade to our Virtual Server environment (CPU and storage) in FY16. This upgrade is expected to be necessary as there have been dramatic improvements in the virtual server environments since our current solution was installed in FY06. By FY16 we expect that our current solution will be under pressure to fully meet all of our requirements and it will be out of warranty at this time. In addition, we need to ensure we continue to meet all requirements of the CDEM Act, in particular the business continuity provisions, which this upgrade will assist with by providing a more robust platform for our business to operate from.

In FY18 it is expected that there will be an upgrade of the physical servers. Historically, the servers have been purchased as part of the introduction of a complete information system rather than being synchronised with other purchases. Over time we expect to move many of our remaining servers to our virtual environment. However, there are tactical reasons for keeping some information systems separate and in some cases systems are not certified for a virtual environment. We expect the FY18 upgrade of our servers will be the introduction of a 'blade' framework for any remaining servers. Although FY18 is relatively far away (particularly for computer technology) we consider that our current physical servers will remain viable until this point.

Telephony expenditure throughout this period includes all expenditure on mobile phones, which have a lifecycle of two years and our Nortel/Avaya telephone switch. There is significant expenditure expected to be incurred in FY16 due to an upgrade of equipment. This upgrade is required to ensure our equipment stays up-to-date and continues to meet our requirements. Along with the upgrade to our virtual server environment this upgrade

is necessary to ensure we continue to meet the requirements of the CDEM Act. Our experience during the earthquakes showed that a functioning and effective communication system is an integral part of ensuring that our business continues to function to its fullest possible extent following a disaster.

Our Document Management project will be implemented in three phases over the next three years and will be complete by FY15. The document management system is necessary to manage our rapidly increasing store of unstructured data including documents, spread sheets, presentations, email and graphical images. The shared drives on our file servers currently hold in excess of one million files and our email servers a similar number of email messages. The document management system will allow us to more effectively organise this data by;

- making authoritative versions of documents easily accessible and therefore reducing the number of copies that are created
- adding metadata to files to enhance search and categorisation capability
- treating files as assets and managing their life cycle through formal records management
- breaking down structural barriers that create departmental silos
- allowing the introduction of document workflow and collaborative document editing

Other expenditure includes business-as-usual purchases for new employees, replacement for damaged equipment (in particular during FY13 as a result of the earthquakes) and incremental improvements.

In most cases our software licensing costs for systems in this category are considered to be relatively stable (annual licence fee) and likely to be subject only to increases related to CPI and industry changes.

The following tables summarise our historical and forecast expenditure in real and nominal terms for the CPP period.

Historical expenditure

	Nominal \$000				
	FY08	FY09	FY10	FY11	FY12
Information and Technology Systems	1,655	3,454	3,507	1,681	2,953
Total	1,655	3,454	3,507	1,681	2,953

FY08 – FY13 IT capex expenditure (exclusive of specific network expenditure)

	Nominal \$000					
	FY08	FY09	FY10	FY11	FY12	FY13
Information and Technology Systems	1,181	1,191	1,499	501	1,746	1,841
Total	1,181	1,191	1,499	501	1,746	1,841

Forecast expenditure (real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Information and Technology Systems	2,958	1,581	1,145	1,869	674	1,266	731
Total	2,958	1,581	1,145	1,869	674	1,266	731

Forecast expenditure (nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Information and Technology Systems	2,958	1,629	1,219	2,062	768	1,488	887
Total	2,958	1,629	1,219	2,062	768	1,488	887

5.2 Basis for expenditure forecast

Our expenditure forecasts for FY13 have been based on budget prepared on a bottom-up basis during FY12. This budget was prepared by the business unit manager in charge of the expenditure and was reviewed by their corporate manager and the CEO. Any significant changes from prior years were reviewed by senior accounting staff who have challenged any items which appear incorrect or unnecessary.

The expenditure forecasts for FY14 – FY19 have been prepared using the FY13 budget as a base.

Overall we intend to match our information systems to the needs of a business that has obligations as a critical infrastructure provider and that needs to operate continuously- especially during catastrophic events.

These expenditure forecasts do not include any contingencies.

5.3 Key assumptions

We have prepared the expenditure forecasts based on several key assumptions. In particular, we have assumed that the business environment remains stable for the forecast period and that Orion continues to operate in the same manner that it does now. Some of the critical components of these assumptions are:

- No further significant earthquakes or aftershocks
- A continued investment in technology
- A continuation of higher post-quake levels of communication with our customers as we keep them updated on the state of the rebuild and future plans
- A similar regulatory environment with Orion returning to a more active involvement in wider industry issues than has been the case in recent years
- Similar employee numbers for the period.

We expect that there will be an increase in business activity in areas of the business associated with recovery and new developments (central city and new subdivisions). Apart from scale we do not expect there will be a significant change in the kinds of activities undertaken.

In addition we have assumed that our current practices in regard to physical infrastructure, productivity tools, personal communications costs and software maintenance will remain largely the same for the CPP period. These practices include:

- Maintaining our lifecycle management for both software and computer hardware on a three year cycle

- Making use of our own physical server infrastructure for core systems and not moving to a cloud based infrastructure
- Maintaining software licenses using our current model
- Maintaining our own fleet of client devices (such as PCs, laptops, tablets and smart phones) and not employing a 'bring your own device' model.

As the main assumptions mean that for the CPP period Orion will continue to operate in the same manner and in a similar environment to the one we are currently operating in, there is no impact on the expenditure forecasts resulting from these assumptions.

5.4 Expenditure reduction initiatives

We do not have any specific expenditure reduction initiatives for the expenditure in this programme. However, efficiencies are achieved through the competitive nature of the contracting model that we use. As we routinely tender the works, the suppliers will include initiatives and work process efficiencies within their pricing. Other initiatives are included when reviewing the lifecycle of the different assets and the assessment of new products.

A key part of the project process model followed whenever significant changes to our information systems is the requirement that the costs of the project are justified and a cost benefit analysis is performed. This ensures that any major expenditure is justified and economical.

Appendix A – Project Process Model

Project process model

Objectives of this presentation

Describe a process that ensures projects...

- are aligned with strategic outcomes
- achieve the engagement of all appropriate business service owners
- are properly assessed in regard to scope, costs and benefits
- use existing internal process, skills, roles and standards
- can be measured and deliver expected benefits

1

Project process model: Definitions

Project: temporary endeavour with a defined scope, beginning and end, undertaken to meet unique goals and objectives. Not business as usual.

Business as usual: activity that conforms to existing standards and processes

Champion : project proposer and supporter

Sponsor: member of the Senior Management Team with responsibility for dealing with project roadblocks

Business Service Owner : someone who is measured and held accountable for the quality and availability of a service

2

Project process model: Definitions (continued)

Service : combination of people and process delivering an outcome

Business Analyst / Project Manager : project roles with specialist technical skills

Governance Group:

- non-operational group that represents the interests of all affected business units
- ensures all information pertinent to a project is considered
- monitors project progress
- approves the transition from one stage of a project to the next

3

Project phases and activities: Overview

Initiation	1. Concept development Initial Investigation & Socialisation	2. First filter Review by Governance Group	3. Second filter Review by Governance Group
Design Solution	4. Business requirements Describe	5. Design Translate	
Construct Solution	6. Apply design Initiate build process	7. Execute design Build	8. Commission Go live
Operate Solution	9. Operate Use the new system, process, technology		

4

Project phases and activities: Initiation

Phase	1. Concept development Initial Investigation & Socialisation	2. First filter Review by Governance Group	3. Second filter Review by Governance Group
Activity			
Level of Analysis	Description of problem or opportunity Summary of proposed solution	Strategic Alignment Achievability Cost benefit Relative priority Business fit True scope of project	Detailed business case Cost benefit
Outcome	Stakeholders & process owners engaged. Initial cost benefit	Recommendation to proceed or halt	Recommendation to proceed or halt Project is programmed
New Document or Record	Project proposal	Project proposal. Sign off by Governance Group	Business case Proposed budget Operational budget Project scope Project governance Sign off by governance group

5

Project phases and activities: Initiation

First Filter

Similarity to existing

- products
- markets
- customers
- production capabilities
- technologies
- sales/marketing methods
- distribution/delivery methods
- human resources / skills
- size/growth & return/profit criteria

6

Project phases and activities: Initiation

Second Filter

- Cost benefit
- Difficulty of implementation
- Priority (absolute and relative to other projects)

7

Project phases and activities: Design solution

Phase	4. Business requirements	5. Design
Activity	Describe	Translate
Level of Analysis	Detail of new solution Performance expectations Service level expectations Benefits realisation process	Technical standard Lifecycle planning Health and safety policy Maintenance policy Operating standards Procurement policy Training requirements Resource requirements
Outcome	Explicit requirements to be satisfied by new solution Project group and TOR	Recommendation to proceed / halt
New Document or Record	Business requirements Functional specification Project plan Change plan Sign off by Governance group	Tenders Contracts Engineering drawings Commissioning plan Training Detailed budget Maintenance regime Inventory Management Service level agreements Acceptance criteria

8

Project phases and activities: Construct Solution

Phase	Apply design	Execute design	Commission
Activity	Initiate build process	Build	Go live
Level of Analysis	Tender process Contract negotiation Project management Service owner update	Contract management Project management Service owner coordination Audit Service owner coordination Training plan	Service owner coordination Acceptance test
Outcome	Contractors (internal and external) engaged Service owners informed	Solution is built	Solution is live
New Document or Record	Contract	Invoices Contract variations "As built" Manuals Operating instructions Training documents Management reports	Completed acceptance tests Sign off by Governance group

9

Project phases and activities: Operate solution

Phase	Operate
Activity	Use solution
Level of Analysis	Operate systems Maintain assets Use spares Operate network Data entry Minor system updates
Outcome	Business benefits are realised
New Document or Record	Event logs Fault / error reports Management reports

10

Project phases and activities

Recommendation

- Senior Management adopts this framework for all business change projects
- We undertake the socialisation process for the framework with middle managers
- Develop and deliver training to managers to ensure a consistent approach
- Identify governance groups for key functions
 - e.g. IT projects, Electricity network – new technology

11

OVERHEAD LINES 11kV AND 400V SCHEDULED MAINTENANCE

CPP101

Programme Summary

1 April 2013 – 31 March 2019

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1 Programme introduction

Programme Name	<i>Overhead Lines 11kV and 400V (CPP101)</i>
Service Category	<i>Provide and operate network infrastructure</i>
Opex Category	<i>Scheduled maintenance</i>

1.1 Description

The work undertaken in this programme involves the scheduled maintenance of Orion's low voltage and 11kV overhead lines.

While this programme focuses on scheduled maintenance, there are some references to the non-scheduled and emergency maintenance programmes for context. For more detail on those please refer to the overhead lines non-scheduled maintenance programme (CPP113) and the overhead lines emergency maintenance programme (CPP117).

The programme is expected to continue in perpetuity.

1.2 Assets included

The assets that are in this programme are the distribution overhead lines operating at 11kV, 400V or 230V. These are made up of:

- Poles
 - Softwood
 - Hardwood
 - Concrete
 - Steel
- Crossarms
 - Hardwood
 - Steel
- Insulators
 - Glass
 - Porcelain
 - Polymer
- Conductors
 - Aluminium
 - Copper.

1.3 Aims and objectives

The main objectives of the programme are to:

- Ensure the safety of the public and our personnel and contractors around our assets.
- Maintain on an annual basis the 11kV and low voltage overhead lines for which it has been determined that maintenance is the cost effective way to ensure reliability of electricity supply and meeting service level targets (including safety).

1.4 Drivers

The main drivers for undertaking the programme are:

- That assets are maintained in a timely and cost effective manner to ensure the condition and performance of our assets are such that they:
 - meet acceptable target levels of safety to people and property
 - provide acceptable levels of network reliability
- The prudent cost effective management of our assets and associated risks

2 Key Assumptions

The project relies on the following key assumptions:

2.1 Input costs

Project input costs are weighted as follows:

	Labour	Material
11 kV Overhead lines	70%	30%
LV Overhead lines	70%	30%

2.2 Labour escalators

For the labour component of the project cost we have determined that it is not appropriate to use the standard New Zealand wide LCI in relation to this project.

We note that Statistics NZ has recently started to monitor construction costs in Canterbury due to the local pressures on construction resources as a result of the Christchurch rebuild, however their data time series is currently limited and unsuitable.

As local labour cost pressure is evident in our most recent contract tenders we have determined a proposed cost escalation index which we refer to as the Canterbury construction labour index based on estimates of labour.

We have sought external advice cost from two quantity surveyor firms on what we may expect in the market over the remainder of the CPP period in this respect. There is considerable uncertainty, however this CPP process requires us to make appropriate estimates. The resulting labour escalators that we propose are:

Index	FY14	FY15	FY16	FY17	FY18	FY19
Canterbury construction labour	7.5%	7.5%	7.5%	5%	5%	5%

For further information on our derivation see section 9.26.4 to 9.26.6 of the CPP proposal.

2.3 Material escalators

For the various material component of the project costs we have considered the most relevant input components for this project. The resulting material escalators for this project are:

Index materials	FY14	FY15	FY16	FY17	FY18	FY19
PPI	3.04%	3.32%	3.65%	3.20%	3.20%	3.20%

For further information on our derivation see section 9.26.4 of the CPP proposal.

2.4 Certainty of forecast

We believe that the assumed timing of the forecast work is reasonable.

2.5 Non-network solutions

We have not considered any non-network solutions for these projects.

2.6 Cost benefit analysis

We have not carried out a cost benefit analysis on this project.

2.7 Consultants reports

There are no departures from consultants' recommendations in this opex programme. We note that the EA Technology's report are not used for maintenance planning, they are only used to inform the replacement programmes. The EA Technology has made some comment regarding asset replacement/maintenance strategies in relation to smart technologies. These are outside of the EAT brief and are being looked at as part of Orion's overall smart technology business strategies.

2.8 Basis for expenditure forecast

We adopt whole lifecycle practices for our network assets and focus on optimising the lifecycle costs for each asset group to meet agreed service level targets and future demand. We use a mixture of maintenance practices to service our equipment. No single method provides the ultimate solution from an asset management perspective but by using a combination of them we can tailor our maintenance schedule to best suit our lines. The maintenance practices use include: time based maintenance, condition based maintenance, reliability based maintenance, condition based risk management and corrective maintenance. Expenditure forecasts require the use of engineering experience and judgement in conjunction with historical asset performance/condition, and estimates of future maintenance requirements.

Our forecast expenditure is based on the following activities

	11kV (per annum)	400V (per annum)
Conductor replacement	130km	
Retightening	6 feeders (150km)	2000 sites plus all new lines/poles within 12-18 months
Crossarm and insulator replacement	300 sites	2000 sites
Retention conductors	72 sites	130 sites
Tree trimming	60 feeders	5000 street properties

This programme involves our maintenance of low voltage overhead lines. Maintenance requirements are primarily based on a 'Conditional Assessment Survey' carried out every five years with a street by street visual check.

Every two years a corona camera inspection of all 11kV overhead lines is carried out. The camera provides the ability to visually detect partial discharge occurring on equipment, eg cracked insulators and defective components at early stages of degradation thus minimising unscheduled outages.

Maintenance work currently planned is as follows:

- Re-tightening programme on a street by street basis of all line components to reduce wear and fatigue on the poles. The Re-tightening Cycle Programme specifies that:
 - New lines/poles are retightened within 12-18 months of installation; and
 - Re-tightened at 30 year intervals thereafter
- At the 30 year mark a full inspection of all equipment is carried out and remedial work is undertaken as required
- As part of the sub transmission (33kV) maintenance, the 11kV underbuilt is maintained:
 - Old 821 insulators replaced with new 1130W insulators
 - Hand binders replaced with distribution ties
 - Replace 7.5mmØ stay wires with new standard stay wires and replace anchor blocks
 - Copper tails changed to aluminium tails
 - Bimetal jumpers and joints replaced
 - Line guards changed to armour guards
 - Stay insulators changed to new standard insulators
- The clearing of trees from lines to comply with regulations.

The CCC installs outreach street lighting arms and tsunami alert warning sirens on our poles. Arc Innovations has also installed antennas and equipment for remote metering on existing poles. In these circumstances the additional loading to the poles is assessed and requires some poles to be changed to meet the additional load.

The following tables provide a more detailed breakdown of the forecast expenditure. The FY10 was the basis of the forecast, as there were significant budget adjustments between the FY09 and the FY10 years. Budgets were increased in the order of \$0.3M for additional trees costs and \$0.5M in retightening and maintenance.

The underlying projected costs are in line with the FY10 costs.

11kV Overhead Scheduled Maintenance

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Tree Cutting	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Equipment Leasing (ultra sound)	30	30	30	30	30	30	30
Pole Inspections/ assessments TEMCO (1/3 rural area)	-	490	490	490	-	-	490
Live Line Retightening/cross arms and insulators	500	500	500	500	500	500	500
Total	2,030	2,520	2,520	2,520	2,030	2,030	2,520

400V Overhead Scheduled maintenance

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
400V Trees	1,100	1,100	1,100	1,100	1,100	1,100	1,100
Low Voltage Problems	30	30	30	30	30	30	30
Pole retightening urban area	250	280	225	225	225	225	225
Pole Inspections/ assessments (TEMCO urban area)	450	-	-	-	450	450	-
Telecommunication Service Connections	100	100	100	100	100	100	100
Removal of assets in red zones	25	835	835	835	-	-	-
Mains (rural overboundary)	560	560	560	560	520	520	520
Total	2,515	2,905	2,850	2,850	2,425	2,425	1,975

Forecast maintenance operational expenditure is increased due to:

- Scheduled maintenance will be increased as earthquake damaged assets are subject to increased levels of scheduled maintenance to mitigate the potential for unplanned interruptions. This is expected to reduce over time.
- Additionally, there is an increase from FY14 – FY16 due to the planned removals of a number of assets in the 'red zone'. The allowance is for the removal of Orion's overhead assets (LV) and removal of any associated ground mounted LV distribution boxes associated with feeding the residential connections. It is estimated that approximately 55km (approximately 1.8%) of overhead LV line is to be removed

- Non-scheduled maintenance is expected to be close to the historical average.
- Emergency works maintenance costs are expected to increase as the emergency works contract now contains new resiliency criteria that require our contractors to meet our obligations under the Civil Defence Emergency Management CDEM Act. A risk review was undertaken by the contractors to determine their susceptibility to future events. The costs incurred to mitigate these issues have been apportioned across each of the asset classes.

2.9 Obligations

Like all companies we are subject to the general provisions of a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

- Electricity Act
- Energy Companies Act
- Electricity Industries Act
- Local Government Act
- Electricity Reform Act
- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act.

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a "lifeline" utility, Orion must comply with the Civil Defence Emergency Management (CDEM) Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand's communities.

The Act requires us to:

- Be able to function to the fullest possible extent during and after an emergency
- Have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- Help define the Crown's CDEM goals and objectives in a National CDEM Strategy
- Participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- Provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- Plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- Be capable of managing our own response to emergencies
- Develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- Establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary NW70.00.14
- Asset Risk Management NW70.60.02.

3 Relevant policies and planning standards

Asset management policy NW70.00.46

- We have used Orion's condition assessment survey as well as consideration of time-based and reliability based maintenance approaches combined with Orion's engineering knowledge and experience to forecast asset maintenance.

Procurement policy OR00.00.19 and Contract management NW73.00.03

- We follow our procurement and contract management policies to achieve value for money by competitively tendering our work with a value over \$20,000.

Delegations of authority policy OR00.00.11

- The overall budgeted expenditure for this programme is approved by the Board as part of the overall Asset management Plan. As and when the expenditure is incurred then approval for the actual expenditure is made in compliance with the delegations of authority policy.

Authorised contractors NW73.10.15

- We ensure only authorised contractors are allowed access to our network (such access may be subject to limits that can be specific to each contractor).

Health and Safety policy OR00.00.01

- We follow our health and safety requirements to ensure the safety of the public and our personnel and contractors around our assets.

Environmental Sustainability Policy OR00.00.03

- We work towards environmental sustainability in our operations.

Inspection and Condition Assessment of Overhead Line Structures NW72.21.11

- This sets out an inspection and assessment procedure for Orion's overhead lines.

Overhead Line Work NW72.21.01, Overhead Line Standard Construction Drawings NW72.21.18, Earthing Installation NW 72.28.01, Earthing Testing NW 72.28.02, Thermographic Survey of HV Network NW72.21.10, Vegetation Work Adjacent to Overhead Lines NW72.24.01 and Vibration Dampers NW 72.21.13.

- These standards outline the methods of line construction and maintenance practices.

Overhead Conductors NW74.23.17, Treated Softwood Timber Poles NW74.23.06, Hardwood Timber Poles NW74.23.08, Cross Arms NW74.23.19 and Approved Earthing Equipment and Application NW 74.23.20.

- These specifications set out the requirements for materials.

NZ Code of Practice for Electrical Safe Distances (NZCEP 34)

- This sets out the requirements for all activities around electrical wires.

11kV Overhead Lines – Asset Management Report YE 2012 (NW70.00.27) and Low Voltage Overhead Lines – Asset Management Report YE 2012 (NW70.00.25)

- These asset management reports set out the assets included and processes followed in this programme in more detail.

4 Programme description

4.1 Work to be undertaken – 11kV overhead lines

Maintenance requirements for 11kV overhead lines are primarily based on a 'Conditional Assessment Survey' cycle with a street by street visual check.

Other surveys conducted which form part of the maintenance programme are:

- A corona camera inspection of the 11kV overhead lines is carried out. The camera provides the ability to visually detect partial discharge occurring on equipment, eg cracked insulators and defective components at early stages of degradation thus minimising unscheduled outages.
- A thermal imaging scan is conducted of selected areas if it is deemed necessary.

Maintenance work currently planned is as follows:

- Conductor replacement based on a condition assessment and/or performance issues (worst performance feeder) is carried out during rebuilding. Some crossarms, insulators and ties are replaced at this stage also. Maintenance on approximately 130km is carried out per year.
- Live line re-tightening programme on a feeder by feeder basis of all line components to reduce wear and fatigue on the poles. The re-tightening cycle programme specifies that:
 - New lines/poles are retightened within 12-18 months of installation and
 - Re-tightened at 20 year intervals thereafter
- All poles are inspected on a 5-year cyclic basis which is a safety inspection. This

is in accordance with NW72.21.11 Inspection and assessment of overhead structures. They are also inspected as part of the 20 year full maintenance programme.

- At the 20 year mark a full inspection of all equipment is carried out and remedial work is undertaken as required. Some crossarms, insulators and ties are replaced at this stage also. Maintenance on approximately six feeders (150km) is carried out per year.
- Maintenance on approximately four kilometres of 11kV overhead lines is carried out per year as part of the subtransmission overhead lines scheduled maintenance programme. Refer to the subtransmission overhead lines scheduled maintenance programme (CPP100).
- Replacing crossarms and insulators. Maintenance on approximately 300 sites is carried out per year.
- Retention conductors for uneven sagging as a result of twisted crossarms. Maintenance on approximately 72 sites is carried out per year.
- Orion continues to focus on clearing trees from lines. Maintenance on approximately 60 feeders is carried out per year.

Other maintenance work is carried out on as-required basis.

4.2 Work to be undertaken – low voltage overhead lines

Maintenance requirements for low voltage overhead lines are primarily based on a 'Conditional Assessment Survey' cycle with a street by street visual check.

Maintenance work currently planned is as follows:

- Re-tightening programme on a street by street basis of all line components to reduce wear and fatigue on the poles. The re-tightening cycle programme specifies that:
 - New lines/poles are retightened within 12-18 months of installation and
 - Re-tightened at 30 year intervals thereafter.
- At the 30 year mark a full inspection of all equipment is carried out and remedial work is undertaken as required. Some crossarms, insulators and ties are replaced at this stage also. Maintenance on approximately 2,000 poles is carried out per year.
- Replacement of crossarms and insulators.
- Retention conductors for uneven sagging as a result of twisted crossarms. Maintenance on approximately 130 sites is carried out per year.
- Orion continues to focus on clearing trees from lines. Maintenance on approximately 5,000 street properties is carried out per year.
- The Christchurch City Council installs various outreach street lighting arms and tsunami alert warning sirens on our poles. Arc Innovations has also installed antennas and equipment for remote metering on existing poles. On these occasions the additional loading to the poles is assessed and requires some poles

to be changed to meet the additional load.

Other maintenance work is on an as-required basis.

4.3 Network constraints and service targets

There are no constraints expected due to forecast load.

Assets must be maintained regularly. Allowing the assets' condition to deteriorate significantly is not appropriate as the consequences of doing so pose a significant risk and are very costly to rectify.

The project contributes to meeting Orion's overall service targets and safety by ensuring that assets are replaced as and when required by the programme and asset management policy.

4.4 Dependencies

The programme is closely related to the 11kV and low voltage overhead lines replacement programme (CPP31), the overhead lines non-schedule maintenance programme (CPP113) and the overhead lines emergency maintenance programme (CPP117).

4.5 Programme deliverability

The ongoing maintenance programme can be carried out within normal contracting arrangements. By having a smooth expenditure forecast we try to avoid peaks and troughs in the work load for our contractors. This enables us to achieve our medium to long term requirements and assists the contractors in their resourcing planning.

4.6 Prioritisation

Prioritisation is based on a number of factors.

Ensuring the safety of the public and our personnel around our assets:

Maintenance of assets required as a result of immediate safety issues will be completed under our emergency works contracts. Accelerated maintenance of assets with known safety issues that can be kept in service with restricted operating protocols is factored into our maintenance programme.

Satisfying individual or collective consumer expectations:

We consider satisfying consumers reasonable expectations as a very influential prioritisation factor. We give priority to the constraints that are most likely to impact consumer supply through extended or frequent outages, or compromised power quality. This is in the context of the overall level of quality that we believe is reasonable to provide.

Managing contractor resource constraints:

We aim to maintain a steady work flow to contractors. The contractors have a diversity of skill sets covering different aspects of our assets and we seek to ensure that our mix of projects, in any given year broadly aligns with that diversity. This ensures that contractor personnel and equipment levels match our capital build program year-on-year at a consistent level, reducing the risk of our contractors being over or under resourced.

Our asset maintenance programme:

We determine our maintenance priorities by following the general principle that the assets supplying the greatest number of consumers receive the highest priority. We extensively review areas of the network where scheduled asset maintenance programmes occur to ensure the most efficient and cost-effective solution is sought to fit in with the current and long-term network development structure.

5 Earthquake consequences

Earthquakes affected the 11kV and low voltage overhead lines across the network. Ground movement and liquefaction as a result of the earthquakes caused instances of foundation failure and the subsequent leaning of poles reduced conductor clearance either to other conductors or to the ground. All unsafe poles and lines have been rectified to the new standards. Other leaning poles will be rectified under the normal maintenance schedule.

Our resources were constrained following the earthquakes as staff and contractors were diverted to deal with the immediate aftermath of the events. This resulted in a reduction in the scheduled maintenance programme for those years. This diversion of resources resulted in increased expenditure in the emergency maintenance for FY11 and FY12 as immediate repairs were carried out to the damaged network.

As the programme we are working towards is that the majority of scheduled works is to be carried out on a cyclic feeder basis at intervals of 20 to 30 years. The relatively small reduction in the levels of schedule work (historical costs) will be recovered over a long period, thus they have a minor/negligible impact on the projections.

6 Expenditure plan

6.1 Expenditure summary for total maintenance expenditure

The following tables summarise our 11kV and low voltage overhead lines historical total maintenance expenditure (in \$000) for FY08 - FY12. The tables split the expenditure into the following categories:

- Scheduled maintenance – is work carried out as part of the maintenance programme. These works are tendered out as part of our contracting model. Historic and forecast maintenance expenditure is detailed in section 6.2.
- Non-scheduled maintenance – is for unknown issues that may occur but would not be carried out under the emergency contract
- Emergency maintenance – this is for all works carried out under the Emergency Works Contract.

During FY10 we ran a tree clearing programme for our 11kV overhead line network, this resulted in an increase in the scheduled maintenance expenditure for that year.

Historical 11kV overhead lines maintenance expenditure (\$000)

	FY08	FY09	FY10	FY11	FY12
Scheduled	1,546	2,238	2,993	1,933	1,599
Non-Scheduled	240	216	460	264	217
Emergency	657	720	683	709	740
Total	2,443	3,174	4,136	2,906	2,557

Historical low voltage overhead lines maintenance expenditure (\$000)

	FY08	FY09	FY10	FY11	FY12
Scheduled	1,722	1,446	1,435	1,190	1,601
Non-Scheduled	494	692	613	602	516
Emergency	698	553	590	1,450	1,875
Total	2,914	2,692	2,639	3,242	3,992

During FY11 and FY12 there was an increase in total emergency maintenance expenditure due to the diversion of contractor resources on to recovery efforts.

Total historical overhead lines maintenance expenditure (\$000)

	FY08	FY09	FY10	FY11	FY12
Scheduled	3,268	3,684	4,428	3,123	3,200
Non-Scheduled	734	908	1,073	866	733
Emergency	1,355	1,273	1,273	2,159	2,615
Total	5,357	5,866	6,775	6,148	6,549

The following tables summarise our 11kV and low voltage overhead lines forecast total maintenance expenditure (in \$000) for the CPP period.

Forecast 11kV overhead lines maintenance expenditure (\$000)

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Scheduled	2,030	2,520	2,520	2,520	2,030	2,030	2,520
Non-Scheduled	415	415	415	415	415	415	415
Emergency	700	950	950	1,135	950	950	950
Total	3,145	3,885	3,885	4,070	3,395	3,395	3,885

Forecast low voltage overhead lines maintenance expenditure (\$000)

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Scheduled	2,515	2,905	2,850	2,850	2,425	2,425	1,975
Non-Scheduled	330	330	330	330	330	330	330
Emergency	700	950	950	1,135	950	950	950
Total	3,545	4,185	4,130	4,315	3,705	3,705	3,255

Total forecast overhead lines maintenance expenditure (\$000)

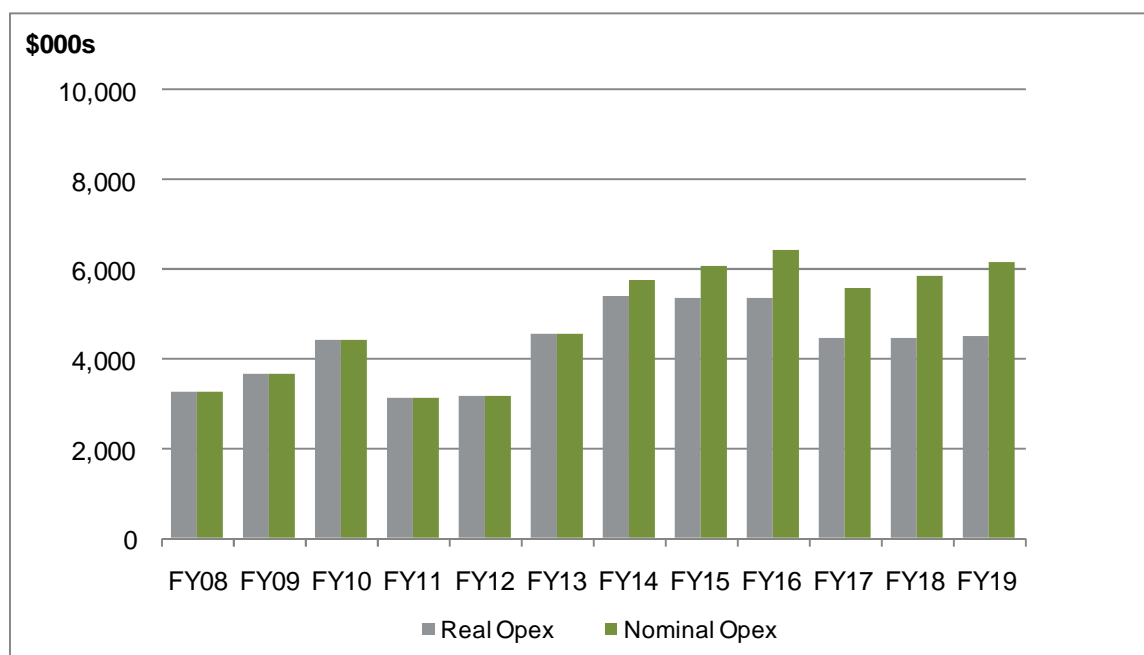
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Scheduled	4,545	5,425	5,370	5,370	4,455	4,455	4,495
Non-Scheduled	745	745	745	745	745	745	745
Emergency	1,400	1,900	1,900	2,270	1,900	1,900	1,900
Total	6,690	8,070	8,015	8,385	7,100	7,100	7,140

These expenditure forecasts do not include any contingencies. A general cross-asset contingency is covered in the maintenance contingency opex estimate (CPP120).

6.2 Expenditure summary for scheduled maintenance expenditure

The following chart shows our 11kV and low voltage overhead lines historical and forecast maintenance expenditure in both real and nominal terms. The real terms have been escalated as per methodology outlined in the CPP proposal to ascertain the nominal terms.

Historical and forecast scheduled maintenance expenditure



The following tables summarise our 11kV and low voltage overhead lines forecast and historical scheduled maintenance expenditure in both real and nominal terms (\$000):

Historical scheduled expenditure

	Nominal \$000				
	FY08	FY09	FY10	FY11	FY12
11kV Overhead Lines	1,546	2,238	2,993	1,933	1,599
LV Overhead Lines	1,722	1,446	1,435	1,190	1,601
Total	3,268	3,684	4,429	3,123	3,201

Forecast scheduled expenditure (real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
11kV Overhead Lines	2,030	2,520	2,520	2,520	2,030	2,030	2,520
LV Overhead Lines	2,515	2,905	2,850	2,850	2,425	2,425	1,975
Total	4,545	5,425	5,370	5,370	4,455	4,455	4,495

Forecast scheduled expenditure (nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
11kV Overhead Lines	2,030	2,675	2,843	3,026	2,547	2,662	3,454
LV Overhead Lines	2,515	3,084	3,216	3,422	3,043	3,180	2,707
Total	4,545	5,759	6,059	6,448	5,590	5,842	6,161

As outlined in section 2.8 there is an increase in expenditure due to:

- Increased levels of scheduled maintenance to mitigate the potential for unplanned interruptions increased as a result of earthquake damaged assets. This is expected to reduce over time; and
- From FY14 – FY16 due to the planned removals of a number of assets in the ‘red zone’. The allowance is for the removal of Orion’s overhead assets (LV) and removal of any associated ground mounted LV distribution boxes associated with feeding the residential connections. It is estimated that approximately 55km (approximately 1.8%) of overhead LV line is to be removed.

7 References

Documents that should be read in conjunction with this Programme summary are:

- 11kV Overhead Lines – asset management report YE 2012 (NW70.00.27)
- Low Voltage Overhead Lines – asset management report YE 2012 (NW70.00.25)

TRANSFORMERS SCHEDULED MAINTENANCE

CPP108

Programme Summary

1 April 2013 – 31 March 2019

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1 Programme introduction

Programme Name	<i>Transformers scheduled maintenance (CPP108)</i>
Service Category	<i>Provide and operate network infrastructure</i>
Opex Category	<i>Scheduled maintenance</i>

1.1 Description

The work undertaken in this programme involves the scheduled maintenance of Orion's transformers.

While this programme focuses on scheduled maintenance, there are some references to the non-scheduled and emergency maintenance programmes for context. For more detail on these programmes please refer to the network assets non-scheduled maintenance programme (CPP114) and the network assets emergency maintenance programme (CPP119).

This programme is expected to continue in perpetuity.

1.2 Assets included

The assets that are included in this programme are voltage regulators, power and distribution transformers. These include:

Voltage regulators:

- 11kV oil filled voltage regulators, 550kVA to 20MVA

Power transformers:

- 20/40MVA (1969-1986)
 - Ferranti, 66/11kV, dual rated with a separate cooling tower, Oil Forced and Air Forced (OFAF)
 - Tyree, 66/11kV, dual rate with a separate cooling tower, OFAF
- 20/40MVA (2001-2007)
 - 34/40MVA, dual rated with integrated cooling tower, Oil Natural and Air Forced (ONAF)
 - 20MVA, dual rated with integrated cooling tower, Oil Directed and Air Forced (ODAF)
- 11.5/23MVA
 - 66/11kV, Pauwells, dual rated with integrated cooling tower, ODAF
 - 33/11kV, dual rated with separate cooling towers, except Larcomb, dual rated with integrated cooling tower
- 10/20MVA, Tyree, 33/11kV only, dual rated with integrated cooling tower
- 7.5/10MVA
 - 66/11kV, dual rated with integrated cooling tower
 - 33/11kV, dual rated with integrated cooling tower
- 7.5MVA, single rated with integrated cooling, no fans, Oil Natural and Air Natural (ONAN)

- 2.5MVA, single rated with integrated cooling, no fans, ONAN

Distribution transformers:

- 11kV/400V
 - 5kVA to 200kVA, pole mounted
 - 250kVA to 1500kVA, ground mounted, outside (pad) or indoors (substation)

1.3 Aims and objectives

The main objectives of the programme are to:

- ensure the safety of the public and our personnel and contractors around our assets
- maintain on a periodic basis high voltage regulators and power and distribution transformers for which it has been determined that maintenance is the cost effective way to ensure reliability of electricity supply and meeting service level targets (including safety).

1.4 Drivers

The main drivers for undertaking the programme are:

- that assets are maintained in a timely and cost effective manner to ensure the condition and performance of our assets are such that they:
 - meet acceptable target levels of safety to people and property
 - provide acceptable levels of network reliability
- the prudent cost effective management of our assets and associated risks.

2 Key Assumptions

2.1 Input cost mix

For the purposes of assigning input cost escalators we have assumed the following input cost weightings:

	Labour	Materials
Power transformers	70%	30%
Distribution transformers	70%	30%

2.2 Labour escalators

For the labour component of the project cost we have determined that it is not appropriate to use the standard New Zealand wide LCI in relation to this project.

We note that Statistics NZ has recently started to monitor construction costs in Canterbury due to the local pressures on construction resources as a result of the Christchurch rebuild, however their data time series is currently limited and unsuitable.

As local labour cost pressure is evident in our most recent contract tenders we have determined a proposed cost escalation index which we refer to as the Canterbury construction labour index based on estimates of labour.

We have sought external advice cost from two quantity surveyor firms on what we may expect in the market over the remainder of the CPP period in this respect. There is considerable uncertainty, however this CPP process requires us to make appropriate estimates. The resulting labour escalators that we propose are:

Index	FY14	FY15	FY16	FY17	FY18	FY19
Canterbury construction labour	7.5%	7.5%	7.5%	5%	5%	5%

For further information on our derivation see section 9.26.4 to 9.26.6 of the CPP proposal.

2.3 Material escalators

For the various material component of the project costs we have considered the most relevant input components for this project. The resulting material escalators for this project are:

Index materials	FY14	FY15	FY16	FY17	FY18	FY19
PPI	3.04%	3.32%	3.65%	3.20%	3.20%	3.20%

For further information on our derivation see section 9.26.4 of the CPP proposal.

2.4 Programme deliverability

We believe that the assumed timing and deliverability of the forecast work is achievable.

The ongoing maintenance programme can be carried out within normal contracting arrangements. The scheduling of the work can be altered to some extent to take into account resource constraints and network loadings.

Our contracting model allows the contractors to bring in additional resources to assist them in completing their contracted works. We have multiple contractors working in the different asset classes that ensure that under normal circumstances that there is more resource available than required. If the contractors are unable or unwilling to bring in additional resource to facilitate indicated increasing workloads, we will add additional contractors to our work base. This has occurred in the past, examples being the introduction of additional tree contractors.

2.5 Non-network solutions

We have not considered any non-network solutions for these projects.

2.6 Cost benefit analysis

We have not carried out a cost benefit analysis on this project.

2.7 Consultants reports

There are no departures from consultants' recommendations in this opex programme.

2.8 Basis for expenditure forecast

We adopt whole lifecycle practices for our network assets and focus on optimising the lifecycle costs for each asset group to meet agreed service level targets & future demand.

Scheduled maintenance expenditure is based on a bottom up approach we have both major and minor maintenance programmes that cover Zone substations. The major programmes are based on a four year cycle while the minor programmes are based on an annual cycle.

Power Transformers

We have 42 66kV power transformers and 33 33kV power transformers of various rating as shown in the table below:

Power transformer quantities (including emergency spares)

Rating MVA	66kV	33kV
30/60	2	-
20/40	25	-
20/24	2	-
11.5/23	7	7
10/20	-	4
7.5/10	6	1
7.5	-	17
2.5	-	4
Total	42	33

The power transformers are inspected ever two months and on an annual basis oil tests for insulation breakdown are carried out, on a bi-annual cycle moisture, acidity and dissolved gas analysis are carried out.

On a four year cycle and as part of the zone substation maintenance cycle winding insulation tests are carried out. Half life tests and refurbishment on 66/33kV transformers are carried on power transformers when they reach their half-life at 40 years.

Tap changer maintenance is based on an annual and four yearly cycle as part of the four-yearly Zone substation cycle The oil in tap changes is reconditioned on an annual basis and invasive maintenance of tap changes is done every four years.

Voltage regulators

We have 20 11kV voltage regulators of various ratings as shown in the table below

Voltage regulator quantities (including emergency spares)

Rating MVA	11kV
20	3
4	12
1	2
0.75	2
0.65	1
Total	20

Voltage regulators installed at Zone substations are included with the annual and four yearly power transformer tap changer maintenance programmes. The new 4MVA regulators are included in a separate section of the distribution maintenance round and are serviced on an eight-yearly cycle

Distribution Transformers

With the exception of the network substation transformers, distribution transformers are normally maintained when they are removed from the network for loading reasons or substation works. Their condition is assessed then assessed on a lifetime cost basis and we decide, prior to maintenance, whether it would be more economic to replace them. If we decide to maintain them they will be improved to a state where it can be expected the transformer will give at least another 15 to 20 years service without maintenance.

Some on-site maintenance is carried out on transformers which are readily accessible from the ground. This work mainly relates to building substations which require maintenance as identified during inspection programmes.

2.9 Obligations

Like all companies we are subject to the general provisions of a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

- Electricity Act
- Energy Companies Act
- Electricity Industry Act
- Local Government Act
- Electricity Reform Act
- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act.

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a “lifeline” utility, Orion must comply with the Civil Defence Emergency Management (CDEM) Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand’s communities. The Act requires us to:

- be able to function to the fullest possible extent during and after an emergency
- have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- help define the Crown’s CDEM goals and objectives in a National CDEM Strategy
- participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- be capable of managing our own response to emergencies
- develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary (NW70.00.14)
- Asset Risk Management (NW70.60.02)

3 Relevant policies and planning standards

Asset management policy (NW70.00.46)

- We use time/age, reliability and condition based maintenance approaches to forecast asset maintenance.

Procurement policy (OR00.00.19) and Contract management (NW73.00.03)

- We follow our procurement and contract management policies to achieve value for money by competitively tendering our work with a value over \$20,000.

Delegations of authority policy (OR00.00.11)

- The overall budgeted expenditure for this programme is approved by the Board as part of the overall Asset management Plan. As and when the expenditure is incurred then approval for the actual expenditure is made in compliance with the delegations of authority policy.

Authorised contractors (NW73.10.15)

- We ensure only authorised contractors are allowed access to our network (such access may be subject to limits that can be specific to each contractor).

Health and Safety policy (OR00.00.01)

- We follow our health and safety requirements to ensure the safety of the public and our personnel and contractors around our assets.

Environmental Sustainability Policy (OR00.00.03)

- We work towards environmental sustainability in our operations.

Asset Management Lifecycle Budget Forecasting Process (NW70.60.15)

- This policy sets out our budgeting approach for our maintenance and replacement programmes in more detail.

Voltage Regulators – Asset Management Report YE 2012 (NW70.00.41), Power Transformers – Asset Management Report YE 2012 (NW70.00.23) and Distribution Transformers – Asset Management Report YE 2012 (NW70.00.40)

- These asset management reports set out the assets included and processes followed in this programme in more detail. For technical standards regarding these assets refer to sections 3.1, 3.2 and 3.3 of these reports.

4 Programme description

4.1 Work to be undertaken – voltage regulators

Voltage regulators installed at our zone substations are included in the annual and four-yearly tap-changer maintenance programmes. The new 4MVA regulators are included in a separate section of the distribution maintenance round and are serviced on an eight-yearly cycle as detailed in Orion's Technical Specifications:

Operator Instruction Standards:

- NW72.13.201 - 11kV Regulator Ferranti
- NW72.13.203 - 11kV Regulator ASEA
- NW72.13.204 - 11kV Regulator Siemens.

Maintenance Standards:

- NW72.23.01 - Mineral Insulating Oil Maintenance
- NW72.23.07 - Zone Substation Maintenance
- NW72.23.22 - Installation or Changing regulators on O/D Pad mounted sites.

4.2 Work to be undertaken – power transformers

At present our power transformers are tested and maintained as part of the zone substation maintenance and inspection rounds as detailed in Orion's Technical Specifications:

- NW72.23.01 - Mineral Insulating Oil Maintenance
- NW72.23.07 - Zone Substation Maintenance
- NW72.23.25 - Power Transformer Servicing.

Half Life Refurbishments

We carry out refurbishments on power transformers when they reach their half-life at 40 years. With the progression into condition based maintenance though, the refurbishments will be dictated by a health score which will be driven by a number of condition indicators, rather than by age. By undertaking a half-life refurbishment on a power transformer we can increase its lifecycle, which is more beneficial economically than purchasing a new unit.

Online maintenance techniques

We use two portable oil monitoring/conditioning trailers, manufactured by Trojan, to monitor and remove excess moisture from our transformer oil. One trailer, with a Calisto 2 gas online DGA and moisture monitor will carry out analysis of the transformer oil moisture level. It monitors the hydrogen (H₂) and Carbon Monoxide (CO) levels present in the oil. All zone substation power transformers are analysed over a two year period.

The second trailer has an inline oil filtration system and is used to target transformers with higher than desirable levels of moisture in their oil. We are also investigating other means of online testing.

Tap-changer Replacement/Maintenance

Annual tap-changer operations can be recorded via modern transformer management relays. A process is being developed to download this data for analysis. If any tap-changers appear to operate more frequently than others in the network an investigation can be undertaken to determine the cause. Switching under load also affects the amount of wear on tap-changer contacts so it is important we consider this whilst developing the maintenance regime.

Vacuum tap-changers require maintenance after 300,000 operations compared with 150,000 for oil. Since our rural transformers require more tap operations per annum, the older style oil tap changers on these units were replaced with vacuum tap-changers. This means that the frequency of maintenance on rural tap-changers can be extended.

4.3 Work to be undertaken – distribution transformers

With the exception of the transformers in network substations, distribution transformers are normally maintained when they are removed from service for loading reasons or because of maintenance work. Their condition at that stage is assessed on a lifetime costs basis and we decide, prior to any maintenance, whether it would be more economic to replace them. If we decide to maintain them they will be improved to a state where it can be expected the transformer will give at least another 15 to 20 year's service without maintenance.

Some on-site maintenance is carried out on transformers which are readily accessible from the ground. This work mainly relates to distribution transformers within building substations that require maintenance as identified during maintenance inspection programmes.

Our maintenance standards:

- NW72.23.02 - Transformer Maintenance (Distribution)
- NW72.23.01 - Specification for Mineral Insulating Oil

For more detail on the programme see the attached asset management reports.

4.4 Network constraints and service targets

There are no constraints expected due to forecast load.

Assets must be maintained regularly. Allowing the assets' condition to deteriorate significantly is not appropriate as the consequences of doing so pose a significant risk to people and property and are very costly to rectify.

The project contributes to meeting Orion's overall service targets and safety by ensuring that assets are maintained as and when required by the programme and asset management policy.

4.5 Dependencies

The programme is closely related to the transformers replacement programme (CPP37), the network assets non-scheduled maintenance programme (CPP114) and the network assets emergency maintenance programme (CPP119).

4.6 Prioritisation

Prioritisation is based on a number of factors:

Ensuring the safety of the public and our personnel around our assets:

Maintenance of assets as a result of immediate safety issues will be dealt with under our emergency works contracts. Accelerated maintenance of assets with known safety issues that can be kept in service with restricted operating protocols is factored into our maintenance programme.

Satisfying individual or collective consumer expectations:

We consider satisfying consumers reasonable expectations as a very influential prioritisation factor. We give priority to the constraints that are most likely to impact consumer supply through extended or frequent outages, or compromised power quality. This is in the context of the overall level of quality that we believe is reasonable to provide.

Managing contractor resource constraints:

We aim to maintain a steady work flow to contractors. The contractors have a diversity of skill sets covering different aspects of our assets and we seek to ensure that our mix of projects, in any given year broadly aligns with that diversity. This ensures that contractor personnel and equipment levels match our maintenance programmes year-on-year at a consistent level, reducing the risk of our contractors being over or under resourced.

Our asset maintenance programme:

We determine our maintenance priorities by following the general principle that the assets supplying the greatest number of consumers receive the highest priority. We extensively review areas of the network where scheduled asset maintenance programmes occur to ensure the most efficient and cost-effective solution is sought to fit in with the current and long-term network development structure.

5 Earthquake consequences

As a result of the earthquake damage we lost two substations which housed transformer assets. The Brighton half-life refurbishment was brought forward as a result of the earthquakes by approximately three years because the substation sunk approximately one metre and the transformer was covered in silt and water. Otherwise the earthquakes had little effect on our transformers assets as reflected in expenditure in FY11 and FY12.

6 Expenditure plan

The following tables show our historical and forecast maintenance expenditure for our power and distribution transformers (\$000). The expenditure has been split into the following categories:

- Scheduled maintenance – this is for planned maintenance and is tendered as part of our contracting model.
- Non-scheduled maintenance – this is for unknown issues that may occur, but would not be carried out under the emergency contract
- Emergency maintenance – this is for all works carried out under the emergency works contract. The emergency works contract now contains new resiliency criteria that require our contractors to meet our obligations under the CDEM Act. A risk review was undertaken by the contractors to determine their susceptibility to future events. The costs incurred to mitigate these issues have been apportioned across each of the asset classes.

These expenditure forecasts do not include any contingencies. A general cross-asset maintenance contingency is covered in the contingency opex (CPP120).

Currently our regulator expenditure is carried out as part of our wider maintenance programmes and as a result cannot be easily separated out. Both power and distribution transformers expenditure remained relatively consistent with the earthquake having no real affect on the total maintenance expenditure. The most significant damage was to two transformers housed in substations which were lost.

Total Historical Power and Distribution Transformers Expenditure (\$000)

	FY08	FY09	FY10	FY11	FY12
Scheduled	871	939	1147	957	1141
Non-Scheduled	93	86	170	58	167
Emergency	127	132	118	105	137
TOTAL	1091	1157	1435	1120	1445

The following tables summarise our power and distribution transformers total forecast maintenance expenditure (in \$000). The non-scheduled and emergency expenditure in the power transformers table is for both power and distribution transformers. There is no step change in the forecast the scheduled maintenance expenditure for power transformers is to remain relatively consistent with pre-earthquake maintenance expenditure except for emergency expenditure.

Emergency works maintenance costs are expected to increase as the emergency works contract now contains new resiliency criteria that require our contractors to meet our obligations under the Civil Defence Emergency Management CDEM Act.

Total Forecast Power Transformers Maintenance Expenditure (\$000)

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Scheduled	855	820	810	810	810	810	810
Non-Scheduled	100	100	100	100	100	100	100
Emergency	140	190	190	225	190	190	190

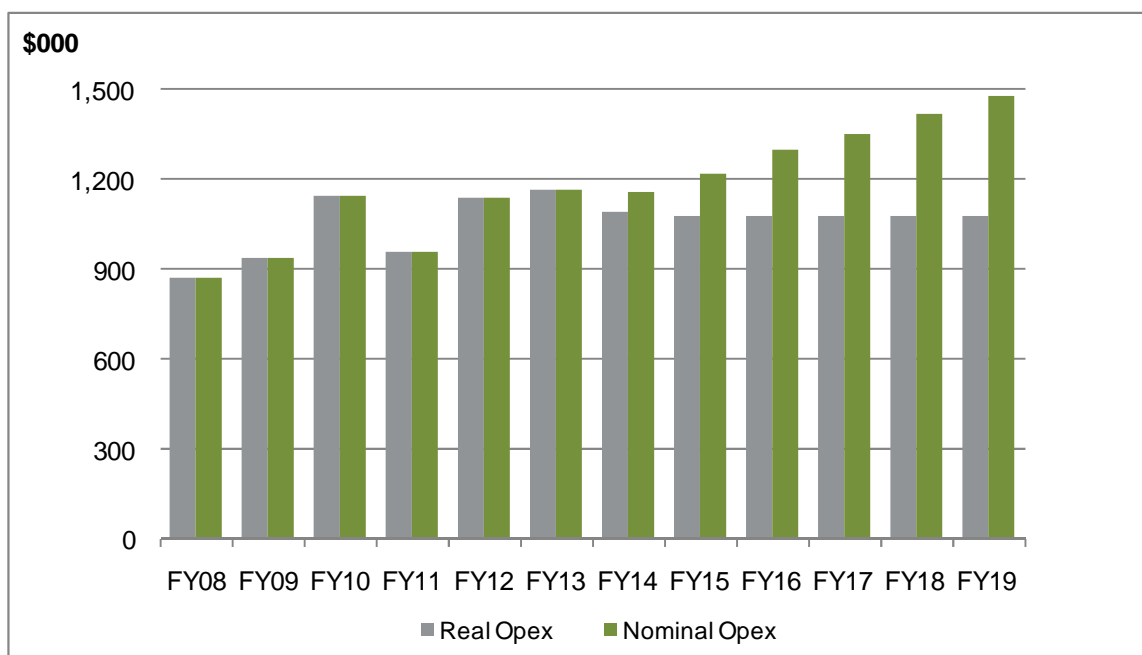
Total Forecast Distribution Transformers Maintenance Expenditure (\$000)

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Scheduled	310	270	270	270	270	270	270

Total Forecast Power and Distribution Transformers Expenditure (\$000)

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Scheduled	1165	1090	1080	1080	1080	1080	1080
Non-Scheduled	100	100	100	100	100	100	100
Emergency	140	190	190	225	190	190	190
TOTAL	1405	1380	1370	1405	1370	1370	1370

The following chart shows our total power and distribution transformers historical and forecast scheduled maintenance expenditure in both real and nominal terms (\$000). The real terms have been escalated as per the methodology outlined in the CPP proposal to ascertain the nominal terms.



The following tables summarise our power and distribution transformers forecast and historical maintenance expenditure in both real and nominal terms (\$000).

Historical expenditure (nominal), Scheduled

	Nominal \$000				
	FY08	FY09	FY10	FY11	FY12
Power transformers	-	-	-	-	-
Distribution transformers	872	938	1,148	957	1,141
Total	872	938	1,148	957	1,141

Forecast expenditure (real), Scheduled

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Power transformers	310	270	270	270	270	270	270
Distribution transformers	855	820	810	810	810	810	810
Total	1,165	1,090	1,080	1,080	1,080	1,080	1,080

Forecast expenditure (nominal), Scheduled

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Power Transformers	310	287	305	324	339	354	370
Distribution transformers	855	871	914	973	1,016	1,062	1,110
Total	1,165	1,157	1,219	1,297	1,355	1,416	1,480

7 References

Documents that should be read in conjunction with this Programme summary are:

- Voltage Regulators – Asset Management Report YE 2012 (NW70.00.41)
- Power Transformers – Asset Management Report YE 2012 (NW70.00.23)
- Distribution Transformers – Asset Management Report YE 2012 (NW70.00.40)

BUILDINGS, GROUNDS AND SUBSTATIONS SCHEDULED MAINTENANCE

CPP109

Project Summary

1 April 2013 – 31 March 2019

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1 Programme introduction

Project Name	<i>Buildings, grounds and substations (CPP109)</i>
Service Category	<i>Provide and operate network infrastructure</i>
Opex Category	<i>Scheduled maintenance</i>

1.1 Description

The work undertaken in this programme involves scheduled maintenance of Orion's buildings, grounds and substations. The programme is expected to continue in perpetuity.

While this programme focuses on scheduled maintenance, there are some references to the non-scheduled and emergency maintenance programmes. For more detail on those please refer to the buildings, grounds and substations non-scheduled maintenance programme (CPP116) and the network assets emergency maintenance programme (CPP119).

1.2 Assets included

We own a large amount of property and buildings which are solely used to house electrical equipment necessary for the operation and control of our electrical subtransmission and distribution networks. The buildings, known as substations, have been split into the following categories:

- zone
- network
- distribution - building
- distribution - kiosk

Note: This project does not cover the multiple assets which are housed within substations, or non-network property.

1.3 Aims and objectives

The main objectives of the programme are to:

- Ensure the safety of the public and our personnel and contractors around our assets
- Ensure security
- Ensure that properties remain environmentally sound to ensure the installed equipment is not compromised
- Repair buildings that have suffered earthquake damage.
- Ensure kiosks are prepared to deter rust and buildings are repainted to protect against water ingress through block work

1.4 Drivers

The main drivers for undertaking the programme include;

- Ensuring acceptable levels of safety to people and property
- Asset management and risk management. The risks our network buildings are exposed to are:
 - *Seismic movement* – we have undertaken to seismically strengthen all building substations
 - *Liquefaction* – removal of any liquefaction
 - *Defective drainage, guttering* - grounds maintenance contracts now cover the clearing of drains and gutters
 - *Roof leaks* - roof replacement programme to be initiated
 - *Vegetation/tree roots* - removal or maintenance of large trees/shrubs in close proximity to our substations as a variation to our grounds maintenance contracts
 - *Vandalism* - repairs carried out as soon as incident is reported
 - *Rust* - replacement programme in place for kiosks situated in close proximity to the coast.
 - *Subsidence* – pumping epoxy filler under kiosks and substations to level damaged ground
 - *Extreme weather conditions* – clearing any snow loading on kiosks or substations, repairs of damaged roofs or guttering
 - *Fire* - smoke detectors installed in zone substation buildings.

2 Key assumptions

The project relies on the following key assumptions:

2.1 Input cost mix

For the purpose of applying cost escalators, the project is weighted as follows:

	Labour	Other
Zone sub land, site development, buildings and structures	70%	30%
Other items	70%	30%
Distribution transformers (pole, 1ph/2ph/3ph)	70%	30%

2.2 Labour escalators

For the labour component of the project cost we have determined that it is not appropriate to use the standard New Zealand wide LCI in relation to this project.

We note that Statistics NZ has recently started to monitor construction costs in Canterbury due to the local pressures on construction resources as a result of the Christchurch rebuild, however their data time series is currently limited and unsuitable.

As local labour cost pressure is evident in our most recent contract tenders we have determined a proposed cost escalation index which we refer to as the Canterbury construction labour index based on estimates of labour.

We have sought external advice cost from two quantity surveyor firms on what we may expect in the market over the remainder of the CPP period in this respect. There is considerable uncertainty, however this CPP process requires us to make appropriate estimates. The resulting labour escalators that we propose are:

Index	FY14	FY15	FY16	FY17	FY18	FY19
Canterbury construction labour	7.5%	7.5%	7.5%	5%	5%	5%

For further information on our derivation see section 9.26.4 to 9.26.6 of the CPP proposal.

2.3 Material escalators

For the various material component of the project costs we have considered the most relevant input components for this project. The resulting material escalators for this project are:

Index materials	FY14	FY15	FY16	FY17	FY18	FY19
PPI	3.04%	3.32%	3.65%	3.20%	3.20%	3.20%

For further information on our derivation see section 9.26.4 of the CPP proposal.

2.4 Non-network solutions

We have not considered any non-network solutions.

2.5 Cost benefit analysis

We have not undertaken any cost benefit analysis in relation to this project.

2.6 Demand forecast

The demand forecast has a limited influence on the project, in relation to the acquisition of spur assets.

2.7 Scheduled work

Scheduled work involves the work known in advance that is most readily able to be managed through our planned contract tendering processes – where we package up similar types of work for tendering purposes.

This project relates only to scheduled maintenance work although there are some references to the non-scheduled and emergency maintenance programmes in the tables below these are not directly relevant to this project. We note that this project includes only the buildings and enclosures, not the network equipment housed within those structures.

Our emergency works budgets incorporate immediate work required to restore the network to service. If work is not an immediate failure or public safety risk then the work is classed as non scheduled (i.e. unplanned work to be undertaken within a 1 week to 6 month window).

There is no emergency budget for buildings and grounds because (with the exception of the earthquakes) they are not involved in emergency events. For more detail non-schedule and emergency maintenance please refer to the buildings, grounds and substations non-scheduled maintenance programme (CPP116) and the network assets emergency maintenance programme (CPP119).

2.8 Basis for expenditure forecast

As this is an ongoing programme of regular inspections and preventative maintenance, this forecast is essentially a base year approach with specific refinements for known issues such as the planned disestablishment of CBD assets, repairs to Papanui assets and earthquake repairs on other substations.

By way of explanation this category includes all network related buildings and grounds and improvements such as fencing. This covers zone and distribution substations. It excludes the network equipment housed in those buildings.

Our scheduled maintenance budget for 'Buildings and Enclosures' is detailed below:

\$000	FY14	FY15	FY16	FY17	FY18	FY19
Zone substations	100	100	100	100	100	100
Building substations	150	150	150	150	150	150
Kiosks	100	100	100	100	100	100
Distribution cabinets	60	60	60	60	60	60
Replacement Locks	200	200	200	200	200	200
Substation floor trip prevention	60	60	60	60	60	60
Building substation door maintenance	150	150	150	150	150	150
Roof replacement	150	150	150	150	150	150
Graffiti	150	150	150	150	150	150
Consents and designs	80	80	80	80	80	80
Seismic upgrades (consumer sites)	100	100	100	100	100	100
Network lease and rental sites	70	70	70	70	70	70
Security	100	100	100	100	100	100
Earthquake repairs for Buildings	400	400				
Papanui	200	10	10	10	10	10
Springston	10	10	10	10	10	10
Addington		10	10	10	10	10
Bromley		10	10	10	10	10
Total	2080	1910	1510	1510	1510	1510

The forecast allows for:

- Replacement locks \$0.2M per annum
- Earthquake repairs for buildings are forecast to be \$1.5m over 3yrs the works include:
 - Crack repairs
 - Painting
 - Levelling of floors / kiosk slabs
 - Re-cladding
- Disestablishment of buildings and kiosks in the CBD - \$1.2m over 5yrs (80 subs @ \$15k average)

We have allocated \$280k over 2yrs for structural works required at Papanui based on a Transpower report.

In addition we have allocated \$140k over 3yrs for ground repairs (includes fences and gates)

What step change there is reflects the planned disestablishment of CBD assets, repairs to Papanui assets and earthquake repairs on other substations. Subsequently it steps down to a normal level. We also note some difficulty in matching the historical data with the forecast as the buildings have only recently been integrated into this group of assets.

2.9 Obligations

Like all companies we are subject to the general provisions of a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

Orion aims to achieve material compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

- Electricity Act
- Local Government Act
- Electricity Reform Act
- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act.

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a *"lifeline"* utility, Orion must comply with the Civil Defence Emergency Management (CDEM) Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand's communities. The Act requires us to:

- be able to function to the fullest possible extent during and after an emergency
- have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- help define the Crown's CDEM goals and objectives in a National CDEM Strategy
- participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- be capable of managing our own response to emergencies
- develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary NW70.00.14
- Asset Risk Management NW70.60.02

3 Relevant policies and planning standards

Procurement policy OR00.00.19 and Contract management NW73.00.03

- We follow our procurement and contract management policies to achieve value for money by competitively tendering our work with a value over \$20,000.

Delegations of authority policy OR00.00.11

- The overall budgeted expenditure for this programme is approved by the Board as part of the overall Asset Management Plan. As and when the expenditure is incurred then approval for the actual expenditure is made in compliance with the delegations of authority policy.

Authorised contractors NW73.10.15

- We ensure only authorised contractors are allowed access to our network (such access may be subject to limits that can be specific to each contractor).

Health and Safety policy OR00.00.01

- We follow our health and safety requirements to ensure the safety of the public and our personnel and contractors around our assets.

Environmental Sustainability Policy OR00.00.03

- We work towards environmental sustainability in our operations.

Substations – Asset Management Report YE 2012 (NW70.00.44)

Network Related Property – Asset Management Report YE 2012 (NW70.00.43)

4 Programme description

4.1 Work to be undertaken

A five year maintenance plan has recently commenced to repair all of our buildings which have suffered earthquake damage. All our buildings and land are inspected regularly, and minor repairs are undertaken as they are identified. Major repair and maintenance work is scheduled, budgeted for and undertaken on an annual basis.

Property maintenance is expected to remain at a constant level, although many of the older consumer owned substations will require seismic upgrading over time if they are retained (earthquake strengthening expenditure is not included in this project). Consumer owned substations that require maintenance or strengthening to remove risk to our equipment may present some problems in relation to who will bear the cost of this work. These will be assessed on a case by case basis.

Upgrading is underway on some of our rural zone substation buildings constructed in modular concrete sections with predominantly steel framed glass ends. The ends are being replaced with about two-thirds solid wall, with aluminium doors and windows. This will help with weather-tightness and security.

Our substations are maintained on an as-required basis, with most general maintenance work identified during six-monthly inspections. Work such as damage repair, ground maintenance, graffiti removal, painting, signage and lock replacement is ongoing.

A number of our substation buildings were constructed with a flat concrete roof with a tar-based membrane covering. These have been prone to leaking when cracks develop in the concrete. Over the past few years we have implemented a programme to upgrade these buildings by constructing a new pitched Coloursteel roof over the top. We expect to have covered all of the original flat concrete roofs within the next few years.

Some of the older kiosk foundations have moved due to surrounding land movement. They need to be levelled to relieve stress on the attached cables. A small number of them are being attended to each year.

We maintain and repaint our kiosks as required with more focus to deter rust on the coastal areas. Buildings are repainted approximately every ten years and we are now using a silicon based product to provide a waterproof membrane and protect the substation from water ingress through the block work.

Graffiti is an ongoing problem at virtually all of our sites. We remove it as soon as possible after it is reported. We liaise with the local councils and community groups in our area to assist us with this problem. Orion now has a specific email set up graffiti@oriongroup.co.nz where members of the community can report graffiti. We aim to attend to graffiti within 48 hours.

4.2 Network constraints and service targets

Letting buildings and substations deteriorate is not appropriate as the consequences of doing so pose a significant safety and reliability risk and are very costly to rectify. Assets are therefore regularly inspected to ensure issues and potential risks are identified in a timely manner so that necessary remedial maintenance work can be carried out.

4.3 Dependencies

Our scheduled maintenance is carried out as part of the wider building and substation maintenance contract which is tendered as part of our contracting model. This programme is closely related to the buildings, grounds and substations non-scheduled, network assets emergency maintenance programmes and replacement programme.

4.4 Programme deliverability

The ongoing maintenance project is carried out as part of the wider substation maintenance contract. By having a smooth expenditure forecast we try to avoid peaks and troughs in the work load for our contractors. This enables us to achieve our medium to long term requirements and assists the contractors in their resourcing planning. The scheduling of the work can be altered to some extent to take resource constraints into account.

Our non-scheduled maintenance forecast is for unknown issues that may occur but would not be carried out under the emergency contract.

Our emergency works contract now contains new resiliency criteria that require our contractors to meet our obligations under the Civil Defence Emergency Management Act. A risk review was undertaken by the contractors to determine their susceptibility to future events. The costs incurred to mitigate these issues have been apportioned across each of the asset classes.

Works on ground and buildings do not require specialised labour. Although we anticipate that the costs of these resources will increase due to the Canterbury rebuild environment we do not envisage that we will be unable to source the contractors we need for this work, given our existing relationships with a large number of contractors. In addition we note that the total quantum of expenditure is quite small, and does not require significant contract resource.

4.5 Prioritisation

Prioritisation is based on a number of factors including:

Satisfying individual or collective consumer expectations:

We consider satisfying consumer expectations as the most influential factor and give priority to the constraints that are most likely to impact consumer supply through extended or frequent outages, or compromised power quality.

Managing contractor resource constraints:

We aim to maintain a steady work flow to contractors and ensure project diversity is preserved within a given year. This ensures that contractor personnel and equipment levels match our capital build program year-on year at a consistent level, reducing the risk of our contractors being over or under resourced.

Coordination with Transpower:

We endeavour to coordinate any major network structural changes adjacent to a GXP with Transpower's planned asset replacement programmes, and also provide direction to Transpower to ensure consistency with our sub-transmission upgrade plans.

Our asset replacement programme:

We determine our maintenance priorities by following the general principle that the assets supplying the greatest number of consumers receive the highest priority. We extensively review areas of the network where scheduled asset replacement programmes occur to ensure the most efficient and cost-effective solution is sought to fit in with the current and long-term network development structure, for example replacement of switchgear in substations.

The risk with any type of replacement programme is that network switching or alternative supplies (generators) will be required to off-load the assets which are to be replaced. This leads to reduced reliability levels and increased risk of outages.

5 Earthquake consequences

As a result of the earthquake activity experienced in Canterbury since September 2010 the reliability of the network has been reduced and in some areas the ability to transfer load has been restricted. This may lead to a higher than normal possibility of outages as a result of switching the network to allow assets to be removed from service. A few of our substation buildings were damaged in the earthquakes by rock falls, collapsed hillsides and liquefaction. These damaged substations required immediate emergency maintenance to repair and re-establish the network.

Our resources were constrained following the earthquakes as staff and contractors were diverted to deal with the immediate aftermath of the events. This resulted in a reduction in the scheduled maintenance expenditure for those years which is addressed in future years. This diversion of resources resulted in increased expenditure in the emergency maintenance for FY11 and FY12 as immediate repairs were carried out to the damaged network.

Following the earthquakes, 12 of our kiosks and substations required levelling of their foundations, to achieve this epoxy filler was pumped underneath these assets to stabilise ground damage. 140 more kiosks and substations may require levelling of their foundations as part of our scheduled maintenance work to be carried out. Geotechnical surveys of the asset sites will help us to determine the extent of the foundation levelling required.

6 Expenditure plan

These expenditure forecasts do not include any contingencies. A general cross-asset contingency is covered in the maintenance contingency programme (CPP120).

The following tables summarise the historical maintenance expenditure in (\$000) for buildings, grounds and substations. Approximately 50% of the historical expenditure relates to scheduled buildings maintenance, however in FY11 and FY12, substations accounted for approximately 60% of the expenditure. This was because resources were diverted to emergency maintenance of the substations to restore the network.

Buildings Historical Maintenance Expenditure

	FY08	FY09	FY10	FY11	FY12
Scheduled	795	1099	1335	1204	635
Non-Scheduled	196	213	197	459	151
Emergency	0	0	0	0	0
Total	991	1312	1532	1663	786

Grounds Historical Maintenance Expenditure

FY	FY08	FY09	FY10	FY11	FY12
Scheduled	261	257	217	171	153
Non-Scheduled	154	113	213	207	128
Emergency	0	0	0	0	0
Total	415	370	430	378	281

Substations Historical Maintenance Expenditure

	FY08	FY09	FY10	FY11	FY12
Scheduled	290	341	407	266	300
Non-Scheduled	1	34	71	27	23
Emergency	35	31	71	652	1228
Total	326	406	549	945	1551

Total Historical Buildings, Ground and Substations Maintenance Expenditure

	FY08	FY09	FY10	FY11	FY12
Scheduled	1346	1697	1959	1641	1088
Non-Scheduled	351	360	481	693	302
Emergency	35	31	71	652	1228
Total	1732	2088	2511	2986	2618

The following tables summarise the forecast maintenance expenditure for buildings, grounds and substations in (\$000). The expenditure forecasts do not include any contingencies. Total forecast maintenance expenditure for network related property is increased as costs to carry out scheduled maintenance work are expected to increase. Contractor rates to carry out scheduled maintenance work have increased following the earthquakes. Forecast scheduled maintenance expenditure for substations has doubled because of increased costs required to repair damaged substations from the earthquakes, such as repairs to roofs and cabinets.

The ongoing work to repair building foundations damaged in the earthquakes will continue in the next few years. Scheduled expenditure from FY18 onwards should return to pre earthquake levels as maintenance programme scheduled to repair earthquake damage are completed.

Buildings Forecast Maintenance Expenditure

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Scheduled	2215	2080	1910	1510	1510	1510	1510
Non-Scheduled	200	200	200	200	200	200	200
Emergency	0	0	0	0	0	0	0
Total	2415	2280	2110	1710	1710	1710	1710

Grounds Forecast Maintenance Expenditure

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Scheduled	410	430	410	390	390	390	390
Non-Scheduled	110	110	110	110	110	110	110
Emergency	0	0	0	0	0	0	0
Total	520	540	520	500	500	500	500

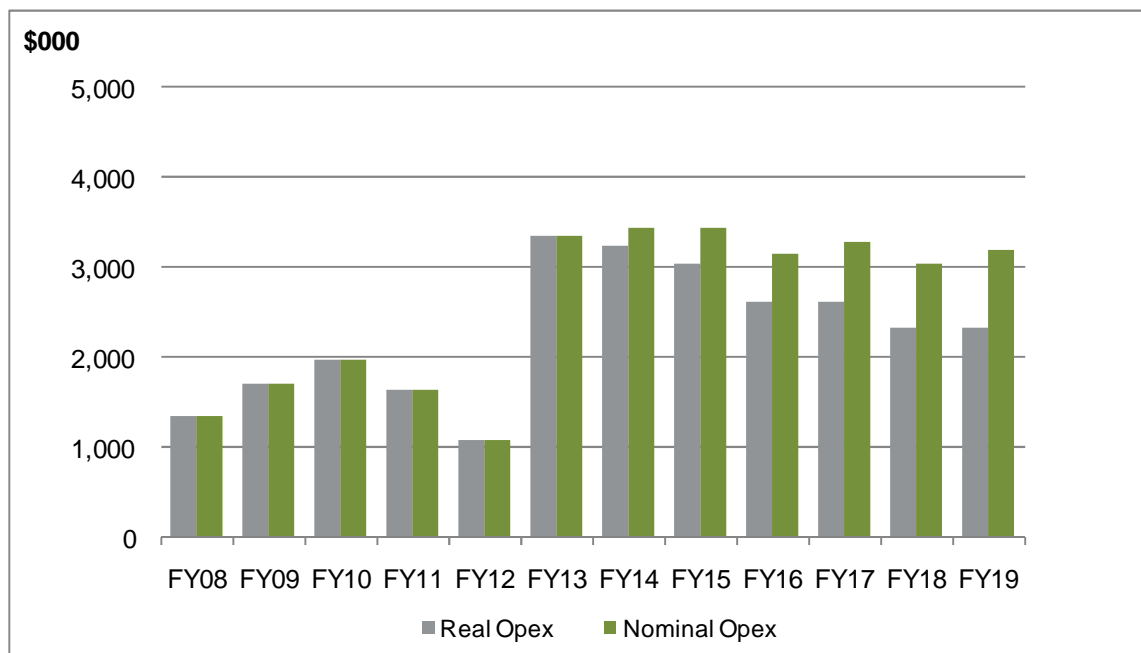
Substations Forecast Maintenance Expenditure

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Scheduled	725	725	725	725	725	425	425
Non-Scheduled	40	40	40	40	40	40	40
Emergency	25	35	35	45	35	35	35
Total	790	800	800	810	800	500	500

Total Forecast Buildings, Ground and Substations Maintenance Expenditure

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Scheduled	3350	3235	3045	2625	2625	2325	2325
Non-Scheduled	350	350	350	350	350	350	350
Emergency	25	35	35	45	35	35	35
Total	3725	3620	3430	3020	3010	2710	2710

The following chart shows our total buildings, grounds and substations historical and forecast scheduled maintenance expenditure in both real and nominal terms (\$000). The real terms have been escalated as per methodology outlined in the CPP proposal to ascertain the nominal terms.



The following tables summarise our total buildings, grounds and substations forecast and historical scheduled maintenance expenditure in both real and nominal terms (\$000).

Historical expenditure, scheduled

	Nominal \$000				
	FY08	FY09	FY10	FY11	FY12
Zone sub land, site development, buildings and structures	795	1,099	1,335	1,204	635
Distribution substations (including land)	290	341	407	266	300
Other items	261	257	217	171	153
Total	1,346	1,697	1,959	1,641	1,088

Forecast expenditure (real), scheduled

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Zone sub land, site development, buildings and structures	2,215	2,080	1,910	1,510	1,510	1,510	1,510
Distribution substations (including land)	725	725	725	725	725	425	425
Other items	410	430	410	390	390	390	390
Total	3,350	3,235	3,045	2,625	2,625	2,325	2,325

Forecast expenditure (nominal), scheduled

	Nominal \$000s						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Zone sub land, site development, buildings and structures	2,215	2,208	2,155	1,813	1,895	1,980	2,070
Distribution substations (including land)	725	770	818	870	910	557	582
Other items	410	456	463	468	489	511	535
Total	3,350	3,434	3,436	3,152	3,294	3,049	3,187

7 References

Documents that should be read in conjunction with this project summary are:

- Substations – Asset Management Report YE 2012 (NW70.00.44)
- Network Related Property – Asset Management Report YE 2012 (NW70.00.43)

SWITCHGEAR SCHEDULED MAINTENANCE

CPP112

Programme Summary

1 April 2013 – 31 March 2019

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1 Programme Introduction

Programme Name	<i>Switchgear (CPP112)</i>
Service Category	<i>Provide and operate network infrastructure</i>
Opex Category	<i>Scheduled maintenance</i>

1.1 Description

The work undertaken in this programme involves the scheduled maintenance of Orion's switchgear.

While this programme focuses on scheduled maintenance, there are some references to the non-scheduled and emergency maintenance programmes for context. For more detail on those please refer to the network assets non-scheduled maintenance programme (CPP114) and the network assets emergency maintenance programme (CPP119).

The programme is expected to continue in perpetuity.

1.2 Assets Included

The assets that are in this programme are high voltage and low voltage switchgear and high voltage circuit breakers. These include:

- Magnefix switch units (MSU)
- Xiria Ringmain unit
- Oil switches, fused and non-fused (Fuse Switch/OIS)
- Air break isolators
- Sectionalisers
- Low voltage switches
- HV Circuit breakers
 - 11kV – gas, oil vacuum
 - 33kV – oil, vacuum
 - 66kV – gas, oil.

1.3 Aims and Objectives

The main objectives of the programme are to:

- Ensure the safety of the public and our personnel and contractors around our assets.
- Maintain on a periodic basis high voltage and low voltage switchgear and high voltage circuit breakers for which it has been determined that maintenance is the cost effective way to ensure reliability of electricity supply and meeting service level targets (including safety).

1.4 Drivers

The main drivers for undertaking the programme are:

- that assets are maintained in a timely and cost effective manner to ensure the condition and performance of our assets are such that they:

- meet acceptable target levels of safety to people and property
- provide acceptable levels of network reliability
- the prudent cost effective management of our assets and associated risks.

2 Key assumptions

The project relies on the following key assumptions:

2.1 Input cost mix

Input costs are assumed to be weighted as follows:

	Labour	Materials
Switchgear	70%	30%

2.2 Labour escalators

For the labour component of the project cost we have determined that it is not appropriate to use the standard New Zealand wide LCI in relation to this project.

We note that Statistics NZ has recently started to monitor construction costs in Canterbury due to the local pressures on construction resources as a result of the Christchurch rebuild, however their data time series is currently limited and unsuitable.

As local labour cost pressure is evident in our most recent contract tenders we have determined a proposed cost escalation index which we refer to as the Canterbury construction labour index based on estimates of labour.

We have sought external advice cost from two quantity surveyor firms on what we may expect in the market over the remainder of the CPP period in this respect. There is considerable uncertainty, however this CPP process requires us to make appropriate estimates. The resulting labour escalators that we propose are:

Index	FY14	FY15	FY16	FY17	FY18	FY19
Canterbury construction labour	7.5%	7.5%	7.5%	5%	5%	5%

For further information on our derivation see section 9.26.4 to 9.26.6 of the CPP proposal.

2.3 Material escalators

For the various material component of the project costs we have considered the most relevant input components for this project. The resulting material escalators for this project are:

Index materials	FY14	FY15	FY16	FY17	FY18	FY19
PPI	3.04%	3.32%	3.65%	3.20%	3.20%	3.20%

For further information on our derivation see section 9.26.4 of the CPP proposal.

2.4 Scheduled work

Scheduled work involves the work known in advance that is most readily able to be managed through our planned contract tendering processes – where we package up similar types of work for tendering purposes.

This project relates only to scheduled maintenance work although there are some references to the non-scheduled and emergency maintenance programmes in the tables below these are not directly relevant to this project.

Our emergency works budgets incorporate immediate work required to restore the network to service. If work is not an immediate failure or public safety risk then the work is classed as non-scheduled (ie: unplanned work to be undertaken within a 1 week to 6 month window).

For more detail refer to the network assets non-scheduled maintenance programme (CPP114) and the network assets emergency maintenance programme (CPP119).

2.5 Programme deliverability

We believe that the assumed timing and deliverability of the forecast work is achievable.

The ongoing maintenance programme can be carried out within normal contracting arrangements. The scheduling of the work can be altered to some extent to take into account resource constraints and network loadings.

Our contracting model allows the contractors to bring in additional resources to assist them in completing their contracted works. We have multiple contractors working in the different asset classes that ensure that under normal circumstances that there is more resource available than required. If the contractors are unable or unwilling to bring in additional resource to facilitate indicated increasing workloads, we will add additional contractors to our work base. This has occurred in the past, examples being the introduction of additional tree contractors.

2.6 Consultants reports

There are no departures from consultants' recommendations in this opex programme.

2.7 Basis for Expenditure Forecast

We adopt whole lifecycle practices for our network assets and focus on optimising the lifecycle costs for each asset group to meet agreed service level targets & future demand.

Scheduled maintenance expenditure is based on a bottom up approach however this forecast also includes some allowances for elements such as repair of link boxes damaged by demolitions and forecast of maintenance related to the acquisition of spur assets which of necessity are broad estimates.

We have both major and minor maintenance programmes that cover Zone substations. The major programmes are based on a four year cycle while the minor programmes are based on an annual cycle.

Scheduled maintenance expenditure is based on historical and forecast quantum and nature of work, and analysis of recent market prices. For further information about our expenditure forecasts process see Asset Management Lifecycle Budget Forecasting Process (NW70.60.15).

By way of explanation this category includes switchgear housed in zone, network and distribution substations.

A more detailed split of our maintenance budget for scheduled maintenance of Switchgear' is given in the table below.

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Zone substations (4 yearly)	125	140	140	140	140	140	140
Infra red/Corona scan of Zone substations	5	5	5	5	5	5	5
Network Substation (8 Yearly)	135	150	150	150	150	150	150
Service CB's after fault	5	5	5	5	5	5	5
Distribution Subs (8 yearly)	10	10	10	10	10	10	10
Brighton Area MSU's (4 yearly)	80	80	80	80	80	80	80
Line CB maintenance	30	30	30	30	30	30	30
Maintenance of Partial discharge MSU's	80	80	80	80	80	80	80
Partial discharge monitor	72	75	75	75	75	75	75
Partial discharge locator	155	155	155	155	155	155	155
Partial discharge after replacement/ maintenance	25	25	25	25	25	25	25
Switchgear investigations and other small projects	100	110	110	110	110	110	110
CT replacement	30	30	30	30	30	30	30
MSU maintenance	100	100	100	100	100	100	100
Repair link boxes damaged by demo's	140	140	140	-	-	-	-
Earthing of Kiosk doors	70	70	-	-	-	-	-
Papanui	5	5	5	5	5	5	5
Springston	-	5	5	5	5	5	5
Addington	-	-	5	5	5	5	5
Bromley	-	-	5	5	5	5	5
Documentation updates	10	10	10	10	10	10	10
Total	1177	1255	1165	1025	1025	1025	1025

2.8 Non-network solutions

We have not considered any non-network solutions for these projects.

2.9 Cost benefit analysis

We have not carried out a cost benefit analysis on this project.

2.10 Obligations

Like all companies we are subject to the general provisions of a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

- Electricity Act
- Energy Companies Act
- Electricity Industry Act
- Local Government Act
- Electricity Reform Act
- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act.

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a "lifeline" utility, Orion must comply with the Civil Defence Emergency Management (CDEM) Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand's communities. The Act requires us to:

- be able to function to the fullest possible extent during and after an emergency
- have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- help define the Crown's CDEM goals and objectives in a National CDEM Strategy
- participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- be capable of managing our own response to emergencies
- develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary (NW70.00.14)
- Asset Risk Management (NW70.60.02).

3 Relevant Policies and Planning Standards

Asset management policy (NW70.00.46)

- We have used time/age based and condition based maintenance approaches to forecast asset maintenance.

Procurement policy (OR00.00.19) and Contract management (NW73.00.03)

- We follow our procurement and contract management policies to achieve value for money by competitively tendering our work with a value over \$20,000.

Delegations of authority policy (OR00.00.11)

- The overall budgeted expenditure for this programme is approved by the Board as part of the overall Asset management Plan. As and when the expenditure is incurred then approval for the actual expenditure is made in compliance with the delegations of authority policy.

Authorised contractors (NW73.10.15)

- We ensure only authorised contractors are allowed access to our network (such access may be subject to limits that can be specific to each contractor).

Health and Safety policy (OR00.00.01)

- We follow our health and safety requirements to ensure the safety of the public and our personnel and contractors around our assets.

Environmental Sustainability Policy (OR00.00.03)

- We work towards environmental sustainability in our operations.

Asset Management Lifecycle Budget Forecasting Process (NW70.60.15)

- This policy sets out our budgeting approach for our maintenance and replacement programmes in more detail.

HV and LV switchgear – asset management report YE 2012 (NW70.00.24) and HV circuit breakers – asset management report YE 2012 (NW70.00.33)

- These asset management reports set out the assets included and processes followed in this programme in more detail.

Technical Specifications: Orion Zone Substation Maintenance (NW72.23.07), Orion Network Substation Maintenance (NW72.23.06), Oil Circuit Breaker Servicing After Operation Under Fault Conditions (NW72.23.15), SF₆ Gas Management Procedures (NW70.10.01), Partial Discharge Tests (NW72.27.03)

- Set out circuit breaker testing and maintenance standards.

4 Programme Description

4.1 Work to be Undertaken

The work to be undertaken in this programme involves the maintenance of switchgear assets as follows:

- 11kV MSUs in close proximity to the sea, which are maintained every four years. A programme to dust MSU's to prevent partial discharge is also employed
- Ring-main units and oil switches in indoor situations are maintained as part of the programme of work (four or eight yearly) for the substation in which they are installed.
- A check on the operation of standard ABIs is included when a line retighten contract is carried out each year. Other maintenance work is on an as-required basis.
- Sectionalisers are maintained every eight years, with an annual external inspection.
- Substation low voltage panels are inspected every six months. Other switches are inspected on a five yearly basis. We are just over halfway through a four-year programme to install safety barriers over the open and live busbars and switches.
- HV CBs are checked during the substation maintenance rounds. When a CB operates for a major fault the CB is removed from service and overhauled. All oil filled CBs are serviced following operation under fault conditions. All metal-clad switchgear (33kV & 11kV indoor CBs) are tested for partial discharge.

For more detail on the programme see the attached asset management reports.

4.2 Network Constraints and Service Targets

There are no constraints expected due to forecast load.

Assets must be maintained regularly. Allowing the assets' condition to deteriorate significantly is not appropriate as the consequences of doing so pose a significant risk to people and property and are very costly to rectify.

The project contributes to meeting Orion's overall service targets and safety by ensuring that assets are maintained as and when required by the programme and asset management policy.

4.3 Dependencies

The programme is closely related to the following:

- Switchgear replacement programme (CPP36)
- Network assets non-scheduled maintenance programme (CPP114)
- Network assets emergency maintenance programme (CPP119).

4.4 Prioritisation

Ensuring the safety of the public and our personnel around our assets:

Maintenance of assets as a result of immediate safety issues will be dealt with under our emergency works contracts. Accelerated maintenance of assets with known safety issues that can be kept in service with restricted operating protocols is factored into our maintenance programme.

Satisfying individual or collective consumer expectations:

We consider satisfying consumers reasonable expectations as a very influential prioritisation factor. We give priority to the constraints that are most likely to impact consumer supply through extended or frequent outages, or compromised power quality. This is in the context of the overall level of quality that we believe is reasonable to provide.

Managing contractor resource constraints:

We aim to maintain a steady work flow to contractors. The contractors have a diversity of skill sets covering different aspects of our assets and we seek to ensure that our mix of projects, in any given year broadly aligns with that diversity. This ensures that contractor personnel and equipment levels match our maintenance programmes year-on-year at a consistent level, reducing the risk of our contractors being over or under resourced.

Our asset maintenance programme:

We determine our maintenance priorities by following the general principle that the assets supplying the greatest number of consumers receive the highest priority. We extensively review areas of the network where scheduled asset maintenance programmes occur to ensure the most efficient and cost-effective solution is sought to fit in with the current and long-term network development structure, for example maintenance of switchgear in substations.

The risk with any type of maintenance programme is that network switching or alternative supplies (generators) will be required to off-load the assets which are to be maintained. This leads to reduced reliability levels and increased risk of outages. We try to mitigate this by co-ordinating maintenance with other work and where possible carry out the work at periods of lower network loading.

5 Earthquake Consequences

As a result of the earthquake activity experienced in Canterbury since September 2010 the reliability of the network has been reduced and in some areas the ability to transfer load has been restricted. This will continue to lead to a higher than normal possibility of outages as a result of switching the network to allow assets to be removed from service.

Our resources were constrained following the earthquakes as staff and contractors were diverted to deal with the immediate aftermath of the events. This resulted in a reduction in the planned maintenance programme for those years. This reduction in planned maintenance will not impact on future expenditure. .

Switchgear assets have not been materially affected by the earthquakes.

6 Expenditure Plan

6.1 Expenditure Summary

The following tables summarise our high and low voltage switchgear and high voltage circuit breaker historical total maintenance expenditure (in \$000) for FY08 - FY12. The tables split the expenditure into the following categories:

- Scheduled maintenance – this is work carried out as part of the maintenance programme. These works are tendered out as part of our contracting model. Historic and forecast maintenance expenditure is detailed in section 5.2.
- Non-scheduled maintenance – this is for unknown issues that may occur but would not be carried out under the emergency contract.
- Emergency maintenance – this is for all work carried out under the Emergency Works Contract.

Historical Switchgear Maintenance Expenditure

	FY08	FY09	FY10	FY11	FY12
Scheduled	681	787	759	584	486
Non-Scheduled	107	99	164	200	174
Emergency	100	126	151	48	74
Total	888	1,012	1,074	832	734

During FY11 and FY12 there was a reduction in the scheduled maintenance due to the diversion of contractor resources on to recovery efforts. Forecast scheduled maintenance expenditure is increased because of this.

The following tables summarise our high and low voltage switchgear and high voltage circuit breaker forecast total maintenance expenditure (in \$000) for the CPP period.

Switchgear Maintenance Expenditure

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Scheduled	1,177	1,225	1,165	1,025	1,025	1,025	1,025
Non-Scheduled	125	125	125	125	125	125	125
Emergency	110	150	150	180	150	150	150
Total	1,412	1,500	1,440	1,330	1,300	1,300	1,300

Forecast maintenance operational expenditure is increased due to:

- Scheduled maintenance will be increased over FY14 and FY15 to mitigate the potential for unplanned interruptions from earthquake related damage that hasn't materialised. This is expected to reduce over time. Additionally, from FY13, through

the CPP period, Orion will be purchasing spur assets from Transpower; it is expected that this will result in a increase in maintenance expenditure.

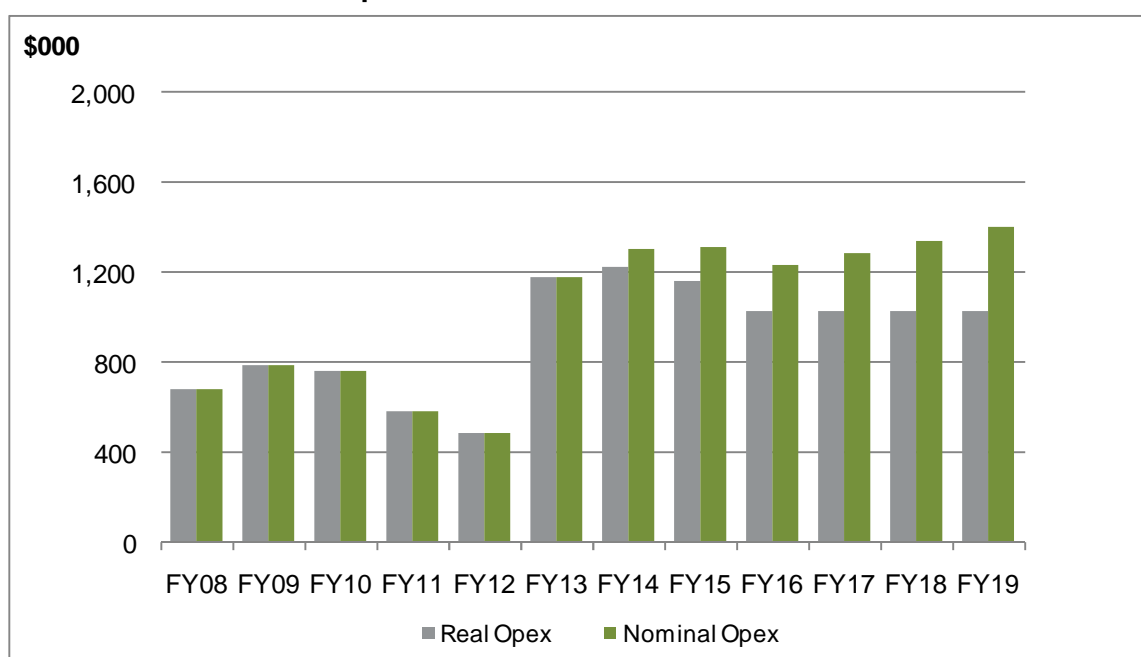
- Non-scheduled maintenance is expected to be close to the historical average.
- Emergency works maintenance costs are expected to increase as the emergency works contract now contains new resiliency criteria that require our contractors to meet our obligations under the Civil Defence Emergency Management CDEM Act. A risk review was undertaken by the contractors to determine their susceptibility to future events. The costs incurred to mitigate these issues have been apportioned across each of the asset classes.

These expenditure forecasts do not include any contingencies. A general cross-asset contingency is covered in the maintenance contingency opex estimate (CPP120).

6.2 Expenditure Summary for Scheduled Maintenance

The following chart shows our switchgear historical and forecast maintenance expenditure in both real and nominal terms (\$000). The real terms have been escalated as per methodology outlined in the CPP proposal to ascertain the nominal terms.

Historical and forecast expenditure



The following tables summarise our switchgear forecast and historical maintenance expenditure in both real and nominal terms (\$000).

Historical scheduled maintenance expenditure

	Nominal \$000				
	FY08	FY09	FY10	FY11	FY12
Distribution switchgear	681	787	759	584	486
Total	681	787	759	584	486

Forecast expenditure (real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Distribution switchgear	1,177	1,225	1,165	1,025	1,025	1,025	1,025
Total	1,177	1,225	1,165	1,025	1,025	1,025	1,025

Forecast expenditure (nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Distribution switchgear	1,177	1,300	1,314	1,231	1,286	1,344	1,405
Total	1,177	1,300	1,314	1,231	1,286	1,344	1,405

7 References

Documents that should be read in conjunction with this programme summary are:

- HV and Low Voltage Switchgear – asset management report YE 2012 (NW70.00.24)
- High Voltage Circuit breakers – asset management report YE 2012 (NW70.00.33).

UNDERGROUND CABLES EMERGENCY MAINTENANCE

CPP118

Programme Summary

1 April 2013 – 31 March 2019

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1 Programme introduction

Programme Name	<i>Underground Cables (CPP118)</i>
Service Category	<i>Provide and operate network infrastructure</i>
Opex Category	<i>Emergency Maintenance</i>

1.1 Description

The work undertaken in this programme involves emergency maintenance of Orion's underground (UG) cables. The programme is expected to continue in perpetuity.

While this programme focuses on emergency maintenance, there are some references to the scheduled and non-scheduled maintenance programmes. For more detail on those please refer to the Subtransmission Underground Cables Scheduled Maintenance Programme (CPP103), 11kV and Low Voltage Underground Cables Scheduled Maintenance Programme (CPP104) and the Underground Cables Non-Scheduled Maintenance Programme (CPP115).

1.2 Assets included

The assets that are included in this programme are Subtransmission UG cables (66kV and 33kV), 11kV UG cable, Low Voltage (LV) UG cable 400V and Distribution hardware. These include:

- Self contained oil-filled (SCOF) three core aluminium 66kV cable
- Cross-linked polyethylene (XLPE) single core copper
 - 66kV cable
 - 33kV cable
 - 11kV cable
 - 400V cable
- Paper insulated lead cable armour (PILCA) grease-filled copper
 - 33kV cable
 - 11kV cable
 - 400V cable
- PILCA grease-filled aluminium
 - 33kV cable
 - 11kV cable
 - 400V cable
- XLPE single core aluminium
 - 33kV cable
 - 11kV cable
 - 400V cable
- PVC 400V cable
 - Copper
 - Aluminium

- Distribution Cabinet (also known as Link boxes)
 - Plastic
 - Steel
 - Fibreglass
- Distribution Box (also known as Boundary boxes)
 - Plastic
 - Steel
 - Concrete

1.3 Aims and objectives

The main objectives of the programme are to:

- respond to and resolve in the shortest time to possible asset faults in the UG network.
- ensure the safety of the public, our personnel and contractors around our assets.
- be cost effective in expenditure.

The programme meets the expenditure objectives by meeting the service level targets set out in Section 3.4 of Orion's 2012 Asset Management Plan.

1.4 Drivers

The main drivers for undertaking the programme are:

- to ensure reliability of electricity supply, meeting service level and safety targets in our Security of Supply Standard (SoSS).
- that assets are maintained and repaired in a timely and cost effective manner to ensure the condition and performance of our assets are such that they:
 - meet acceptable levels of safety to people and property.
 - meet acceptable levels of network reliability.
- the prudent cost-effective management of our assets and risks.

2 Key assumptions

2.1 Input cost mix

For the purpose of assigning input cost escalators we have assumed the following input cost weightings:

	Labour	Cables/ Lines
66kV, 33kV, 11kV and 400V underground cables	70%	30%

2.2 Labour escalators

For the labour component of the project cost we have determined that it is not appropriate to use the standard New Zealand wide LCI in relation to this project.

We note that Statistics NZ has recently started to monitor construction costs in Canterbury due to the local pressures on construction resources as a result of the Christchurch rebuild, however their data time series is currently limited and unsuitable.

As local labour cost pressure is evident in our most recent contract tenders we have determined a proposed cost escalation index which we refer to as the Canterbury construction labour index based on estimates of labour.

We have sought external advice cost from two quantity surveyor firms on what we may expect in the market over the remainder of the CPP period in this respect. There is considerable uncertainty, however this CPP process requires us to make appropriate estimates. The resulting labour escalators that we propose are:

Index	FY14	FY15	FY16	FY17	FY18	FY19
Canterbury construction labour	7.5%	7.5%	7.5%	5%	5%	5%

For further information on our derivation see section 9.26.4 to 9.26.6 of the CPP proposal.

2.3 Material escalators

For the various material component of the project costs we have considered the most relevant input components for this project. The resulting material escalators for this project are:

Index materials	FY14	FY15	FY16	FY17	FY18	FY19
PPI	3.04%	3.32%	3.65%	3.20%	3.20%	3.20%

For further information on our derivation see section 9.26.4 of the CPP proposal.

2.4 Certainty of forecast

We believe that the assumed timing of the forecast work is reasonable.

2.5 Non-network solutions

We have not considered any non-network solutions for these projects.

2.6 Cost Benefit analysis

We have not carried out a cost benefit analysis on this project.

2.7 Consultants reports

There are no departures from consultants' recommendations in this opex programme. While the various AMR's related to this project refer to the EAT CBRM this is in the context of replacement it is not relevant for maintenance and has not been used in relation to this project.

2.8 Basis for expenditure forecast

Emergency maintenance responds to unplanned events that impair the normal operation of our cables. The aim of this opex is to undertake cable repairs as quickly as possible after unplanned outages in order to bring our distribution network back to at least its minimum acceptable and safe operating condition.

We have two emergency response contractors. These contractors have defined response areas within their contracts. ILS provides our full emergency response service in the high country and plains areas and a portion of the Banks Peninsula area (covering all overhead reticulation and low voltage cable response). Connetics services the balance of our network.

The emergency contracts were retendered and awarded in FY13. Pricing for these contracts are based on fixed and variable components. These are negotiated and now include additional provisions for complying with the CDEM Act. Each contract includes scheduled rates for labour and plant. When a contractor tenders for emergency response or non-scheduled contracts, they propose their scheduled rates.

A bottom up approach is generally used with a review of trends of faults and costs across the asset groups. We have incorporated the projected impacts on costs that will be incurred as a result of the recent re-negotiation of emergency contracts.

Our forward cost projections were completed in July/August 2012 based on current information at that time showed we were seeing approximately 30% more incidents associated with HV and LV cable faults.

More recent information from preliminary fault comparison data, (information has not been validated) for 2013 YTD (i.e. approximately 3/4 complete) indicates that the 11kV cable faults (causing outages) is expected to be 60* against a long term average per earthquakes of 21 i.e. approximately 290%. (*Actual to date is 45 however we have prorated to allow for end of period comparison) Also the total of underground equipment faults is expected to be 975 against a pre earthquake average of 395. i.e. approximately 250% higher.

However, we still are unable to adequately predict projected failure rates on our cables. It will take a number of years of historical data analysis and collation of cable testing results to determine the long term expected fault rates. Our assumption is that the amount of emergency repair as a result of faults will remain at an elevated level over the CPP period

There is a step change in our expenditure as a result of:

- \$1.4M increased cable fault rate due to impaired/reduced cable lifecycle
- \$0.3M increased establishment (fixed) costs
- \$0.2M increased costs associated with road access compliance

In addition to the above there is a one off increase of \$0.64M in FY16 to account for requirement to upgrade emergency storage and emergency facilities infrastructure.

Note: The increase in establishment (fixed) costs and the one off increase related to the upgrade of emergency storage facilities in FY16 result from an apportionment of these costs across all the asset classes covered under the entire emergency budget.

The establishment costs are fixed costs associated with providing the emergency works response. These costs have increased due to:

- Increased standby costs in both standby numbers and incentive cost

- Increased cost associated with provision of resilient services (business support systems, communications, management services, resilient infrastructure)

2.9 Obligations

Like all companies we are subject to the general provisions of a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

- Electricity Act
- Local Government Act
- Electricity Reform Act
- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act.
- Electricity Industries Act
- Energy Companies Act

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a "*lifeline*" utility, Orion must comply with the Civil Defence Emergency Management (CDEM) Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand's communities. The Act requires us to:

- be able to function to the fullest possible extent during and after an emergency

- have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- help define the Crown's CDEM goals and objectives in a National CDEM Strategy
- participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- be capable of managing our own response to emergencies
- develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary NW70.00.14
- Asset Risk Management NW70.60.02

3 Relevant policies and planning standards

Asset management policy NW70.00.46

- We have used time-based and reliability based maintenance approaches combined with Orion's engineering knowledge and experience to forecast asset maintenance.

Procurement policy OR00.00.19 and Contract management NW73.00.03

- We follow our procurement and contract management policies to achieve value for money by competitively tendering our work with a value over \$20,000.

Delegations of authority policy OR00.00.11

- The overall budgeted expenditure for this programme is approved by the Board as part of the overall Asset management Plan. As and when the expenditure is incurred then approval for the actual expenditure is made in compliance with the delegations of authority policy.

Authorised contractors NW73.10.15

- We ensure only authorised contractors are allowed access to our network (such access may be subject to limits that can be specific to each contractor).

Health and Safety policy OR00.00.01

- We follow our health and safety requirements to ensure the safety of the public and our personnel and contractors around our assets.

Environmental Sustainability Policy OR00.00.03

- We work towards environmental sustainability in our operations.

We employ several different asset management practices for UG cable assets:

- GIS: accurately maps the location of our UG services
- Cable digging awareness program: A cable awareness program run in association with external contractors to minimise the risk of cable interruption for any digging in close proximity to the network cables.
- Fault incident report: database that serves as information hub - this is used to collect all root causes of any fault or interruption and interpret the information in a presentable form.
- Cables database: database provides all the relevant cable information e.g. cable lengths, joints and time of installations.
- NZCEP 34 for guidance.
- DigSILENT: Software we employed to model load flow for any network development driven by load or major project requirement.
- Shrouding and Earthing programme: Designed to minimise the risk of live exposed metal equipment from contractors and the public as well as being a long term programme of replacing all live exposed metal equipment with completely insulated DIN equipment to eventually eliminate this risk all together.
- Underground Cable Design NW70.52.01: cable design standard that outlines the engineering design criteria, mainly for use as a guideline for any Orion engineering design. This is to ensure outcomes of the design, incorporates acceptable engineering principles in optimising cable rating, cable route, minimising variation and smoothen installation process.
- Cabling Installation and Maintenance NW72.22.01: Procedures outlining the operation guidelines for the contractor when commencing cable installation and maintenance.
- Underground Standard Construction Drawings NW72.21.20: These standards outline the methods of underground construction and maintenance practices.
- Equipment Specification NW74.23.04 Distribution Cable 11kV: Sets out the requirements for materials and work practices on our underground electricity network
- Equipment Specification Distribution Enclosure Installation NW72.22.03: Procedures outlining the guidelines for the contractor when commencing distribution enclosure installation.

- Inspection and Condition Assessment of the LV Underground Network NW72.21.12: The purpose of this specification is to set out an inspection and assessment procedure for LV equipment.
- Statutory compliance manual 2012.

Asset management reports:

- 66kV Underground Cables – Asset Management Report YE 2012 (NW70.00.32)
- 33kV Underground Cables – Asset Management Report YE 2012 (NW70.00.31)
- 11kV Underground Cables – Asset Management Report YE 2012 (NW70.00.30)
- Low Voltage Underground Cables and Hardware – Asset Management Report YE 2012 (NW70.00.29).

4 Programme description

4.1 Work to be undertaken

The work to be undertaken in this programme involves the emergency maintenance of the UG cable network. This involves the reinstatement of failed network assets because of third party damage, equipment failure or equipment malfunction/mal-operation. Connetics are also responsible for managing the emergency spares.

4.2 Network constraints and service targets

Typically in most interruptions power is restored through switching, and the fault is generally resolved under the emergency maintenance contract.

There are two emergency maintenance contracts – one for short term emergency response (two contractors) and one for major emergency response (multiple contractors). This allows us to meet our restoration service targets in the case of typical small failure events, as well as being able to respond to major emergencies (such as the earthquake).

4.3 Dependencies

The programme is closely related to the following:

- 11kV and Low Voltage Underground Cables Replacement Programme (CPP32)
- Subtransmission Underground Cables Replacement Programme (CPP41)
- 11kV and Low Voltage Underground Cables Scheduled Maintenance Programme (CPP104)
- Subtransmission Underground Cables Scheduled Maintenance Programme (CPP103)
- Underground Cables Non-Scheduled Maintenance Programme (CPP115).

4.4 Programme deliverability

The emergency maintenance programme is carried out via an emergency contracting arrangement. The timing of the work is random and often difficult to predict, although weather, particularly in winter as the water table rises can result in increased faults. The scheduling of the work can be altered to some extent to take into account resource constraints and network loadings.

4.5 Prioritisation

Prioritisation is based on satisfying consumer expectations in the event of a outage:

Satisfying individual or collective consumer expectations:

We consider satisfying consumer expectations as the most influential factor and give priority to the constraints that are most likely to impact consumer supply through extended or frequent outages, or compromised power quality.

5 Earthquake consequences

As a result of the earthquake activity experienced in Canterbury since September 2010 the reliability of the network has been reduced and in some areas the ability to transfer load has been restricted. This may lead to a higher than normal possibility of outages as a result of switching the network to allow assets to be removed from service.

Our resources were constrained following the earthquakes as staff and contractors were diverted to deal with the immediate aftermath of the events. This resulted in a reduction of the scheduled maintenance programme for those years which is addressed in future years. This diversion of resources resulted in increased expenditure in the emergency maintenance for FY11 and FY12 as immediate repairs were carried out to the damaged network.

6 Expenditure plan

6.1 Expenditure summary

These expenditure forecasts do not include any contingencies. A general cross-asset contingency is covered in the contingency opex estimate (CPP120).

The following tables summarise the 66kV, 33kV, 11kV and LV 400V UG cable historical maintenance expenditure in (\$000). Approximately 50% of the expenditure relates to 66kV maintenance with the rest being comprised of 11kV and LV maintenance expenditure. 33kV maintenance expenditure is fairly negligible, typically making up less than 1% on an annual basis. In FY11 and FY12, as a result of the earthquakes, scheduled maintenance expenditure on all UG cables was reduced as resources were diverted to emergency maintenance (repair work to re-establish the network).

Historical 66kV Subtransmission UG Cables Maintenance Expenditure (\$000)

	FY08	FY09	FY10	FY11	FY12
Scheduled	2264	2738	1953	1019	26
Non-Scheduled	5	33	80	6	8
Emergency	18	5	10	782	1619
Total	2287	2776	2043	1807	1653

Historical 33kV Subtransmission UG Cables Maintenance Expenditure (\$000)

	FY08	FY09	FY10	FY11	FY12
Scheduled	0	7	0	1	1
Non-Scheduled	3	35	7	1	2
Emergency	28	1	2	46	30
Total	31	43	9	48	33

Historical 11kV Low Voltage UG Cables Maintenance Expenditure (\$000)

	FY08	FY09	FY10	FY11	FY12
Scheduled	137	205	220	151	185
Non-Scheduled	221	288	61	112	97
Emergency	692	481	711	4059	10088
Total	1050	974	992	4322	10370

Historical Low Voltage 400V UG Cables Maintenance Expenditure (\$000)

	FY08	FY09	FY10	FY11	FY12
Scheduled	347	385	636	486	231
Non-Scheduled	116	255	227	142	177
Emergency	535	472	537	1254	2851
Total	998	1112	1400	1882	3259

Total Historical Subtransmission, 11kV and Low Voltage Underground Cables Maintenance Expenditure (\$000)

	FY08	FY09	FY10	FY11	FY12
Scheduled	2748	3335	2809	1657	443
Non-Scheduled	345	611	375	261	284
Emergency	1273	959	1260	6141	14588
Total	4366	4905	4444	8059	15315

The following tables summarises the 66kV UG forecast maintenance expenditure in (\$000). Forecast scheduled maintenance expenditure for 66kV UG cable is less than historical expenditure because the joint inspection programme that was in place before the earthquakes struck, is to be resumed, but at a reduced rate. The increase in the emergency expenditure in FY16 is a one-off cost for moving the emergency stores.

Forecast emergency maintenance expenditure is greater than historical expenditure because the emergency works contract now contains new resiliency criteria that require our contractors to meet our obligations under the CDEM Act. A risk review was undertaken by contracts that carry out emergency maintenance work to determine the susceptibility to future events. The increased costs to mitigate these issues have been apportioned across all of the underground cables.

Forecast 66kV Subtransmission UG Cables Maintenance Expenditure (\$000)

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Scheduled	780	880	880	880	880	880	880
Non-Scheduled	30	30	30	30	30	30	30
Emergency	50	70	70	85	70	70	70
Total	860	980	980	995	980	980	980

The following tables summarises the 33kV UG forecast maintenance expenditure in (\$000). Forecast expenditure for 33kV UG cable is greater than historical expenditure because of an increase in cable testing of the 33kV network and increased contractor costs to carry out the maintenance work. The increase in the emergency expenditure in FY16 is a one-off cost for moving the emergency stores.

Forecast 33kV Subtransmission UG Cables Maintenance Expenditure (\$000)

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Scheduled	45	45	45	45	45	45	45
Non-Scheduled	50	50	50	50	50	50	50
Emergency	40	55	55	65	55	55	55
Total	135	150	150	160	150	150	150

The following tables summarises the 11kV UG forecast maintenance expenditure in (\$000). Forecast expenditure for 11kV UG cable is greater than historical expenditure because of an increase in cable testing and increased contractor costs to carry out maintenance works. The increase in the emergency expenditure in FY16 is a one-off cost for moving the emergency stores.

Forecast 11kV UG Cables Maintenance Expenditure (\$000)

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Scheduled	710	510	510	510	510	510	510
Non-Scheduled	80	80	80	80	80	80	80
Emergency	1200	1625	1625	1950	1625	1625	1625
Total	1990	2215	2215	2540	2215	2215	2215

The following tables summarises the LV 400V UG forecast maintenance expenditure in (\$000). Forecast expenditure for LV 400V UG cable is greater than historical expenditure because of an increase in cable testing and increased contractor costs to carry out maintenance work. The increase in the emergency expenditure in FY16 is a one-off cost for moving the emergency stores.

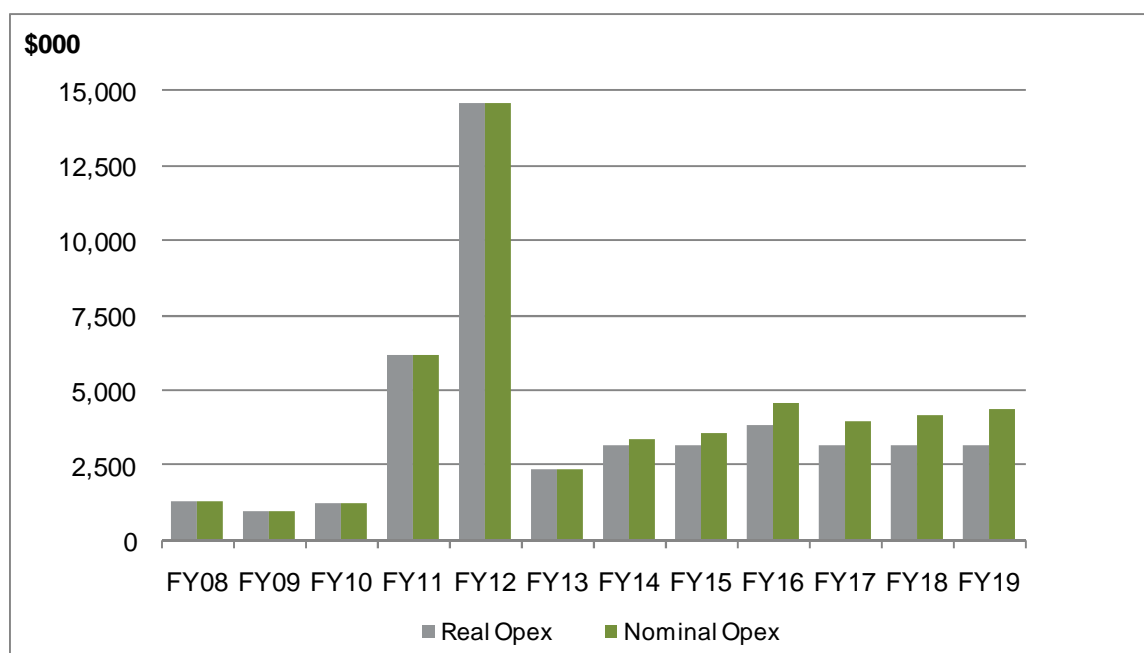
Forecast Low Voltage 400V UG Cables Maintenance Expenditure (\$000)

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Scheduled	720	720	720	720	720	720	720
Non-Scheduled	130	130	130	130	130	130	130
Emergency	1050	1420	1420	1710	1420	1420	1420
Total	1900	2270	2270	2560	2270	2270	2270

Total Forecast Subtransmission, 11kV and Low Voltage Underground Cables Maintenance Expenditure (\$000)

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Scheduled	2255	2155	2155	2155	2155	2155	2155
Non-Scheduled	290	290	290	290	290	290	290
Emergency	2340	3170	3170	3810	3170	3170	3170
Total	4885	5615	5615	6255	5615	5615	5615

The following chart shows our total UG cables historical and forecast emergency maintenance expenditure in real and nominal terms (\$000). The real terms have been escalated as per the methodology in the CPP proposal to ascertain the nominal terms.



The following tables summarise our total UG cables forecast and historical emergency maintenance expenditure in both real and nominal terms (\$000).

Historical expenditure (Nominal), Emergency

	Nominal \$000				
	FY08	FY09	FY10	FY11	FY12
66 kV Underground cables	18	5	10	782	1,619
33 kV Underground cables	28	1	2	46	30
11 kV Underground cables	692	481	711	4,059	10,088
LV Underground cables	535	472	537	1,254	2,851
Total	1,274	960	1,261	6,141	14,588

Forecast expenditure (Real), Emergency

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
66 kV Underground cables	50	70	70	85	70	70	70
33 kV Underground cables	40	55	55	65	55	55	55
11 kV Underground cables	1,200	1,625	1,625	1,950	1,625	1,625	1,625
LV Underground cables	1,050	1,420	1,420	1,710	1,420	1,420	1,420
Total	2,340	3,170	3,170	3,810	3,170	3,170	3,170

Forecast expenditure (Nominal), Emergency

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
66 kV Underground cables	50	74	79	102	88	92	96
33 kV Underground cables	40	58	62	78	69	72	75
11 kV Underground cables	1,200	1,725	1,834	2,341	2,039	2,131	2,227
LV Underground cables	1,050	1,508	1,602	2,053	1,782	1,862	1,946
Total	2,340	3,365	3,577	4,574	3,978	4,157	4,345

7 References

Documents that should be read in conjunction with this programme summary are:

- 66kV Underground Cables – Asset Management Report YE 2012 (NW70.00.32)
- 33kV Underground Cables – Asset Management Report YE 2012 (NW70.00.31)
- 11kV Underground Cables – Asset Management Report YE 2012 (NW70.00.30)
- Low Voltage Underground Cables and Hardware – Asset Management Report YE 2012 (NW70.00.29)

NETWORK ASSETS EMERGENCY MAINTENANCE

CPP119

Programme Summary

1 April 2013 – 31 March 2019

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1 Programme introduction

Programme Name	<i>Network assets (CPP119)</i>
Service Category	<i>Provide and operate network infrastructure</i>
Opex Category	<i>Emergency maintenance</i>

1.1 Description

The work undertaken in this programme involves emergency maintenance of Orion's network assets.

While this programme focuses on emergency maintenance, there are some references to the scheduled and non-scheduled maintenance programmes for context. For more detail on these please refer to section 4.3 for a full list of programmes.

The programme is expected to continue in perpetuity.

1.2 Assets included

The assets that are included in this programme are:

- Earths
- Control systems
- Protection and communication cables
- Transformers
- Distribution – building (includes grounds)
- Distribution – kiosk (includes grounds)
- Meters
- Generators
- Switchgear
- Load management systems
- Asset management systems
- Distribution management systems
- Connection and contract management is our contractor costs associated with first response to major storms
- Other asset management services are our contractor costs associated with the provision of emergency spares

1.3 Aims, objectives and drivers

The aim of this opex is to undertake emergency works on the electricity network that are of an urgent nature and repairs are undertaken immediately due to the loss of power or for safety reasons

The main objectives of the programme are to:

- ensure the safety of the public and our personnel and contractors around our assets.
- respond to and resolve in a timely manner asset faults in our network assets.

The main drivers for the programme are:

- that assets are repaired in a timely and cost effective manner to ensure the condition and performance of our assets are such that they:
 - meet acceptable target levels of safety to people and property
 - provide acceptable levels of network reliability
- the prudent cost effective management of our assets and associated risks

1.4 Obligations

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network; of particular note is the Health and Safety in Employment Act 1992. Orion's main obligations are contained in Orion's statutory compliance manual. In addition, as a "lifeline" utility, Orion must comply with the Civil Defence Emergency Management Act.

2 Key Assumptions

The project relies on the following key assumptions:

2.1 Input costs

Project input costs are weighted as follows:

	Labour	Material
Protection	70%	30%
Switchgear	70%	30%

2.2 Labour escalators

For the labour component of the project cost we have determined that it is not appropriate to use the standard New Zealand wide LCI in relation to this project.

We note that Statistics NZ has recently started to monitor construction costs in Canterbury due to the local pressures on construction resources as a result of the Christchurch rebuild, however their data time series is currently limited and unsuitable.

As local labour cost pressure is evident in our most recent contract tenders we have determined a proposed cost escalation index which we refer to as the Canterbury construction labour index based on estimates of labour.

We have sought external advice cost from two quantity surveyor firms on what we may expect in the market over the remainder of the CPP period in this respect. There is considerable uncertainty; however this CPP process requires us to make appropriate estimates. The resulting labour escalators that we propose are:

Index	FY14	FY15	FY16	FY17	FY18	FY19
Canterbury construction labour	7.5%	7.5%	7.5%	5%	5%	5%

For further information on our derivation see section 9.26.4 to 9.26.6 of the CPP proposal.

2.3 Material escalators

For the various material components of the project costs we have considered the most relevant input components for this project. The resulting material escalators for this project are:

Index materials	FY14	FY15	FY16	FY17	FY18	FY19
PPI	3.04%	3.32%	3.65%	3.20%	3.20%	3.20%

For further information on our derivation see section 9.26.4 of the CPP proposal.

2.4 Emergency work

Our emergency works budgets incorporate immediate work required to restore the network to service.

If work is not an immediate failure or public safety risk then the work is classed as non scheduled (ie: unplanned work to be undertaken within a 1 week to 6 month window).

This project relates only to emergency maintenance work although there are some references to the non-scheduled and emergency maintenance programmes in the tables below these are not directly relevant to this project.

Scheduled work involves the work known in advance that is most readily able to be managed through our planned contract tendering processes – where we package up similar types of work for tendering purposes.

2.5 Programme deliverability

We believe that the assumed timing and deliverability of the forecast work is achievable.

Our emergency works are delivered primarily under two contracts. Our contracting model allows the contractors to bring in additional resources to assist them in completing their contracted works if required.

2.6 Non-network solutions

We have not considered any non-network solutions for these projects.

2.7 Cost Benefit analysis

We have not carried out a cost benefit analysis on this project.

2.8 Consultants reports

There are no departures from consultants' recommendations in this opex programme.

2.9 Basis for Expenditure Forecast

Our emergency works are delivered primarily under two emergency works contracts. We

had defined emergency response (works) and non-scheduled (minor works) contracts in place with Connetics and Independent Lines Services (ILS) for many years. These have recently been renegotiated. The previous contracts were negotiated in 2006 and were due to expire March 2011 - but due to the earthquakes, they were extended until the new contracts could be formalised, which occurred in October 2012. The new contracts have a three year term (expiring on 30 September 2015), with a possible two year extension, subject to satisfactory performance.

When a fault on the network occurs, our Control Group dispatches the emergency response contractor responsible for the network area concerned, to remedy the fault and make the network safe again. The Emergency Works Technical Specification NW72.20.03 defines what is classed as routine and non-routine plant repairs and certain estimated values of work that the contractor is authorised to respond to. When the repair works is non routine or above a certain estimated value, our Contract Manager is engaged to assist the contractor devise a repair strategy and provide the authorisation for the works to occur.

The emergency contracts were retendered and awarded in FY13. Pricing for these contracts are based on fixed and variable components. Each contract includes scheduled rates for labour and plant. When a contractor tenders for emergency response or non-scheduled contracts, they propose their scheduled rates. Our evaluation of the proposed rates compares them against previously benchmarked rates for the same types of labour and plant response works and the previous contract rates with appropriate cost escalation factors derived from NZS3910:2003 (Appendix A which sets out relevant Statistics NZ labour and materials indices). The escalated old rates and benchmark information provide us with information about the percentage increases/decreases (in some instances) proposed by the contractor. These rates are clarified, with due diligence if necessary and accepted or re-negotiated as appropriate.

A bottom up approach is generally used with a review of trends of faults and costs across the asset groups. We have incorporated the projected impacts on costs that will be incurred as a result of the recent re-negotiation of emergency contracts.

Our emergency contractors are an essential part of our overall resiliency under the CDEM Act. If our key contractors are unable to operate in an emergency, then it will seriously undermine our own ability to respond.

Our emergency works contracts now contain new resiliency criteria that require our contractors to meet our obligations under the CDEM Act. Risk reviews have been undertaken by the contractors to determine their susceptibility to future events. The costs incurred to mitigate these issues have been apportioned across each of our asset classes.

There are no contingency factors provided for in this emergency maintenance programme

The projected costs include an increase of approximately \$0.3m related to fixed costs. Additional expenditure in real terms not related to fixed costs is in the order of < \$0.1m. This is generally due to increased contractor costs.

3 Relevant policies and planning standards

- Asset management policy (NW70.00.46)
- Procurement policy (OR00.00.19)
- Contract management (NW73.00.03)
- Health and Safety policy (OR00.00.01)
- Delegations of authority policy (OR00.00.11)
- Authorised contractors (NW73.10.15)
- Environmental Sustainability Policy (OR00.00.03)
- Asset Management Lifecycle Budget Forecasting Process (NW70.60.15)

4 Programme description

4.1 Work to be undertaken

Emergency maintenance responds to unplanned events that impair the normal operation of network assets. Work is undertaken as quickly as possible after the occurrence of an unexpected event in order to bring the distribution network back to at least its minimum acceptable and safe operating condition.

For more detail on the programme see the attached asset management reports.

4.2 Network constraints and service targets

There are no network constraints expected due to forecast load.

Assets must be repaired promptly. Allowing the assets' condition to deteriorate significantly is not appropriate as the consequences of doing so can pose a significant risk and are very costly to rectify. This project contributes to meeting Orion's overall service targets (including safety) by ensuring that assets are maintained as and when required.

4.3 Programme deliverability, prioritisation and dependencies

The emergency maintenance programme can be carried out within normal contracting arrangements. Prioritisation is based on a number of factors including ensuring the safety of the public and our personnel around our assets, satisfying individual or collective consumer expectations, managing contractor resource constraints, and our asset maintenance programme.

This programme is closely related to the following programmes:

- Communication cables and protection systems replacement programme (CPP33)
- Control systems replacement programme (CPP34 and CPP43)
- Switchgear replacement programme (CPP36)
- Transformers replacement programme (CPP37)
- Substations replacement programme (CPP38)
- Buildings and grounds replacement programme (CPP39)
- Meters replacement programme (CPP40)
- Load management systems programme (CPP35)
- Information solutions – asset management system replacement programme (CPP42)
- Earths scheduled maintenance programme (CPP102)

- Mapping and asset storage scheduled maintenance programme (CPP105)
- Control systems scheduled maintenance programme (CPP106 and CPP123)
- Communication cables and protection systems programme (CPP107)
- Transformers scheduled maintenance programme (CPP108)
- Meters scheduled maintenance programme (CPP110)
- Generators scheduled maintenance programme (CPP111)
- Switchgear scheduled maintenance programme (CPP112)
- Load management systems scheduled maintenance programme (CPP121)
- Information solutions – asset management systems scheduled maintenance programme (CPP122)
- Network assets emergency maintenance programme (CPP119).

5 Earthquake consequences

As a result of the earthquake activity experienced in Canterbury since September 2010 the reliability of the network has been reduced and in some areas the ability to transfer load has been restricted. A few of our substation buildings were damaged in the earthquakes by rock falls, collapsed hillsides and liquefaction. These damaged substations required immediate emergency maintenance to repair and re-establish the network.

Prior to the Canterbury earthquakes, our generator requirements were limited. We increased our generator numbers as a direct result of the earthquakes to ensure we were in a position to restore power in a timely fashion after an event.

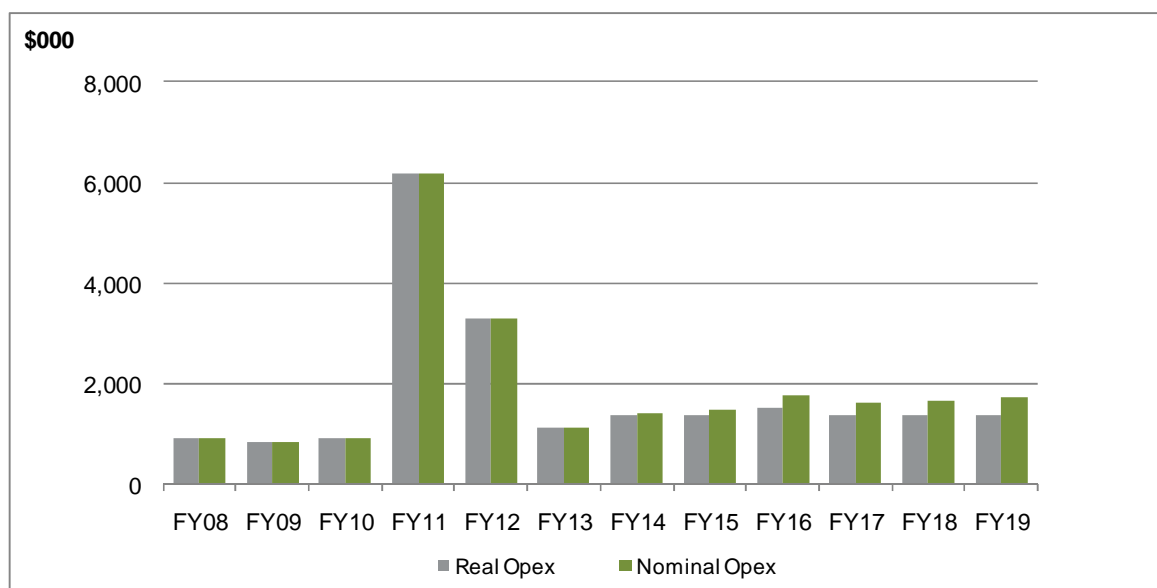
6 Expenditure plan

6.1 Expenditure summary

The following chart shows our network assets historical and forecast emergency maintenance expenditure in both real and nominal terms (\$000). The real terms have been escalated as per methodology outlined in the CPP proposal to ascertain the nominal terms.

Network assets emergency maintenance expenditure was higher in FY11 and FY12 than historically as resources were diverted to emergency repairs of the network. Forecast expenditure is expected to be consistent with historical pre-earthquake expenditure.

These expenditure forecasts do not include any contingencies. A general cross-asset contingency is covered in the contingency maintenance opex programme (CPP120).



The following tables summarise our network assets forecast and historical emergency maintenance expenditure in both real and nominal terms (\$000).

Historical expenditure (nominal)

	Nominal \$000				
	FY08	FY09	FY10	FY11	FY12
Protection	138	85	86	87	101
Distribution transformers	131	132	118	105	137
Distribution substations (including land)	35	31	71	652	1,228
Distribution switchgear	100	126	151	48	74
Load management	15	14	14	19	31
SCADA and control	123	107	113	87	85
Communications Equipment	13	12	25	13	247
Generators	-	-	2	841	807
Operations	2	3	3	1	1
Connection and contract management	20	10	12	3,980	286
Other asset management services	335	316	300	335	299
Total	913	835	895	6,168	3,297

Forecast expenditure (real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Protection	130	175	175	215	175	175	175
Distribution transformers	140	190	190	225	190	190	190
Distribution substations (including land)	25	35	35	45	35	35	35
Distribution switchgear	110	150	150	180	150	150	150
Load management	20	30	30	35	30	30	30
SCADA and control	90	120	120	145	120	120	120
Communications Equipment	15	20	20	30	20	20	20
Generators	5	5	5	10	5	5	5
Operations	5	5	5	10	5	5	5
Connection and contract management	160	215	215	215	215	215	215
Other asset management services	410	410	410	410	410	410	410
Total	1,110	1,355	1,355	1,520	1,355	1,355	1,355

The operations category relates to mapping and asset information. Connection and Contract management is our contractor costs associated with first response to major storm events. Other asset management services are our contractor costs associated with provision of emergency spares storage. These costs are all contractor costs.

Forecast expenditure (nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Protection	130	186	197	258	220	229	240
Distribution transformers	140	202	214	270	238	249	260
Distribution substations (including land)	25	37	39	54	44	46	48
Distribution switchgear	110	159	169	216	188	197	206
Load management	20	32	34	42	38	39	41
SCADA and control	90	127	135	174	151	157	164
Communications Equipment	15	21	23	36	25	26	27
Generators	5	5	6	12	6	7	7
Operations	5	5	5	11	6	6	6
Connection and contract management	160	220	225	232	237	243	249
Other asset management services	410	419	429	442	453	464	475
Total	1,110	1,414	1,478	1,747	1,605	1,664	1,724

7 References

Documents that should be read in conjunction with this programme summary are:

- NW70.00.22 Asset Management Report - Protection Systems
- NW70.00.23 Asset Management Report - Power Transformers
- NW70.00.24 Asset Management Report - Switchgear HV and LV
- NW70.00.28 Asset Management Report - Underground Cables - Communication
- NW70.00.33 Asset Management Report - Circuit Breakers

- NW70.00.34 Asset Management Report - Communication Systems
- NW70.00.36 Asset Management Report - Distribution Management Systems
- NW70.00.37 Asset Management Report - Load Management Systems
- NW70.00.38 Asset Management Report - Metering
- NW70.00.39 Asset Management Report - Generators
- NW70.00.40 Asset Management Report - Transformers - Distribution
- NW70.00.41 Asset Management Report - Voltage Regulators
- NW70.00.43 Asset Management Report - Property - Network
- NW70.00.44 Asset Management Report - Substations

CORPORATE OPEX

CPP160

Programme Summary

1 Apr 2013 – 31 Mar 2019

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1 Programme introduction

Programme name	<i>Corporate Opex (CPP160)</i>
Service category	<i>N/a</i>
Opex category	<i>General management, administration and overheads</i>

1.1 Board

The board is appointed by its two shareholders Christchurch City Holdings Limited and Selwyn Investment Holdings Limited (CCHL and SIHL respectively), pursuant to the company's constitution. CCHL appoints up to five of the directors (it must consult with SIHL on one of those five). SIHL appoints the other director.

Pursuant to the company's constitution, at least a third of the Orion directors must retire by rotation each year. The shareholders may reappoint any director who so retires.

CCHL has a policy that its appointees should not serve on the Orion board for more than nine years unless there are exceptional circumstances. Prior to making its appointments, CCHL consults with the chairman of Orion.

There are currently five non-executive directors on the Orion board and no executive directors. The board has all of the responsibilities and duties that any corporate board has. As an energy company pursuant to the Energy Companies Act 1992, the company and the board have more public disclosure and accountability obligations than privately owned companies. For example, Orion is required to operate within what is stated in its published statement of intent (SOI) and to report its performance against the targets it sets in its SOIs.

The board is ultimately responsible for setting the goals of the company and for compliance with law and for performance.

The key responsibilities of the board are:

- commercial performance
- business plans and budgets
- corporate policies
- financial and dividend policies
- management oversight and development
- delegations of authority
- identification and management of business risks
- identification and management of business opportunities
- internal control systems
- integrity of management information systems
- compliance with relevant law
- relationships with stakeholders and other external parties

- reports to shareholders.

The board appoints the chief executive officer and negotiates the terms and conditions of the CEO's employment. The board delegates management of the company to the CEO and the CEO's management team. The board monitors the performance of the CEO and his management team and the company.

The board formally reviews the following on a regular basis (at least annually):

- statement of intent
- business plan, network asset management plan, budgets and financial forecasts
- key policies (for example delegations of authority and HR policies).

The board also receives regular progress reports (for example financial and operational) and revised forecasts from time to time. The full board generally meets monthly, although other meetings occur from time to time. The board's committees meet separately.

The board liaises with external independent auditors.

The board has two standing committees – each with their own terms of reference:

- audit committee
- remuneration committee.

The board is accountable to the company's shareholders. As an energy company the board is also publicly accountable.

1.2 Corporate management team

The CEO and his direct management reports are responsible for the overall management of the company, within specified delegated authorities and within authorised policies.

Each corporate manager has their own area of responsibility, however there is a collegiate approach and culture at Orion – and so there is a lot of cross-over and assistance between corporate managers (and their teams) on certain issues and developments.

The corporate management team consists of:

- Chief Executive Officer
- Chief Operating Officer
- General Manager Corporate Services
- General Manager Commercial
- General Manager Information Solutions
- Human Resources Manager
- Communications and Engagement Manager
- Executive Assistant (PA).

1.3 Human resources

The Human Resources (HR) Manager assists line managers (including the CEO) in their employee management responsibilities. Responsibility for line management remains with line management, not the HR Manager. The HR Manager's responsibilities include:

- HR strategy development
- HR policies, systems and processes

- workforce and succession planning
- advising and supporting managers to recruit, induct, train, develop, coach and performance manage their employees
- organisational development
- change management
- employment policy development
- legislative compliance – including training managers in their responsibilities
- employee wellbeing programmes
- HR administrative assistance to line managers (for example drafting employment agreements, variations etc)
- supporting negotiations with employees and unions
- supporting dispute resolution
- supporting the management of disciplinary issues.

1.4 Fleet management

The company's fleet management function facilitates getting and keeping the right vehicles in the right place at the right time. Fleet management works closely with line managers throughout the company to ensure vehicles are fit for purpose, safe, reliable, efficient and cost effective.

A rough breakdown of the current vehicle fleet is as follows:

- 16 network field operator utility vehicles
- Three heavy trucks that carry emergency generators
- 36 operational vehicles
- One van
- 29 vehicles largely as part of total remuneration packages. This includes some SUVs for key network managers – part of the company's overall risk management approach.

Fleet management:

- plans the company's vehicle fleet in light of market developments and departmental needs
- recommends policy
- arranges and negotiates purchase, maintenance, repair and disposals in liaison with line managers
- keeps records of vehicles
- costs vehicles
- negotiates key contracts – for example purchase, fit-out, repair, maintenance, fuel etc
- promotes safety awareness
- assists with compliance – for example FBT, road user charges, weight restrictions etc.

The overriding standard that fleet management seeks to achieve is “*fit for purpose*”. Other objectives such as fuel efficiency mean little when customers experience a power outage. This especially applies to our vehicles that our field operators use. The vehicles must:

- be able to carry certain electrical gear
- be able to bear that weight
- be able to negotiate difficult terrain sometimes and
- be reliable
- be safe.

1.5 Aims and objectives

The objective of Orion's corporate expenditure is to manage operations so that they are safe, economically efficient, reliable and cost-effective for consumers.

1.6 Obligations

Like all companies we are subject to the general provisions of a wide range of legislation; of particular note is the Health and Safety in Employment Act 1992, which has far-reaching impacts. Other specific safety requirements are found in the Electricity Act, the Electricity Regulations, the Electricity Industry Act and the Building Act.

Orion aims to achieve compliance with all relevant legislation, regulations and codes of practice that relate to how we manage our electricity distribution network, including:

- Electricity Act
- Energy Companies Act
- Electricity Industry Act
- Local Government Act
- Electricity Reform Act
- Building Act
- Electricity Regulations
- Health and Safety in Employment Act
- Electricity (Hazards from Trees) Regulations
- Health and Safety in Employment Regulations
- Electricity Information Disclosure Requirements
- Public Bodies Contract Act
- NZ Electrical Codes of Practice
- Public Works Act
- Civil Defence Emergency Management Act
- Electricity Amendment Act
- Resource Management Act.

The main obligations under these Acts are contained in Orion's statutory compliance manual.

As a “*lifeline*” utility, Orion must comply with the Civil Defence Emergency Management (CDEM) Act. The Act stipulates the responsibilities and roles of key lifeline agencies, including Orion, with respect to emergencies or disasters.

The CDEM Act affects the way we carry out our continuity planning and how we relate to other utilities, emergency services, local government and New Zealand's communities. The Act requires us to:

- be able to function to the fullest possible extent during and after an emergency
- have plans for being able to function that can be made available to the Director of Civil Defence Emergency Management.

We may be requested to:

- help define the Crown's CDEM goals and objectives in a National CDEM Strategy
- participate in the development of a National CDEM Plan and/or regional CDEM Group plans
- provide technical advice on CDEM issues to the Director of Civil Defence Emergency Management or CDEM Groups (consortia of regional authorities and emergency services).

This means that we must:

- plan for, and be able to ensure continuity of service, particularly in support of critical CDEM activities
- be capable of managing our own response to emergencies
- develop plans co-operatively to co-ordinate across our industry sector and with other sectors
- establish relationships with CDEM groups across regions.

Our obligations under the Act are addressed in the following policies:

- Disaster Resilience Summary NW70.00.14
- Asset Risk Management NW70.60.02

2 Relevant policies and documents

The most significant policies and documents for the board and corporate management are:

- statement of intent 2013-2015
- business plan and financial forecasts produced annually
- network asset management plan 2012
- key governance control policies as follows:
- board and directors' code of conduct
- human resources – OR00.00.05
- delegations of authority – OR00.00.11
- fraud and theft – OR00.00.08
- protected disclosures ("whistleblower") – OR00.00.16
- Treasury
- tax risk management.

The most significant policies for HR are:

- network asset management plan 2012
- human resources – OR00.00.05
- delegations of authority – OR00.00.11

- fraud and theft – OR00.00.08
- protected disclosures (“whistleblower”) – OR00.00.16
- motor vehicle – OR00.00.09.
- information systems – OR00.00.13/1

The most significant policies for fleet management are:

- network asset management plan 2012
- human resources – OR00.00.05
- delegations of authority – OR00.00.11
- procurement – OR00.00.19
- fraud and theft – OR00.00.08
- protected disclosures (“whistleblower”) – OR00.00.16
- motor vehicle – OR00.00.09.

3 Links to other projects

This programme is related to all of Orion's other infrastructure opex and capex programmes as it provides management for the infrastructure that the other programmes will take place within.

4 Programme deliverability

The directors are experienced business people who have a range of skills and experience. Director rotation and retirement ensures that there is renewal over time so that the company benefits from fresh governance perspectives, while retaining continuity.

The corporate management team is very experienced and it also has a balance of skills and experience.

The HR Manager is qualified and is very experienced. She is assisted by a capable PA.

The fleet management function (0.50 FTE) also has significant skills and experience.

Policy development and management systems (including IT) have developed over time to ensure that the company can monitor performance and deliver results.

The board and management are encouraged to seek expert independent advice and services as appropriate.

Any additional employees required due to changes in forecast workloads or staff turnover will be recruited as required.

5 Earthquake consequences

The most **immediate** consequences for the board, corporate management, HR function and fleet management were:

- some employees had very real and urgent personal issues to deal with and for most it was a very taxing and difficult period to deal with
- the 22 February 2011 earthquake in particular was very large. It was very difficult to get timely information on what had actually happened so that strategies to address the issues could be developed

- much of the damage to the network was underground (for example 66kV and 11kV cables) and so it was very difficult to assess timeframes for restoration of supply
- customers, the community and other stakeholders (for example the media, Civil Defence and Government politicians) became hungry for information. A significant effort went into meeting those expectations and the CEO led those efforts so that key managers could concentrate on the job at hand
- key recovery decisions had to be made without perfect information because of the urgency of the situation. For example the decision to not repair the damaged 66kV cables from Bromley GXP to Brighton zone sub
- it was decided that wherever possible we would use existing management systems and procedures to decide on and dispatch work – this included appropriate delegated authorities and approval processes. This meant that the management group needed to keep the board apprised of key issues and to gain specific approvals for certain initiatives
- employees had to do other jobs completely different to what they had been used to – for example manning phones and helping out in other ways
- employees lost access to their offices, records and other resources for several weeks and in some cases permanently
- attempts were made to recover lost records, while minimising time spent inside severely compromised damaged buildings
- cordon access became a major hindrance
- employees had to innovate to get necessary work done. For example Fleet Management sought and gained crucial assistance from vehicle suppliers and vehicle repairers so that the vehicle fleet remained operable
- the volume of some work increased enormously
- other work backed-up.

The **medium term** consequences have been:

- some of the backed-up work had to be caught up
- some key records were recovered from the damaged office buildings and stored elsewhere on site in temporary containers
- some key records were not able to be safely recovered from the damaged office buildings
- the corporate group needed to reset priorities for the company – it's just not possible to do everything we want to do given pressing priorities
- some improvement projects have been put on hold while other earthquake recovery priorities have taken precedence – for example to review our network architecture and sub-transmission strategy in light of the earthquakes and to prepare and negotiate our insurance claims and to prepare our CPP application
- we have had many requests from external organisations for information about our experiences so that they can learn

- fortunately, only two of this group's employees have resigned since 22 February 2011 – Roger Sutton has resigned to head up CERA and Tas Scott has resigned to work for WEL Networks in Hamilton. Rob Jamieson was promoted to CEO and David Freeman-Greene has replaced Rob as General Manager Commercial. Gina Clarke has strengthened the corporate management team as Communications Manager (previously a contractor to the company).

6 Expenditure plan

These expenditure forecasts do not include any contingencies.

Opex costs for these groups are relatively fixed from year to year. Most costs relate to employee remuneration. The forecasts show no increases in FTEs over the forecast period to 31 Mar 2019.

Any variations in opex from year to year are relatively immaterial in the context of the company's CPP application.

As proportions, approximately:

- 89% of the board's total annual forecast costs (of \$0.34m) is for the directors' fees/remuneration
- 76% of corporate management's total annual forecast costs (of \$3.5m) is for the CEO's and his direct reports' remuneration costs including benefits and FBT, 7% is for audit fees, 5% is for AMI stadium sponsorship and 4% is for independent expert advice. The company does not have an in-house legal department
- 24% of the human resources function's total annual forecast costs (of \$0.34m) is for the remuneration of the PA and 24% is for medical and occupational health. There is a range of other smaller centralised costs here too – including independent advice (3%), social club donation (3%), staff training (10%), staff functions (9%) and staff survey (3%).

Fleet management is costed in a different way. In summary:

- the fleet management function is handled by 0.50 FTE in the finance function
- \$50k per annum of annual employee remuneration costs are transferred out of the finance function (K10) to a centralised vehicle cost centre (K18) to reflect the 0.50 FTE
- all other fleet opex is captured in K18 – including depreciation expense, insurance, repairs and fuel
- each vehicle has its own job number within K18 to collect costs, fuel consumption, mileage etc
- each vehicle is then "leased" (re-costed) to each operational cost centre that uses the vehicles. This monthly lease is intended to cover costs, including fuel, maintenance, registration, insurance, depreciation expense and a return on investment.

Fleet management **indirect** costs are around \$70k per annum and can be summarised as follows:

- \$50k for the 0.5 FTE re-costed from Finance
- \$45k for annual insurance costs for vehicles (\$2k excess)

- \$15k other costs
- (\$40k) revenue offset from profits and depreciation recovered on sale of vehicles.

Fleet direct costs are around \$1.1m per annum and can be summarised as follows:

- \$0.6m depreciation expense
- \$0.3m fuel
- \$0.1m repairs and maintenance
- \$0.1m other costs (tyres, registrations, RUC and WOF).

Fleet “revenues” (that is recharged to the functions that use the vehicles) is around \$1.2m per annum.

Taking account all of the above, the company’s fleet makes a pre-tax “profit” of around \$0.1m per annum – an approximate 5% return on of the depreciated book value of the fleet (around \$1.9m).

6.1 Employee FTEs

The company’s CPP expenditure forecasts assume that there is no increase in FTEs during the CPP forecast period. Total FTEs assumed for the CPP forecast period are as follows:

- 0.0 – for board – no employees
- 8.0 – for corporate management – includes the CEO and a PA
- 1.0 – for HR – this is a PA
- 0.0 – for fleet management - this FTE is already included in Finance.

The following chart shows our board, corporate management team, human resources and fleet historical and forecast opex expenditure in both real and nominal terms. The real terms have been escalated as per the methodology outlined in our CPP proposal to ascertain the nominal terms.

Historical and forecast expenditure



The following tables summarise our board, corporate management team, human resources and fleet net rental profit forecast in both real and nominal terms (\$000).

Historical expenditure

	Nominal \$000				
	FY08	FY09	FY10	FY11	FY12
Corporate	3,008	3,008	3,105	3,119	3,151
Total	3,008	3,008	3,105	3,119	3,151

Forecast expenditure (real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Corporate	3,607	3,580	3,576	3,589	3,597	3,604	3,600
Total	3,607	3,580	3,576	3,589	3,597	3,604	3,600

Forecast expenditure (nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Corporate	3,607	3,660	3,741	3,863	3,967	4,072	4,167
Total	3,607	3,660	3,741	3,863	3,967	4,072	4,167

The \$0.45m increase from FY12 to FY13 is comprised of the following:

- \$0.2m – for our sponsorship agreement with AMI Stadium. Our sponsorship was halted in FY12 due to earthquake damage to the previous stadium. Our sponsorship is due to recommence in FY13. We consider this sponsorship to be an important part of our business as it provides wider community benefits which is quite different from our normal sponsorship of energy or energy-related items. In addition, Orion gets some additional benefits from this sponsorship in terms of access to tickets etc.
- \$0.1m – an increase in our forecast spend on management training/development for the corporate management group. This training was driven by results from our staff survey during FY10. We have attempted to begin the training programme twice since this time, but both times have been interrupted by the earthquakes.
- \$0.1m – an increase in medical and occupational health (and to a lesser extent host expenses).
- The remaining increase is due to other sundry increases, including pay rises and increased travel and accommodation expenditure.

The sponsorship for AMI stadium has been included in this programme as this is where it has historically been classified. All other sponsorship has been included in the commercial and special projects opex programme (CPP165 and CPP171).

6.2 Basis for expenditure

The non-staff related costs are forecast using a base year approach, extrapolated from FY12. FY12 was chosen as the base year as we felt that the most recent information is going to be the most similar to the expenditure during the CPP period. In addition, there were no costs incurred during FY12 that we do not expect to be incurred in the future (i.e. there were no specific earthquake related costs).

Our expenditure forecast for the FY13 staff related costs has been based on a budget prepared on a bottom-up basis during FY12. This budget was prepared by the business unit manager in charge of the expenditure and was reviewed by their corporate manager and the CEO. Any significant changes from prior years were reviewed by senior accounting staff who challenged any items which appear incorrect or unnecessary.

6.3 Key assumptions

We have prepared the expenditure forecasts using several key assumptions. In particular, we have assumed that the business environment remains stable for the forecast period and that Orion continues to operate in the same manner as it currently does. Some critical components of these assumptions are:

- No further significant earthquakes or aftershocks
- A similar regulatory environment with Orion returning to a more active involvement in wider industry issues than has been the case in recent years
- A similar number of employees for the period

We expect that there will be an increase in business activity in areas of the business associated with recovery and new developments (central city and new subdivisions). Apart from scale we do not expect there will be a significant change in the kinds of activities undertaken.

As the main assumptions mean that for the CPP period Orion will continue to operate in the same manner and in a similar environment to the one we are currently operating in, there is no impact on the expenditure forecasts resulting from these assumptions.

We have also made some assumptions regarding our FTE employees and their replacement:

- A majority of current FTE employees stay on for the medium-long term. If this does not happen we expect there will be little impact on the expenditure forecasts as we expect we will be able to fill the job with a suitable candidate on a similar salary.
- Any FTE employees who leave are able to be replaced with a suitable candidate in a timely manner. Any change to this assumption would not have a significant impact on the expenditure forecasts. If a suitable candidate cannot be found then we are generally able to cover the vacant position using a combination of temporary staff and reallocation of duties to existing FTE employees.
- The job market stays reasonably similar with FY12, for example the remuneration expected for these roles does not significantly change. Any change in expected remuneration will have a significant impact on the expenditure forecasts. However, there is currently no reason to believe that there will be significant changes in the job market.

These calculations would change if the company:

- Grows in size/complexity (for example if the company lists on the stock exchange, enters into mergers/acquisitions, arranges significant debt financings or undertakes complex earthquake insurance claims and negotiations);

- Is required to undertake more regulatory imposts; and/or
- Is affected by any further catastrophic events such as the earthquakes.

6.4 Expenditure reduction initiatives

We do not have any specific expenditure reduction initiatives for the expenditure in this programme. However, efficiencies are achieved through the competitive nature of the contracting model that we use. As we routinely tender the works, the suppliers will include initiatives and work process efficiencies within their pricing. Other initiatives are included when reviewing the lifecycle of the different assets and the assessment of new products.

A major part of the budgeting process which was used to forecast the FY13 staff costs (as described in section 6.2) was the review of all costs by several different people within Orion. Any expenditure which seemed excessive or incorrect was questioned and needed to be justified.

No cost benchmarking or cost-benefit analyses have been undertaken by Orion.

6.5 Alternatives considered

We consider all costs included in this programme to be a necessary part of the business with no real alternatives (i.e. there is no alternative for any of the board costs).

For the other staff costs the alternatives we have identified are using temporary staff and contractors. We currently use a combination of FTE employees, temporary staff and contractors to achieve optimal outcomes.

In order to function as effectively and efficiently as possible the majority of staff we employ need to be skilled and experienced. Following the earthquakes it has become significantly more difficult to attract staff with the relevant skills and experience, particularly on a temporary basis. This means that our ability to use temporary staff or contractors is limited.

Additionally, we consider that for the positions included in this programme FTE employees are the most appropriate alternative given the ongoing nature of the roles and their importance to Orion.

INFORMATION SOLUTIONS – CORPORATE SYSTEMS OPEX

CPP 164

Programme Summary

1 April 2013 – 31 March 2019

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1 Programme introduction

Programme Name	<i>Information Solutions – Corporate Systems (CPP164)</i>
Service Category	<i>N/a</i>
Opex Category	<i>General Management, Administration and Overhead</i>

This document covers the expensed component of our corporate line of business information systems, data and personal communications, productivity software and physical computer infrastructure. It also includes the direct costs of the Information Solutions group (including salaries).

1.1 Services

Services included in this category include:

- the maintenance of out-of-warranty hardware
- printer consumables and printer operations
- fixed and mobile communications operations (telephony)
- software licences (20%, the remaining 80% is accounted for in capex)
- software maintenance agreements
- business analysis, IT related project management, contractor/vendor management, software development, infrastructure support and administration.

1.2 Aims and objectives

The aims and objectives of this programme are:

- the prudent management of costs related to information systems and infrastructure
- the delivery of highly resilient computer infrastructure information systems that reflect the 24 x 7 x 365 nature of our business and that our business is a provider of critical infrastructure.

1.3 Drivers

The drivers for this programme are:

- acknowledgement of the high level of dependence of the business on information systems
- the requirements of Civil Defence Emergency Management Act 2002
- minimisation of issues that prevent the effective use of information systems.

2 Relevant policies and consultant reports

The relevant policies and documents that apply to the Information Solutions group are:

- Statement of Intent
- business plan and financial forecasts

- health and safety
- emergency management
- key governance control policies as follows:
 - Delegations of Authority OR00.00.11
 - Human Resources OR00.00.05
 - Fraud and Theft OR00.00.08
 - Employee Travel OR00.00.04
 - Motor Vehicle OR00.00.09
 - Information Systems OR00.00.13/1
 - Housekeeping OR00.00.05
 - Procurement OR00.00.19

3 Programme description

3.1 Scope of services

Corporate line-of-business systems and productivity software

Our corporate line-of-business systems and productivity software supports cross-organisational processes within Orion. This includes financial systems, employee management systems (e.g. HR, Payroll, Health and safety) and personal productivity software (desktop applications, email, web and document management).

The costs in this section are largely related to 20% of the cost of software licenses. A portion of the software license is attributed to maintenance including patches and fixes as well as a small component that pays for support. The bulk of the license payment (80%) is regarded as a prepayment for future upgrades and therefore appears in the capex budgets.

There are no significant step changes in costs during the review period.

Physical computer infrastructure

Our computer infrastructure:

- hosts our information systems
- maintains the connections between systems required for an integrated environment
- provides the networks and devices for users' access to our information systems.

It is our policy to own and manage computer infrastructure rather than outsource to third parties because of the critical nature of some of our information systems and the need for them to be continuously connected in real time to equipment on the electricity network.

We have few maintenance agreements associated with hardware, typically choosing to manage maintenance ourselves or to ensure that equipment is current and within warranty.

There are no significant step changes in costs during the review period.

Information Solutions

Salaries represent around 50% of overall costs in this category. Changes (increases and decreases) in this review period reflect the retirement of a number of key employees and our response to provide continuity of service.

Information Solutions is an “in-sourced” service provider of all IT and business change-related activities. The group is comprised of a business change / software development section, an infrastructure section and a section dedicated to the administration of control systems.

3.2 Programme deliverability

The management of computer infrastructure is done in house and the major risk to programme deliverability is the retirement or resignation of key personnel. We are currently focussed on developing a succession plan to ensure that any disruption caused by the loss of key personnel is minimised and effectively managed.

3.3 Dependencies

This is related to the ‘IT Related Capex Project’ (CPP64).

4 Earthquake consequences

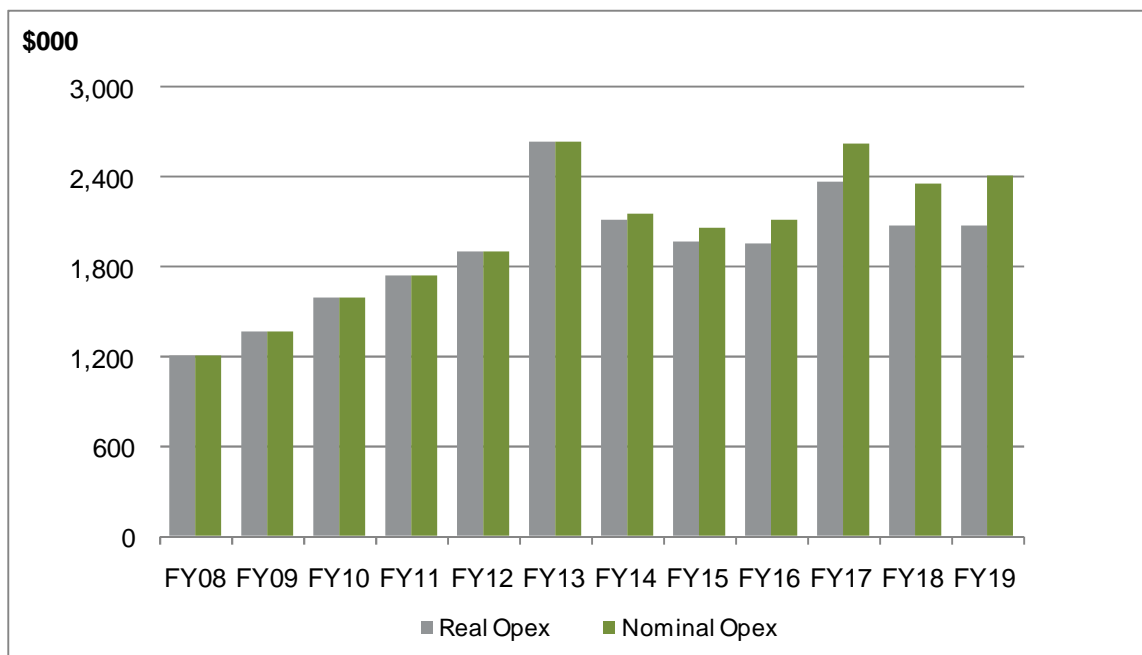
The services covered by this document, including information systems and staff, have remained stable and largely unaffected by the earthquake.

Existing difficulties in recruiting skilled staff have been exacerbated by the earthquake and replacing employees as they retire may be problematic.

5 Expenditure plan

5.1 Expenditure summary

The following chart shows our total Information Solutions corporate systems historical and forecast network expenditure in both real and nominal terms (\$000). The real terms have been escalated as per methodology outlined in our CPP proposal to ascertain the nominal terms.



There is no particular item that accounts for all of the progressive increases between FY08 and FY12.

- In FY09 and FY11 new employees was taken on in the Control Systems Group to support the new ENMAC (PowerOn) Network Management system.
- In FY10 there was an upgrade to our GIS, we saw the first ENMAC licensing costs and we required extra support for a number of maintenance activities on infrastructure
- FY11 and FY12 includes some costs related to investigations into issues on the radio network and also support for maintenance activities on our telephone switch aimed at increasing system resilience.

The increase in FY13 is due to the following:

- An increase of salaries of \$290k due to a redundancy and three new employees coming on during the year.
- A reduction of \$40k in recoveries to capital projects as we expect that the software developers will not contribute to any capital projects during FY13.
- An increase of \$80k in consultancy costs. We expect that consultancy costs will increase due to the new software we are installing requiring significantly more outside assistance to maintain and integrate with our systems. For example we now have significant dealings with General Electric due to the PowerOn system.
- An increase of \$140k in the cost of interdivisional sales. This is due to a change in an accounting policy. The telephony costs used to be spread across the business units, but are now all recognised in this programme.
- An increase of \$170k in the cost of licensing the PowerOn and GIS systems. These are a required and set cost of running these systems. These costs have been delayed following the installation of the systems as there is a period of 1-2 years following installation where no licensing fees are payable.

There is a significant decrease from FY14 onwards as we have changed the allocation of any systems which are solely related to network services. This means the PowerOn and Foxbro software maintenance costs will be included with Load Management Systems (CPP121) and GIS will be included in the information solutions – asset management systems scheduled maintenance programme (CPP122) and information solutions – asset management systems replacement programme (CPP42).

Information Solutions workload is forecast to remain stable over the CPP period of this review but salary expenditure does vary throughout the period as new staff are recruited to train alongside and then replace key employees that are forecast to retire. The table below shows a breakdown of the salary expense for FY12 – FY19:

	Nominal \$000	Real \$000						
	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Total salary expense	1,238	1,526	1,404	1,264	1,264	1,672	1,391	1,391
Employees	13	15	14	13	13	16	14	14
Average salary	95	102	100	97	97	105	99	99

The expected changes from FY13 are as follows:

- FY14 – Retirement of a GIS developer with the functions of this role to be redistributed between the business analyst/programmers and the senior system (DBA)
- FY15 – Retirement of a senior systems engineer with the functions of this role to be reallocated between the IT ops manager and control systems group.
- FY17 – Appointment of two new senior systems engineers (DBA) to replace the current senior system engineers expected to retire in FY18. As this is a key role occupied by a very competent engineer we expect that we will require two engineers for up to three years to replace them.
- FY18 – Retirement of the senior systems engineer (DBA).

As these changes are dependent on retirements which can be very hard to predict they will be reviewed closer to the time.

When planning for succession we do not have a formal succession policy rather our corporate team have succession planning meetings on a regular and at least on an annual basis. In addition our recruitment and training programs and our engineering development program are all part of the succession planning process.

The following tables summarise our information solutions - corporate systems historical and forecast network expenditure in both real and nominal terms (\$000).

Historical Expenditure (Nominal)

	Nominal \$000				
	FY08	FY09	FY10	FY11	FY12
Business information solutions	1,210	1,374	1,590	1,741	1,908
Total	1,210	1,374	1,590	1,741	1,908

Forecast Expenditure (Real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Business information solutions	2,634	2,111	1,971	1,962	2,370	2,079	2,079
Total	2,634	2,111	1,971	1,962	2,370	2,079	2,079

Forecast Expenditure (Nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Business information solutions	2,634	2,159	2,065	2,116	2,621	2,357	2,416
Total	2,634	2,159	2,065	2,116	2,621	2,357	2,416

5.2 Basis for expenditure forecast

Our expenditure forecast has been based on a budget prepared on a bottom-up basis during FY12. This budget was prepared by the business unit manager in charge of the expenditure and was reviewed by their corporate manager and the CEO. Any significant changes from prior years were reviewed by senior accounting staff who challenged any items which appear incorrect or unnecessary. All subsequent years have been based on this FY13 budget.

These expenditure forecasts do not include any contingencies.

5.3 Key assumptions

We have prepared the expenditure forecasts based on several key assumptions. In particular, we have assumed that the business environment remains stable for the forecast period and that Orion continues to operate in the same manner that it does now. Some of the critical components of these assumptions are:

- No further significant earthquakes or aftershocks
- A continued investment in technology
- A continuation of higher post-quake levels of communication with our customers as we keep them updated on the state of the rebuild and future plans
- A similar regulatory environment with Orion returning to a more active involvement in wider industry issues than has been the case in recent years
- Similar employee numbers for the period.

We expect that there will be an increase in business activity in areas of the business associated with recovery and new developments (central city and new subdivisions). Apart from scale we do not expect there will be a significant change in the kinds of activities undertaken.

In addition we have assumed that our current practices in regard to physical infrastructure, productivity tools, personal communications costs and software maintenance will remain largely the same for the CPP period. These practices include:

- Maintaining our lifecycle management for both software and computer hardware on a three year cycle

- Making use of our own physical server infrastructure for core systems and not moving to a cloud based infrastructure
- Maintaining software licenses using our current model
- Maintaining our own fleet of client devices (such as PCs, laptops, tablets and smart phones) and not employing a 'bring your own device' model.

As the main assumptions mean that for the CPP period Orion will continue to operate in the same manner and in a similar environment to the one we are currently operating in, there is no impact on the expenditure forecasts resulting from these assumptions.

5.4 Expenditure reduction initiatives

We do not have any specific expenditure reduction initiatives for the expenditure in this programme. However, efficiencies are achieved through the competitive nature of the contracting model that we use. As we routinely tender the works, the suppliers will include initiatives and work process efficiencies within their pricing. Other initiatives are included when reviewing the lifecycle of the different assets and the assessment of new products.

A major part of the budgeting process which was used to forecast the FY13 costs (as described in section 5.2) was the review of all costs by several different people within Orion. Any expenditure which seemed excessive or incorrect was questioned and needed to be justified.

No cost benchmarking or cost-benefit analyses have been undertaken by Orion.

COMMERCIAL, REGULATORY AND SPECIAL PROJECTS OPEX

CPP165 and CPP171

Programme Summary

1 Apr 2013 – 31 Mar 2019

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1 Programme introduction

Programme name	<i>Commercial, Regulatory (CPP165) and Special projects (CPP171)</i>
Service category	<i>N/a</i>
Opex category	<i>General management, administration and overheads</i>

This document covers the commercial and regulatory expenses and special projects components of our corporate line of business.

1.1 Services included

The expenditure categories in this programme include:

- Commercial team staff salaries and overheads
- The communications function (including annual and other reports and sponsorship). Note that from FY13 it is not included as it is a separate business unit.
- Commercial related consultancy, except for FY13 (recorded as “*job-costed expenditure*” in our opex reports)
- Special projects (ie CPP project in FY13 and DPP in FY19)

1.2 Aims and objectives

Orion's overarching purpose is to delivering a safe, secure and cost effective supply of electricity to our customers.

The Commercial team aims to:

- ensure that Orion receives a fair rate of return on the fair value of its assets
- ensure that Orion's network delivery pricing and billing are well communicated, transparent, timely, accurate and compliant with price control requirements
- ensure that Orion's demand side management signals have good take-up as appropriate
- ensure that Transpower's charges are accurate
- ensure that other charges (for example distributed generation) are accurate
- ensure that key negotiations are well managed and conducted – for example new delivery services agreements and new investment agreements with Transpower
- actively participate in the development of the regulatory regime – making considered submissions as appropriate
- ensure compliance with regulatory and contractual requirements
- understand regulatory impacts on Orion and the industry, and contribute to related initiatives
- foster and effectively manage relationships with key stakeholders such as retailers, major customers, the Commerce Commission and the Electricity Authority.

The Commercial team also provides broader commercial support to our business.

The Commercial team has eight employees, plus the General Manager Commercial. One employee is part time.

The key responsibilities of the Commercial team are:

Billing (2.3 FTEs)

- Bill \$200m of annual network delivery revenue monthly
- Maintain relationships with major customers (some directly contracted)
- Maintain relationships with retailers and Transpower
- Manage billing systems (outsourced to NZX) and inputs to those

Pricing (3 FTEs)

- Annual price reviews and compliance
- Pricing review and development
- Regulatory information disclosures
- Network load management
- Contractual relationships / arrangements with retailers, major customers and Transpower (including implementing changes to those)
- Relationships with other Electricity Distribution Businesses (EDBs) as part of the upper South Island project
- Regulatory input, including submissions and advice on others' submissions
- Market monitoring (spot prices, forward prices, hydro storage)

Regulatory (1 FTE)

- Monitor, submit on and manage regulatory matters (mainly Commerce Commission and Electricity Authority)
- Manage the Transpower contract and relationship
- Manage the customised price path application project

Commercial (1 FTE)

- Manage key projects and other commercial matters impacting Orion

Special projects (nil FTE)

- Transparent contingency \$0.5M per annum
- CPP application costs in FY13 and FY14
- DPP reset costs in FY19

2 Relevant policies and documents

The most relevant policies and documents for the Commercial team are:

- Statement of intent
- business plan and financial forecasts
- Network Asset Management Plan
- Statutory Compliance Manual
- Key governance control policies as follows:
 - Human Resources – OR00.00.05
 - Delegations of Authority – OR00.00.11
 - Fraud and Theft – OR00.00.08

- Employee Travel – OR00.00.04
- Motor Vehicle – OR00.00.09

3 Programme description

3.1 Work to be undertaken

Section 1 above describes the day-to-day functions performed by the Commercial team, most of which are similar year-to-year, and some of the planned special projects included in forecast expenditure such as the CPP and DPP projects (FY13/FY14 and FY19 respectively).

3.2 Dependencies

There are no specific dependencies for this programme of work.

3.3 Programme deliverability

Salaries and consultancy costs (recorded as “consultancy” and “job costed expenditure” in our opex reports) make up a large part of the Commercial team’s opex.

We have a very lean (1 FTE) regulatory team so we augment this with independent experts when required. For example, we have engaged expert legal and economic advice as part of our submissions on the development of Parts 4, 4A and 5 of the Commerce Act, and the subsequent price and quality control and information disclosure requirements.

Specific independent advice is especially sought on specialist areas such as WACC.

4 Earthquake consequences

The main consequence of the earthquakes that affected the Christchurch area, and particularly planned expenditure, is the need to apply for a Customised Price-Quality Path.

The immediate consequences for the Commercial team were that:

- some employees had very real and urgent personal issues to deal with and for most, it was a very taxing and difficult period to deal with
- employees had to perform jobs completely different to what they had been used to – for example manning phones and helping out in other ways
- employees lost access to their offices and laptops etc for several weeks
- attempts were made to recover lost records, while minimising time spent inside severely compromised damaged buildings
- cordon access became a major hindrance
- employees had to innovate to get necessary work done or delay some initiatives
- the volume of some work increased
- other work was put on hold.

The medium term consequences for the Commercial team have been to:

- catch up backlogs of work – for example we needed to:
 - update and roll forward our RAB records
 - update our billing quantities and demolition information
- review our regulatory options to recover earthquake related costs and losses and to address our network quality standards in a post earthquake environment. The initial proposal was to propose an Order in Council (OIC) – however this was rejected by the Government and so we needed to examine and consider whether a customised price path (CPP) was feasible
- lead the CPP application project
- some key records were recovered from the damaged office buildings and stored elsewhere on site in temporary containers
- some records were not able to be safely recovered from the damaged office buildings. This has meant extra work to attempt to estimate certain entries and in some cases it has not been possible to provide the level of detail required in our CPP application and information disclosure requirements
- prepare a number of OICs under the CERA legislation relating to the new Rawhiti zone substation, the temporary 66kV overhead lines to Rawhiti and also to provide an exemption to aspects of the Part 4 price and quality path requirements
- work on (loss of revenue) insurance claims and new head office requirements
- undertake additional billing and compliance requirements
- deal with regulatory compliance breaches resulting from the earthquakes.

5 Expenditure plan

Commercial opex costs are relatively fixed from year-to-year. Overall, our CPP forecasts indicate that opex costs will remain relatively consistent in future years, with the Commercial team remaining at eight people over the forecast period.

Historically, two areas have seen material fluctuations in opex expenditure.

First, “*communications*” expenditure has been significant for the Commercial team and actual spend did vary. This includes the company’s annual report and other reports and sponsorships. From FY13 onwards, “*communications*” will be a separate business unit (see Communications and engagement programme (CPP166)).

Second, “*consultancy*” expenditure fluctuates depending on regulatory activity and our participation in it (for example submissions). Consultancy is mainly recorded as “*job costed expenditure*” in our opex reports. For example:

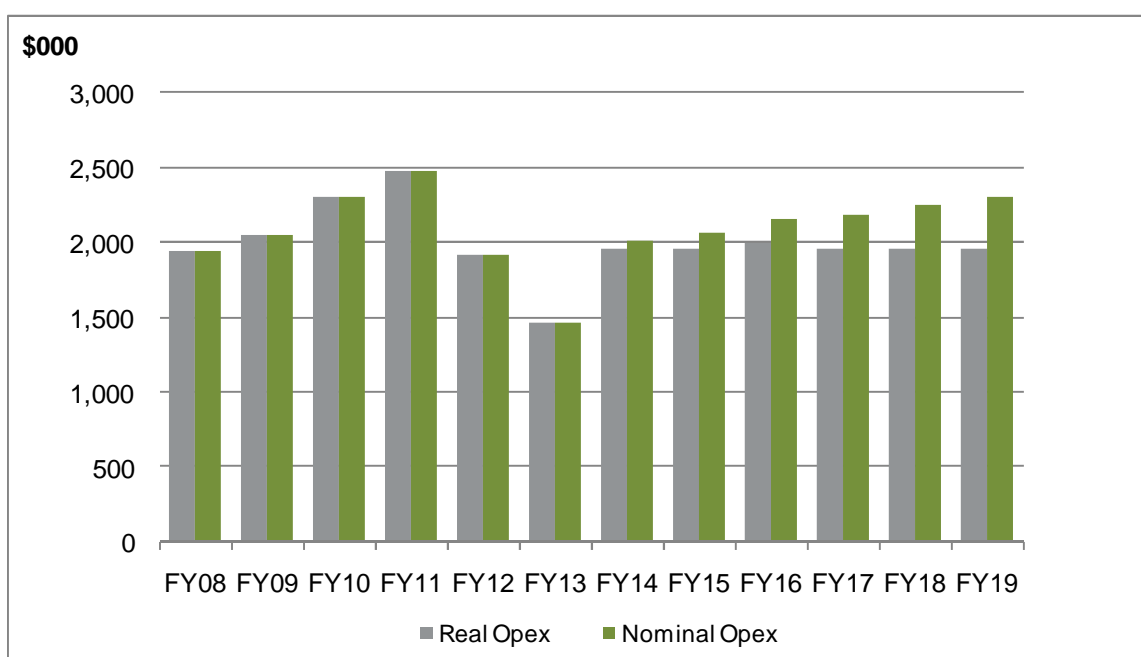
- In FY11, \$950k was spent on consultancy. This especially involved extensive submissions on the Commerce Commission’s draft input methodologies (IMs)
- In FY12, \$370k was spent on consultancy fees against a budget of \$1m. Key reasons for a lower spend than expected was due to our focus on the post 22 February 2011 earthquake recovery as well as our decision not to participate in the High Court merits review

- In FY13, our job-costed expenditure is forecast to be significantly higher (up to \$2m) as we prepare our CPP application and pay for the Commission's costs too.

Once our CPP application is complete and approved, we forecast that our consultancy spend in future years will be relatively stable, based on our view on the regulatory and industry landscape.

5.1 Commercial and regulatory expenditure

The following chart shows our total commercial and regulatory historical and forecast network expenditure in both real and nominal terms (\$000). The real terms have been escalated as per methodology outlined in the CPP proposal to ascertain the nominal terms.



The significant drop in actual expenditure in FY12 is due to relatively few consultancy costs for regulatory submissions in that year (around \$0.1m) as our focus was clearly on earthquake recovery. The further significant drop in forecast expenditure in the FY13 forecast shown is due to:

- removal of the “communications” budget to a separate cost centre, an estimate of these costs for FY08 – FY12 is as follows:

	\$000
FY08	300
FY09	400
FY10	500
FY11	400
FY12	500
Total	2,100

- we expect the commercial team to be fully focussed on the CPP project in FY13 and we have used part of the normal consultancy and project work budget to fund the CPP. The costs of the commercial team working on the CPP project have been recognised in the special projects programme below (see section 5.2).

We note that while the communications budget includes Orion's sponsorship expenditure, due to our historic classification the sponsorship of AMI stadium is included in the 'Corporate Opex Programme' (CPP160). The total sponsorship expenditure included in the CPP proposal is as follows:

	Real \$000		
	AMI Stadium	Other	Total
FY08	211	120	331
FY09	210	221	431
FY10	210	274	484
FY11	210	185	395
FY12	-	216	216
FY13	175	275	450
FY14	175	275	450
FY15	175	275	450
FY16	175	275	450
FY17	175	275	450
FY18	175	275	450
FY19	175	275	450
Total	2,066	2,941	5,007

As mentioned above the sponsorship for AMI Stadium has all been included in the 'Corporate Opex Programme' (CPP160). The other sponsorship has been included in this programme for FY08 – FY12 and in the 'Communications and Engagement Non-network Opex Programme' (CPP166) for FY13 – FY19.

The following tables summarise our total commercial and regulatory historical and forecast network expenditure in both real and nominal terms (\$000).

Historical expenditure (nominal)

	Nominal \$000				
	FY08	FY09	FY10	FY11	FY12
Commercial and regulatory	1,943	2,050	2,310	2,484	1,917
Total	1,943	2,050	2,310	2,484	1,917

Forecast expenditure (real)

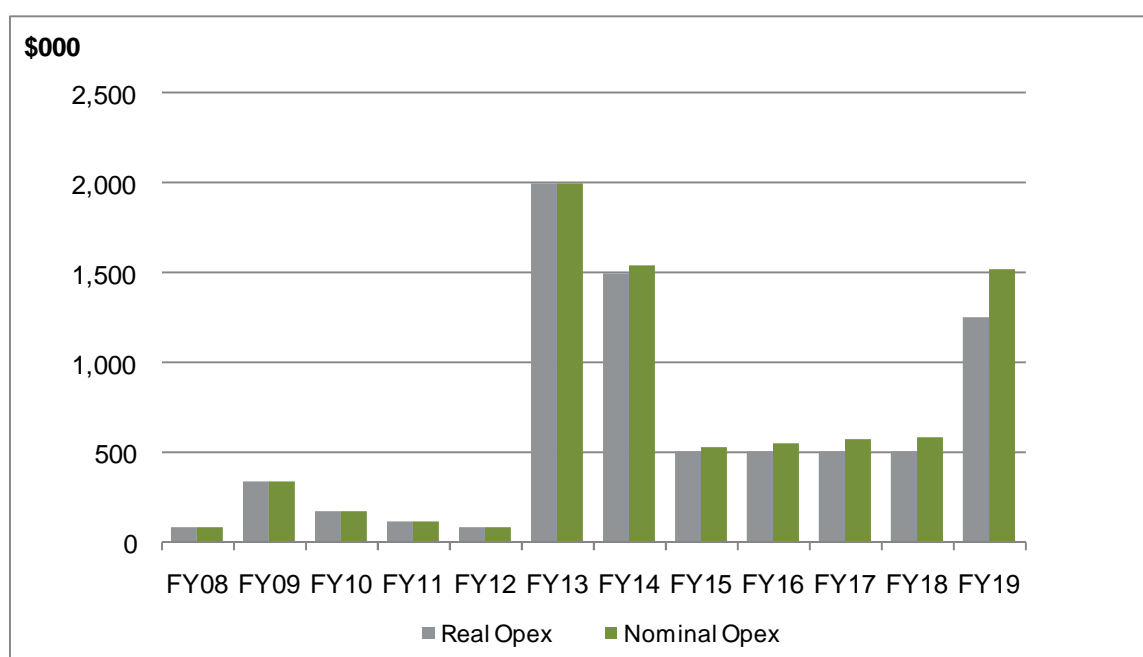
	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Commercial and regulatory	1,461	1,961	1,961	1,991	1,961	1,961	1,961
Total	1,461	1,961	1,961	1,991	1,961	1,961	1,961

Forecast expenditure (nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Commercial and regulatory	1,461	2,011	2,065	2,163	2,189	2,249	2,310
Total	1,461	2,011	2,065	2,163	2,189	2,249	2,310

5.2 Special projects expenditure

The following chart shows our total special projects historical and forecast network expenditure in both real and nominal terms (\$000). The real terms have been escalated as per methodology outlined in our CPP proposal to ascertain the nominal terms.



The following tables summarise our total special projects historical and forecast network expenditure in both real and nominal terms (\$000). The special projects forecast consultancy costs spike in FY13 and FY14 for the CPP project and reduce to approximately \$0.5m per annum for other special projects from FY14 until FY19 when the budget includes an additional \$0.75m for the DPP process.

Historical expenditure (nominal)

	Nominal \$000				
	FY08	FY09	FY10	FY11	FY12
Corporate costs	78	334	177	111	79
Total	78	334	177	111	79

Forecast expenditure (real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Corporate costs	2,000	1,500	500	500	500	500	1,250
Total	2,000	1,500	500	500	500	500	1,250

Forecast expenditure (nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Corporate costs	2,000	1,546	532	552	569	588	1,516
Total	2,000	1,546	532	552	569	588	1,516

5.3 Basis for expenditure

The commercial costs have been forecast using FY12 as a base year. We consider that this represents an accurate starting point for the CPP period. As we noted in section 5 the costs are relatively fixed from year to year and we feel that any fluctuations in expenditure will be immaterial. A more detailed breakdown of the costs each year is as follows:

	\$000
Communications	12
Computer processing	150
Consultancy	150
Customer seminars	5
Fringe benefit tax	10
General expenses	28
Host expenses	4
Legal expenses	45
Printing and stationery	3
Publications and subscriptions	15
Staff training	40
Travel and accommodation	70
Vehicles	25
Allowances	5
Salaries	909
Recoveries	(10)
Job-costed expenditure	500
Total	1,961

The only variances from the above breakdown occur during FY13 and FY16. There is no job-costed expenditure forecast for FY13 as this has been reclassified to the special projects budget due to the CPP project. During FY16 there is a very slight variation in the forecast salaries.

The special projects forecast expenditure is made up of the following:

- CPP expenditure of \$2m in FY13 and \$1m in FY14
- General contingency of \$0.5m for FY14 – FY19
- New CPP or DPP proposal costs of \$0.75m in FY19.

The CPP expenditure for FY13 is relatively easy to forecast given we are most of the way through the year. We have recently reviewed our costs for the project and our expected expenditure for the FY13 year is just over the \$2m included in this programme. The FY14 expenditure relates to our engagement with the commission on the CPP proposal. We expect that once the proposal is submitted to the commission we expect we will have to

engage with the commission in detail on the proposal. The costs we are anticipating include consultancy, legal, expert and communication costs on top of any of the commission's costs which we will be liable for. Given we have never prepared a CPP proposal before it is difficult to estimate the costs to Orion and we consider \$1m to be reasonable based on our experience of the proposal process thus far.

The general contingency of \$0.5m per annum is a centralised allowance for the board or CEO to use for any unexpected costs that are subsequently required. For example we expect that in FY14 there is a good chance the CPP expenditure will need to use some or all of this allowance. This amount is agreed with our CEO during the budget process and is subsequently agreed to by the board. Overall, based on past experience we consider a contingency of \$0.5m to be reasonable given for FY14 this is part of around \$32m in forecast administrative opex.

The CPP or DPP proposal expenditure in FY19 is the expenditure incurred as this is the year we will be coming out of our CPP. At this stage we see additional expenditure in that process, again seeking advice and potentially applying for a further CPP. We have based this forecast on our experience with the current CPP proposal process.

5.4 Key assumptions

We have prepared the expenditure forecasts using several key assumptions. In particular, we have assumed that the business environment remains stable for the forecast period and that Orion continues to operate in the same manner as it currently does. Some critical components of these assumptions are:

- No further significant earthquakes or aftershocks
- A similar regulatory environment with Orion returning to a more active involvement in wider industry issues than has been the case in recent years
- A continuation of higher post-quake levels of communication with our customers as we keep them updated on the state of the rebuild and future plans
- A similar number of employees for the period

We expect that there will be an increase in business activity in areas of the business associated with recovery and new developments (central city and new subdivisions). Apart from scale we do not expect there will be a significant change in the kinds of activities undertaken.

As the main assumptions mean that for the CPP period Orion will continue to operate in the same manner and in a similar environment to the one we are currently operating in, there is no impact on the expenditure forecasts resulting from these assumptions.

The increase in communication levels have resulted in an increase in the forecast communication expenditure. With this in mind our expenditure forecast for the FY13 costs has been based on a budget prepared on a bottom-up basis during FY12. This budget was prepared by the business unit manager in charge of the expenditure and was reviewed by their corporate manager and the CEO. Any significant changes from prior years were reviewed by senior accounting staff who challenged any items which appear incorrect or unnecessary. For further details see the 'Communications and Engagement Non-network Opex Programme' (CPP166).

We have also made some assumptions regarding our FTE employees and their replacement:

- A majority of current FTE employees stay on for the medium-long term. If this does not happen we expect there will be little impact on the expenditure forecasts as we expect we will be able to fill the job with a suitable candidate on a similar salary.
- Any FTE employees who leave are able to be replaced with a suitable candidate in a timely manner. Any change to this assumption would not have a significant impact on the expenditure forecasts. If a suitable candidate cannot be found then we are generally able to cover the vacant position using a combination of temporary staff and reallocation of duties to existing FTE employees.
- The job market stays reasonably similar with FY12, for example the remuneration expected for these roles does not significantly change. Any change in expected remuneration will have a significant impact on the expenditure forecasts. However, there is currently no reason to believe that there will be significant changes in the job market.

These calculations would change if the company:

- Grows in size/complexity (for example if the company lists on the stock exchange, enters into mergers/acquisitions, arranges significant debt financings or undertakes complex earthquake insurance claims and negotiations);
- Is required to undertake more regulatory imposts; and/or
- Is affected by any further catastrophic events such as the earthquakes.

5.5 Expenditure reduction initiatives

We do not have any specific expenditure reduction initiatives for the expenditure in this programme. However, efficiencies are achieved through the competitive nature of the contracting model that we use. As we routinely tender the works, the suppliers will include initiatives and work process efficiencies within their pricing. Other initiatives are included when reviewing the lifecycle of the different assets and the assessment of new products.

No formal cost benchmarking or cost-benefit analyses have been undertaken by Orion.

5.6 Alternatives considered

For the staff costs the alternatives we have identified are using temporary staff and contractors. We currently use a combination of FTE employees, temporary staff and contractors to achieve optimal outcomes.

In order to function as effectively and efficiently as possible the majority of staff we employ need to be skilled and experienced. Following the earthquakes it has become significantly more difficult to attract staff with the relevant skills and experience, particularly on a temporary basis. This means that our ability to use temporary staff or contractors is limited.

Additionally, we consider that for the positions included in this programme FTE employees are the most appropriate alternative given the ongoing nature of the roles and their importance to Orion.

At this stage there are no realistic alternatives to the special project costs as there has already been a significant investment made in the CPP proposal.

INFRASTRUCTURE MANAGEMENT OPEX

CPP167

Programme Summary

1 April 2013 – 31 March 2019

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1 Programme introduction

Programme Name	<i>Infrastructure management (CPP167)</i>
Service Category	<i>N/a</i>
Opex Category	<i>Network Management and Operations</i>

Orion's overarching purpose is to deliver a safe, secure and cost effective supply of electricity to our customers.

This programme of opex covers nine areas of indirect overheads in Infrastructure, which is responsible for managing Orion's assets to achieve that purpose.

This programme includes the following:

- Safety and Risk Management
- Lifecycle Management
 - Data Management
 - GIS
 - Contract Administration
 - Property Management
- Strategic Planning
- Network Asset Management
 - Reticulation Asset Management
 - Substation Asset Management
 - Distribution Services
 - Customer Services
 - Connections
 - Distribution
- Operations Management
 - Control Centre
 - Contact Centre
 - Field Response
 - Network Access Management
 - Operations Services
 - Release Planning
- Engineering Support
- Technical Management

2 Relevant policies and reports

The forecast expenditure is prepared in accordance with the following policies and documents:

2.1 Emergency management

- Civil Defence Emergency Management (CDEM) act
- Orion disaster resilience summary NW70.00.14
- Orion asset risk management plan NW70.60.02
- Risk reports
 - 2005 Papanui liquefaction potential (ELMAC)
 - 2005 Middleton liquefaction potential (ELMAC)
 - 2005 Anti-climbing device review (Linetech)
 - 2005 Christchurch network foundation investigations (Opus)
 - 2004 Brighton transformer liquefaction prediction (Beca)
 - 2004 Hawthornden geotechnical report (Beca)
 - 2003 Highfield geotechnical report (MWH SF)
 - 2002 Transpower Orion seismic risk assessment (ELMAC)
 - 2002 Pole foundation strength analysis Christchurch CPT address (Opus)
 - 2002 Pole foundation strength analysis Christchurch NE (Opus)
 - 2002 Pole foundation strength analysis Christchurch CPT test data
 - 2002 Condition assessment concrete poles Christchurch area (Opus)
 - 2002 Christchurch network pole test report (Opus)
 - 2001 Killinchy geotechnical report (SF)
 - 2001 TePirita geotechnical report (SF)
 - 2000 Armagh seismic strengthening design (Beca)
 - 2000 Halswell geotechnical report (Beca)
 - 2000 Halswell 66kV transformer installation (Beca)
 - 2000 Assessment OH LV network Christchurch area (Opus)
 - 2000 Armagh geotechnical report (Beca)
 - 2000 Condition assessment timber pole Christchurch area (Opus)
 - 1999 Lancaster geotechnical report (Beca)
 - 1998 Substation liquefaction hazard (SF)
 - 1998 Dallington 66kV cable liquefaction river crossing
 - 1998 Outdoor pad transformer survey (MW)
 - 1997 Ground transformer survey (MW)
 - 1995 Substation seismic risk report (KM)
 - 1993 RMA reduction of risk exposure (KM)
 - 1993 RMA risk assessment (Morrison Cooper)
- Building emergency plan 200-210 Armagh Street OR00.00.17
- Communication plan – major outage OR00.00.07
- Communications – network capability NW 74.23.21
- Contingency plan – business information systems
- Contingency plan – infrastructure business NW70.60.04
- Contingency plan – loss of supply to the CBD, district Subs and GXP NW20.40.03
- Contingency plan – natural event/equipment failure NW20.40.01
- Contingency plan – supply of emergency generators NW20.40.02

- Network storage and emergency spares contract
- Network storage and emergency spares specification NW72.20.08
- Contingency plan – security of supply, participant outage plan NW20.40.09
- Disconnection of demand as required by the Electricity Commission NW20.40.05
- Emergency works contract (Connetics)
- Emergency works contract (ILS)
- Emergency works specification NW72.20.03
- Major emergency response contract extension
- Mutual aid agreement – electricity supply
- Recovery plan

2.2 Health and safety

- Health and safety policy OR00.00.01
- Health and safety committee constitution OR00.00.02
- Health and safety management manual NW70.00.16
- Orion hazard management plan OR00.00.06
- Housekeeping standards – Armagh Street and vehicles OR00.00.18
- Health and safety in employment act

2.3 Network documents

- Annual work plan
- Asset management plan
- Design standards
 - Network asset identification NW70.00.12
 - Cables – underground reticulation design NW70.52.01
 - Document control NW70.50.03
 - Draughting and records NW70.50.02
 - Earthing – design NW70.59.01
 - Network – extensions and connections NW70.10.03
 - Network design and overview NW70.50.05
 - Overhead line – design standard NW70.51.01
 - Overhead line design manual NW70.51.02
 - Overhead line design worked examples NW70.51.03
 - Overhead line technical manual NW70.51.04
 - Protection – design NW70.57.01
 - Railway crossing application form NW70.50.06
 - Scada remotes NW70.56.01
 - Subtransmission protection design NW70.57.02
 - Substation – customer premises NW70.53.02
 - Substation – design NW70.53.01
- Drawings
- Equipment specifications
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 - Contract – request for pricing NW73.10.10
 - Contract – standard document NW73.00.01
 - Contract – standard procedure NW73.00.02
 - Contract – tender procedures NW73.10.09
 - Countercost model jobs NW70.00.05
 - Customer connections NW73.10.04
 - Embedded generation requirements NW70.10.04
 - Event reporting NW72.11.03
 - Duct installation for future use NW72.12.01
 - Expenditure control NW70.00.02
 - Expenses – distribution system NW70.00.07
 - Health and safety checklist NW72.00.01
 - Indirect expenditure NW70.00.06
 - Over-boundary maintenance NW72.00.00
 - Mapping centre procedures NW71.10.01
 - Network asset management overview NW70.00.01
 - Network business plan NW70.20.00

- Oil filled cable contingency plan NW72.12.02
- Orders for work NW70.00.03
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 - Connecting equipment to Orion’s street lighting network NW21.72.01
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 - Marking the boundaries of work permit areas in stations NW21.02.05
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- 33kV OCB McGraw Edison RVE NW72.13.16
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- 11kV Voltage regulator Siemens NW72.13.204
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- 11kV Pole VCB Nu-lec type U12 NW72.13.42
- 11kV Pole VCB Cooper V4H1ph NW 72.13.45
- 11kV Pole VCB McGraw Edison KF NW72.13.46
- 11kV Pole VCB McGraw Edison KFE NW72.13.47
- 11kV Pole VCB McGraw Edison KFME NW72.13.48
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- 11kV OCB South Wales C4X,D4,D4X NW72.13.09
- 11kV OCB South Wales D4X,D6X NW72.13.62
- 11kV VCB Holec SVS NW72.13.63
- 11kV VCB Holec Xiria NW72.13.70
- 11kV S and C Vista.pdf NW72.13.66
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- Mineral insulating oil maintenance NW72.03.01
- Network sub inspection NW72.23.04
- Network sub maintenance NW72.23.06
- Ocb – aei bvp17 maintenance NW72.13.04
- Ocb - servicing after fault operation NW72.23.15
- Ocb – South Wales 11kV cx, dx maintenance NW72.13.02
- Overhead line – inspection and assessment NW72.21.11
- Overhead line – retighten components NW72.21.03
- Overhead line tree cutting NW72.24.01
- Overhead line – work NW72.21.01
- Partial discharge tests NW72.27.03
- Power transformer servicing NW72.23.25
- Protection NW72.27.02
- Protection – unit 11kV maintenance tests NW72.27.01
- Regulator installation NW72.23.22
- Ripple control system details NW70.26.01
- Ripple equipment maintenance NW72.26.02
- SCADA master maintenance NW72.26.04
- SCADA rtu maintenance NW72.26.05
- Seismic strengthen substation NW72.23.19
- Shared use of poles NW72.21.14
- Shared use of service and back section poles NW72.21.15
- Spares management WASP NW72.20.09
- Temporary connection guide NW72.15.04
- Test and commission of secondary equipment NW72.27.04
- Thermographic survey of hv network NW72.21.10
- Tower painting NW72.21.05
- Transformer – installation NW72.23.16
- Transformer – maintenance (distribution) NW72.23.02
- Vibration dampers NW72.21.13
- Works – general requirements NW72.20.04
- Works – emergency NW72.20.03
- Works – non scheduled NW72.20.02
- Works – scheduled NW72.20.01
- Physical security plan NW70.60.03
- Security standard review

2.4 Environmental management

- Environmental policy OR00.00.03
- Environmental management manual NW70.00.08
- Environmental procedures oil/fuel NW70.10.02
- Environmental procedures SF6 gas NW70.10.01
- Environmental risk register NW70.10.06

2.5 Other policies and relevant documents

- Resource management act

- Electricity act
- Contract standard - 3910
- Delegations of authority policy OR00.00.11
- Fraud policy OR00.00.08
- Procurement policy OR.00.00.19
- Human resources policy OR00.00.05
- Information systems policy OR00.00.13/1
- Motor vehicle policy OR00.00.09
- Media policy OR00.00.22
- Social media policy OR00.00.21
- Protected disclosures policy OR00.00.16
- Sponsorship policy OR00.00.12
- Travel policy OR00.00.04
- Contractor newsletters
- Compliance manual

Orion's summary list of legislative obligations is set out in the 2012 Statutory Compliance Manual.

3 Programme descriptions

3.1 Summary of FTE changes

The following table sets out the current and forecast FTE employees included in this programme.

These will be covered in more detail in the following sections.

	Jun 2010 FTE / (technical engineers)	Dec 2012 FTE / (technical engineers)	FY19 FTE / (technical engineers)	
Management	8 / (-)	6 / (-)	6 / (-)	
Safety and risk management	2 / (-)	3 / (-)	4 / (-)	Increasing safety compliance requirements
Lifecycle and data management	2 / (-)	8 / (-)	9 / (-)	Development of lifecycle management approach (CBRM)
GIS	7 / (-)	7 / (-)	9 / (-)	Earthquake recovery and rebuild
Contract administration	1 / (-)	2 / (-)	3 / (-)	Earthquake recovery and rebuild
Property management	4 / (-)	7 / (-)	7 / (-)	
Strategic planning	6 / (-)	3 / (-)	5 / (-)	Manage spur asset integration and new technologies
Network, reticulation and substation asset management	7 / (-)	9 / (-)	11 / (-)	Earthquake recovery and rebuild
Distribution, customer and connection services	22 / (-)	26 / (2)	26 / (2)	
Operations management	6 / (-)	7 / (-)	7 / (-)	
Control centre and field response	21 / (-)	26 / (-)	31 / (-)	Earthquake recovery, demolition and connection enquiries
Contact centre	8 / (-)	8 / (-)	10 / (-)	Earthquake recovery and rebuild
Network access management	2 / (-)	1 / (-)	1 / (-)	
Operations services	2 / (-)	2 / (2)	3 / (2)	Earthquake recovery and rebuild
Release planning	1 / (-)	3 / (1)	4 / (1)	Earthquake recovery and rebuild
Engineering support and technical management	9 / (-)	8 / (-)	10 / (-)	Support for protection systems
Total	108 / (-)	126 / (5)	146 / (5)	

The requirement for additional employees was determined by each of the section managers reviewing their forward needs on a year-by-year basis. They needed to include work volume estimations based upon increasing workloads driven by customer demand. The considerations have included assessments on limiting the overtime or additional hours worked by employees as a key health and safety objective. These forecasts have been thoroughly reviewed by our accounting and management team.

The increase in FTE employees from June 2010 to December 2012 can be summarised as follows:

- We created 6 new roles in distribution services. This is earthquake related to a degree, but we knew before the earthquakes that we needed to restructure the leadership component of this team because it wasn't working. The earthquakes slowed down the restructure because it became more difficult for us to identify exactly what our needs were moving forward.

- We have taken on about 6 new technical engineers – with the movement of those from this programme into permanent roles within the business. The purpose of this development programme is to help us manage succession with many of our very experienced engineers heading towards retirement. This is the sort of recruitment we expect to continue.
- We've transferred some sections into the infrastructure group and have restructured the management team during the period, which also adds to complexity when preparing comparisons. In particular, we've merged the former Network Development team (lead by Tas Scott) into Infrastructure following Tas' resignation, where it has been split into its core engineering support and strategic planning roles. We've also transferred our call centre from being part of our information solutions group into Infrastructure.
- We have filled some roles that had remained vacant for a period of time – GIS, network access management role in operations – because appropriate people came onto the market.
- We have created new roles to address a number of issues, including:
 - Operator (trainee) role - so we can bring our own operators through rather than poach off the industry all the time
 - Network access role – required due to workloads and succession planning
 - Two project managers in property – we changed the function of this team, from solely focussing on property to managing all of the property related assets, and have markedly improved the management of property related contractors. In the future, this area will also pick up the management of our new Papanui site, the planned purchase of the Springston GXP, property issues at kiosk sites in the CBD and red-zone, and dealing with an uplift in graffiti post-quakes
 - Engineering administration – this was deemed necessary to take some of the load off the engineers (it is very difficult to find engineers and can take a long time to get them up to speed so we chose to employ a good administrator to carry the low level load)
 - Increases in operator and controller numbers – required due to our desire to reduce overtime being worked, and our network architecture now involves more switching
 - Increases aimed at getting the full possible benefit out of our Power-On system
 - Increases attributable to asset management – some driven by regulation. We've established a new lifecycle management team to cover CBRM and AMMAT, as well as our expanding our asset management plan and other information disclosure obligations
 - Although we've transferred our ground fault neutraliser (GFN) sales to Connetics, we need to ensure that we get the benefits offered by the GFN and other new technology, and make sure our staff and contractors understand the technological and safety aspects
 - We've also been proactive with safety with so many contractors working on and around our network.

All these issues drive the staff number increase between June 2010 and December 2012, and continue to drive further increases over the next period.

We have some areas where we see reduction as employees retire during the period – for example, engineering support clearly has two employees who will retire during the period. However, we believe that most of the issues addressed above will remain in place for the period through to and including FY19.

In addition to the above issues the main driver of the increase in FTE employees during the CPP period is the continuing work in relation to earthquake recovery and the associated rebuild. As we have no information which indicates that the recovery phase will end during the CPP period we have no reason to believe that this will be the case. Our estimate is that there may be some reductions attributable to earthquake works which start to show from FY20, but many of the issues will be ongoing.

3.2 Infrastructure Management (N79)

Provide leadership and direction for the infrastructure management function, and coordinate and manage all activities associated with Orion New Zealand Ltd's network infrastructure. To be achieved in accordance with the goals and objectives of the organisation to ensure safe, sustainable, customer focused outcomes.

Provide quality management to ensure we retain value, build resilience, optimally develop and safely operate the network.

Responsible for opex and capex and associated contractor management for all work associated with our network infrastructure.

Manage approved business growth ventures relating to core network activities.

This group is led by our Chief Operating Officer.

Currently six FTE direct report employees:

- Safety and Risk Manager
- Lifecycle Manager
- Strategic Planning Manager
- Network Asset Manager
- Operations Manager
- Engineering Support Manager

There is no forecast material change in the number of direct reports to the COO out to FY19.

The services, aims, objectives and responsibilities associated with this team are as follows:

Objectives

- provide leadership and direction, and co-ordinate and manage Orion's network infrastructure and corporate properties in accordance with Orion's goals and objectives to ensure safe and sustainable customer focused outcomes
- provide quality engineering management and advice
- develop network planning options, particularly with respect to the long term development and performance of the network to retain and build value in the electricity network
- optimise network investment
- co-ordinate and manage major engineering/technical issues as they impact the Asset Management Plan (AMP), service levels and future demands, including the network capex budget
- align planning to the objectives outlined in the National Infrastructure Plan and the CDEM Act
- manage new, approved business growth ventures relating to core network activities
- promote the achievement of safety targets through leadership, training, incident analysis and effective implementation of corrective action.

Key responsibilities

- manage the electricity network and property assets to ensure safety, improve stakeholder value and meet network agreed performance targets while balancing the company's social, economic and environmental objectives
- adopt a risk-based approach to network management
- develop the overall network architecture, monitor performance, and develop opex and capex plans especially in terms of the trade-offs between capital and operating costs, reliability performance and planning options
- manage demand and network growth. This includes connecting new customers
- develop network and organisational resiliency. This includes proactive preparedness for emergency situations in compliance with obligations under the CDEM Act and good industry practice. This also includes supporting proactive communications with stakeholders and the community in relation to the post earthquake network rebuild
- establish and maintain effective emergency management systems and resources to restore service after a significant event
- plan for emergency management - including mutual aid arrangements and actively participate in CDEM planning and response
- set standards, plan, budget, construct, maintain, replace and operate the electricity network in an optimal way to ensure compliance with legislation and industry rules
- develop and maintain robust contractor performance management and administration systems to ensure excellent cost control and quality outcomes
- ensure robust, cost effective contract administration systems and management of contractors
- provide quality, objective advice to the CEO, the corporate management group and the board on engineering/technical management and investment issues
- produce the annual AMP
- identify innovative solutions and advances in technology and assess the appropriateness for our network (e.g. considering safety, risk and cost implication)
- retain and develop expertise
- represent Orion in industry and regulatory matters
- manage the relationship with Transpower and monitor Transpower's performance. Negotiate Grid Exit Points (GXP), new investment agreements and purchases of spur assets with Transpower
- evaluate and purchase extensions to electricity network infrastructure
- ensure that employee, contractors and the public are safe on or near our network
- implement the board approved policy of material legislative compliance by developing systems, processes and reporting
- ensure there is a specific permanent solution for the eastern suburbs security of supply by March 2014
- provide an asset focused engineering function and technical resource necessary to achieve quality engineering outcomes
- establish and maintain quality documentation - including for network design, technical specifications, procurement and operations to ensure high quality service delivery and statutory compliance

- provide a 24/7 centralised network control centre, operations response team and associated contractors to provide repair services to the network
- manage and develop the Geographic Information Systems (GIS) and engineering data base records systems for the efficient management and valuation of network assets
- improve network performance and optimisation
- evaluate and set optimal levels of network system spares, having due regard to key risks
- build a safety culture through effective communication and coaching of staff and contractors
- provide and develop training facilities for ongoing competency and assessment.

3.3 Safety and Risk Management (N10)

The overall focus for this group is to keep the public and our workers safe. To achieve this we use a risk based approach to safety to help us focus on the most significant risks. Direct communication with and via media is essential in getting the message out to the general public. Regular monitoring of safety statistics and complaints is an important part of this role as is investigations into safety and related issues. This group is led by our Safety and Risk Manager.

Current staff: 3 FTE employees

- Safety Management Consultant
- 2 x Public Safety Advisors

Retirement of long serving staff from across the business will create an “experience” gap. This, along with the cumulative increase in compliance requirements will require an increase in safety and compliance support, particularly to the Infrastructure group. We anticipate increasing the number of FTE employees to four with the addition of a Safety Advisor in FY15.

Proposed staff (FY15 – 19): 4 FTE employees

The services, aims, objectives and responsibilities associated with this group are as follows:

- promote the safety of the public, our contractors and our staff by monitoring and promoting safety externally and internally
- manage network complaints within delegated authorities and report on outcomes
- control and manage our overall risk management process, recommend an appropriate risk management framework and prepare reports for senior management
- develop and implement processes to evaluate and rate various business risks
- maintain a database of risk ratings by category
- provide a comprehensive compliance programme to ensure that network risks are managed
- ensure that Orion’s risk based compliance management process is implemented
- develop, implement and manage Orion’s safety management system to meet the legislative requirements to protect employees, contractors and the public
- integrate of safety management practices as part of standard management systems
- capture and manage all data relating to any incidents involving employees, contractors, the public and Orion assets
- ensure that all significant incidents are investigated effectively
- co-ordinate the legal/insurance/customer aspects of significant incident investigations involving employees and/or Orion assets, so that the risk of either prosecution or compensation payments is minimised
- develop, implement and manage a customer complaints management process consistent within the requirements of the Electricity & Gas Complaints Commission Scheme

- facilitate settlement of compensation claims through effective liaising with legal advisors, insurers and claimants
- ensure that incident investigation results are reviewed by the Chief Operating Officer, Network Asset Manager, Operations Manager and Safety and Risk Manager to achieve consistent and improving risk based solutions
- ensure that corrective action recommendations from these reviews are implemented
- continue to implement Orion's environmental management system to meet legislative requirements
- regularly review all relevant legislative changes and communicate these to the appropriate personnel for action
- mentor the contact centre to improve their overall industry knowledge
- facilitate improvement in awareness of customer needs both internally and externally, particularly between Infrastructure and the Contact Centre
- promote electrical and network safety with other infrastructure providers (including Stronger Canterbury Infrastructure Rebuild Team (SCIRT)), contractors (including third party) and the general public. This can include A & P shows and the like.

Legislative requirements are now prescribing increased penalties and government agencies are indicating their intention to aggressively pursue recovery under these statutes.

These include:

- The Ministry of Consumer Affairs who are now the agency responsible for the Electricity and Gas Complaints Commission scheme, which is now a compulsory regime. They have signalled their preference to raise the present \$20,000 limit on binding rulings by the Commissioner to \$100,000. An interim step has already been proposed for implementation from October 2012 of raising the limit to \$50,000 and by agreement with the lines company or retailer, to \$100,000.
- The Electricity Authority has amended the Participation Code to require lines companies to indemnify electricity retailers against any event originating from the network which results in a successful claim for compensation against the retailer. There is no upper limit to these claims.
- Both the National Rural Fire Authority and the Department of Conservation have recently pursued us for cost recovery for electrically initiated fires under the strict liability provisions of the Forests and Rural Fires Act 1977. Their strongly stated position is that they will take court action if they cannot recover the majority of the debt. There is no upper limit to these claims.

These increases in exposure to liability and the need to defend against any resulting claims will inevitably result in higher costs for legal advice, as set out below.

Compensation claims

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
FY13 budget	35,000	35,000	35,000	35,000	35,000	35,000	35,000
Fire additional costs	-	50,000	50,000	50,000	50,000	50,000	50,000
Indemnity additional costs	-	100,000	100,000	100,000	100,000	100,000	100,000
Total	35,000	185,000	185,000	185,000	185,000	185,000	185,000

Legal advice

	FY13	FY14	FY15	FY16	FY17	FY18	FY19
FY13 budget	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Additional costs	-	20,000	20,000	20,000	20,000	20,000	20,000
Total	30,000	50,000	50,000	50,000	50,000	50,000	50,000

3.4 Lifecycle Management (N76)

The objective of lifecycle management is to plan and document lifecycle management for both electrical and property assets. Lifecycle management includes the “*cradle to the grave*” focus on long life assets and includes quantifying assets, their location, condition and capability from acquisition to disposal. Maintenance and renewal planning and modelling is a core function. This group is led by the Lifecycle manager.

Current staff: 5 FTE employees

- Property Manager
- Contract Administration Manager
- Network Engineer – Asset Lifecycle
- Data Manager
- GIS Manager

There is an allowance for one extra Network Engineer from FY14 onwards, otherwise there is no forecast material change in these numbers out to FY19.

Proposed staff (FY14 – 19): 6 FTE employees.

The services, aims, objectives and responsibilities associated with this team are as follows:

- produce the network AMP and supporting information
- develop asset lifecycle plans in conjunction with the Network Asset Manager. These plans are to be documented in the AMP and used for Orion’s maintenance and replacement programmes. These strategies must be robust and supported by external evidence and review as appropriate
- monitor, analyse and report network performance - including detailed asset failure analysis
- support other infrastructure staff
- provide an asset data management function including:
 - prepare and co-ordinate annual asset management plans
 - provide network performance information and statistics
 - provide and control engineering drawings
 - provide the network asset register
 - provide and control design standards and technical specifications
 - co-ordinate budgets and report
- analyse and monitor network assets including:
 - ensure equipment and system failures are appropriately analysed and recorded
 - keeping the Network Asset Manager and key asset managers (substations and reticulation) fully informed of asset performance statistics and equipment failure analysis
 - implement optimal asset lifecycle strategies
 - analyse Orion’s asset replacement and maintenance programmes
 - analyse Orion’s design and installation standards
 - report on network asset performance
- provide a data management function

- provide a GIS function
- provide a contract administration function
- provide an efficient property and facilities management function including:
 - manage all properties – including all substations, office sites, holiday homes etc
 - manage all land titles, leases, easements, caveats etc
 - manage all rental properties
 - manage all property acquisitions, sales etc
 - manage all head office facilities management issues
 - manage all property contractors.

3.5 Data Management (N76)

Data Management's objectives are to:

- manage the WASP (Works, Assets, Solutions and People) asset data base to support the lifecycle property function and asset management functions
- control access to and update key network documents
- manage the preparation of our annual asset management plan.

Current staff: 3 FTE employees

- Data and Performance Coordinator
- Data Coordinator
- Drawing Coordinator.

There is no forecast material change in these numbers out to FY19.

The services, aims, objectives and responsibilities associated with this team are as follows:

- manage and develop the asset register and systems necessary to ensure infrastructure asset data is accurate and available for the effective management of the network
- manage the content, review and dissemination of business documentation both internally and external to Orion
- manage and develop systems and procedures to ensure accurate network reliability statistics
- manage and update the asset register in a way that ensures the integrity of core asset data
- provide accurate information in a timely manner and assist in the assembling of data for contracts by other network managers
- manage and develop the interface between the asset register and the GIS
- manage and develop systems to ensure accurate asset data for the network valuation model in a manner that will satisfy an external audit
- manage and support the transformer/switchgear stock management application
- manage Orion's controlled documents including policies, design standards, technical specifications, operating standards and procurement standards
- facilitate the production of Orion's AMP and ensure it continues to be seen as a leading example in the industry
- ensure common high standards of documentation presentation and content
- manage Orion's engineering/substation drawings by controlling their maintenance by outside contractors and designers
- manage the document distribution process both internally and external to Orion
- manage the restricted website interface with designers, contractors and operators to ensure access to up to date documents and drawings
- manage the purchase and storage of technical publications and standards
- manage the data to determining network reliability performance
- provide reliability data for disclosure to the satisfaction of an external auditor
- provide an annual Network Performance Report
- provide a system to capture and report network asset failure modes

- provide technical support to the other members of the Infrastructure team
- expand knowledge for all components of the network and industry for all aspects of data and information management.

3.6 GIS (N64)

GIS's objectives are to:

- manage the GIS data base to support the lifecycle property function and Asset management functions
- support the Operations group with the provision of an electrical connectivity diagram
- provide maps to contractors, designers and interested parties to minimise the impact of contractor hits on our assets.

Current staff: 7 FTE employees

- 6 x GIS Operators
- Mapping Administrator

There is an allowance for two extra GIS Operators from FY14 onwards for the additional earthquake recovery work.

Proposed staff (FY14 -19): 9 FTE employees

The services, aims, objectives and responsibilities associated with this team are as follows:

- provide business direction for the development of GIS and Network Management System (NMS) (cartography) and ensure that outcomes align with Orion's business priorities
- improve usability and effectiveness of these tools for employees and contractors
- co-ordinate with Infrastructure and Information Solutions managers to determine GIS projects and priorities
- develop and manage GIS user feedback
- build GIS industry knowledge and recommend new proposals that provide business value to Orion
- ensure GIS information is maintained and up-to-date and accurate:
 - provide various "models" of the distribution system as required
 - maintain up to date "as built" records of underground and overhead plant locations
 - ensure the prompt updates of the operational wall map and distributed system diagrams
 - provide GIS information for valuation and regulatory purposes
- maintain and update Network Management System model (ENMAC) as required within agreed timeframes
- manage the GIS mapping interface to customers particularly with the location of lines and cables
- provide a 24-hour mapping emergency service to contractors
- provide field staff to investigate customer requests for cable location and recording
- investigate plant damage claims associated with GIS information
- identify, record and manage all known significant material hazards

- ensure that all accidents, incidents and near misses are reported and where required assist with accident or incident investigation
- assist the Safety and Risk Manager with “complaints” from contractors, customers and the public as required.

3.7 Contract Administration (N60)

Contract Administration's objective is to provide a credible and efficient contract administration function for Infrastructure. This includes compiling contracts, tendering, notice to tenderers and preparation of comparative bids for the Contract Engineer's evaluation.

Communication with contractors and receiving/verifying invoices is an essential part of this process.

Current staff: 2 FTE employees

- 2 x Contract Administrators

There is an allowance for an extra Contract Administrator in FY14 to allow for the increased volume of property and asset management contracts expected due to recovery works.

Proposed staff (FY14 – 19): 3 FTE employees

The services, aims, objectives and responsibilities associated with this group is as follows:

- manage, co-ordinate, tender, evaluate and award network and property contracts in a transparent and standardised way
- ensure that contracts are properly tendered, awarded and signed and that proper records are kept
- ensure that only authorised contractors are engaged
- co-approve contractor progress claims and invoices within delegated authorities
- manage contract retentions, co-approve release of retentions
- ensure that contractors are provided with consistent and clear contract terms and conditions and instructions of a high quality
- ensure that the terms and conditions of contracts are clear in terms of compliance obligations – including compliance with appropriate legislation (such as the Resource Management Act, Health and Safety in Employment Act and the Electricity Act)
- liaise with contractors to allow them to forecast workloads and plan their resources
- report on costs, progress and variations as requested by managers
- ensure that contractors comply with relevant Acts which includes, by ensuring appropriate contract requirements
- manage contract systems to ensure that contractors are competent to perform the specified work
- maintain contact lists for emergency contractors
- co-ordinate contractor pandemic preparedness and maintain contact lists
- administer the works management database – including ongoing improvements
- administer shared use agreements (for example for attachments to our poles) and prepare invoices within delegated authorities for all invoices
- prepare the regular contractor newsletter
- establish and maintain written work procedures
- administer agreements for consultancy services to be provided to Orion

- communicate non contract specific feedback/changes to contractors
- assist with the collation of data pertaining to contractor incidents/accidents that occurred while undertaking Orion works
- update the Orion website with the list and details pertaining to current Orion projects
- assist in the administration around scheduled system, compliance and environmental audits
- manage any Orion staff usage of Orion authorised contractors for their benefit to ensure there are no conflicts of interest to the business
- communicate changes of standards to contractors and Orion employees and provide general contractor performance feedback.

3.8 Property Management (N40)

Property Management's objectives are to:

- manage the company's corporate and network properties
- manage contractors working on or around our properties.

Orion's properties include a new head office in Wairakei Road, the existing CBD head office site, 315 building substations and around 4,000 kiosk substations.

Current staff: 7 FTE employees

- Project Manager
- Land Coordinator
- 3 x Contract Managers
- Custodian
- Assistant Custodian

There is no forecast material change in these numbers out to FY19.

The services, aims, objectives and responsibilities associated with this team are as follows:

- manage Orion's land and buildings to ensure the most productive and efficient use of Orion's property assets. This includes Orion's administration buildings, substations and the two Hanmer holiday properties - along with rental houses, easements, caveats and leases
- ensure security for offices and substations is robust
- manage and maintain all substation grounds and buildings in conjunction with the Network Asset Manager
- scope work and set standards to safely manage property maintenance and construction by contract
- administer Orion's site rentals and Orion's land and easement management functions
- provide support to the network asset group as required.
- prepare annual plans for substation sites and administration offices in conjunction with the Lifecycle Manager – including budgets – and implement those plans as appropriate
- authorise all work in compliance with Orion's contracting policies and processes and within delegated authorities and manage employee expectations
- arrange office space and furniture and equipment as requested by management
- ensure that all administration offices are cleaned and maintained to acceptable standard
- ensure all property related plant is maintained and replaced as identified in the property AMP
- minimise energy use to ensure optimal performance
- prepare substation work plans and co-ordinate with the network asset group
- scope work and prepare suitable specifications to have work contracted
- evaluate tenders and manage property related contractors
- arrange rental agreements and property easements, purchases and sales
- arrange urgent work when required

- ensure that there is an appropriate level of spares and contractor resources available for emergency work
- implement property security policies as necessary to achieve intended outcome
- regularly supply written reports which will include project progress and associated costs
- comply with Orion's environmental policy and associated actions
- ensure compliance with relevant legislation and appropriate approval for any new works and alterations. This includes specific six monthly sign off of the Building Act and the Fire Service Act and certification of building strength for the CDEM act as part of our compliance programme
- ensure a safe work environment for employees, contractors and the general public.

3.9 Strategic Planning (N90)

Strategic Planning's objective is to develop long term plans for development of the electrical network.

Considerations include forecast growth, network resilience, public and worker safety, service level expectations and network capacity planning. Provision of optimal outcomes and challenging the status quo is a focus. The identification of core opportunities to expand the business is considered important. This group is led by the Strategic Planning Manager.

Current staff: 3 FTE employees

- Development Engineer
- Planning Engineer
- Network Analyst

There is an allowance for 2 further Network Analysts (one in each of the FY14 and FY15 years) to manage the extra workload associated with the purchase of spur assets and to better investigate the efficiencies and opportunities associated with new technologies and the concept of a 'Local System Operator' including Upper South Island (USI) Load Management.

Proposed staff (FY14 – 15): 4 FTE employees

Proposed staff (FY16 – 19): 5 FTE employees

The services, aims, objectives and responsibilities associated with this team are as follows:

- provide overall vision and direction for the long term development of the network – especially as it relates to high value issues – including transmission, sub-transmission, high voltage, network architecture, growth options and security of supply standards
- ensure safe outcomes for employees, contractors and the public
- provide high quality network development analysis reports – such reports to include engineering and economic analysis, options and recommendations
- identify and develop new network related business opportunities that provide shareholder value while taking account of customer expectations
- challenge and seek to be challenged on assumptions and analysis
- research and identify potential network business development opportunities that are aligned to core business
- identify and develop spur asset purchase opportunities
- lead the upper South Island load management project and co-ordinate internally and with other EDBs
- identify and present Local System Operator (USILM) opportunities
- liaise with Transpower to ensure that there is appropriate transmission and GXP capacity to deliver a reliable, secure and economic service to our customers
- review and monitor the loading on the Orion network to meet our service levels
- identify and forecast growth trends in system usage by monitoring factors such as population growth, economic growth, changes in land use, electricity utilisation, clean air initiatives, etc

- develop options and recommend plans for future network capital expenditure that ensure that Orion's overall objectives for safety, optimisation of losses, reliability performance, overall security of supply and cost effectiveness of solutions are met
- actively consider the role and potential of demand side management and its potential to defer peak load capacity investment in the network. Use economic modelling where appropriate and produce justification for the options considered
- evaluate and develop options to deal with emerging issues such as electric vehicles and photo voltaics
- contribute to the annual ten year AMP update process
- work closely with the Lifecycle Manager, Network Asset Manager and Operations Manager to establish annual reinforcement and lifecycle replacement priorities
- work closely with the Lifecycle Manager, Network Asset Manager and Operations Manager to establish long term development plans for the network. This includes communication systems, asset capability studies, demand side management, load management strategies and the local system operator concept. Document and budget as appropriate in the AMP
- take account of considerations and information provided by the Engineering Support Manager and team that may include public, contractor and staff safety concerns. This includes advice on practical considerations related to protection and control systems including Ground Fault Neutraliser (GFN) operation and application
- develop the scope of proposed projects sufficiently for the Asset Management team to administer the contracted detailed design and construction phases by working closely with the Network Asset Manager
- align planning with the objectives within the National Infrastructure Plan and the CDEM
- ensure vision alignment with other Infrastructure Managers
- carry out modelling and analysis to assist with regulatory requirements.

3.10 Network Asset Management (N52)

Network Asset Management's objective is to work closely with strategic planning, life cycle and operations teams to ensure that a safe, secure and reliable network is constructed, maintained and renewed.

The focus here is on the physical development and stewardship of the network.

Connection and disconnection of customers is a core function, as is physical engineering and management of contractors who work on or adjacent to our network. This group is led by the Network Asset Manager.

Current staff: 7 FTE employees

- Engineering Systems Support Administrator
- HSE Systems Advisor
- Reticulation Asset Manager
- Substations Asset Manager
- Asset Testing Manager
- Development Engineer
- Distribution Services Manager

There is no forecast material change in these numbers out to FY19.

The services, aims, objectives and responsibilities associated with this group are as follows:

- ensure the safety of the public, our contractors and our staff while working on or near our network
- set network asset standards
- safely manage, maintain and renew our network to achieve agreed service levels
- safely construct, maintain and renew our network using a sustainable competitive contracting model
- provide a customer focused responsive service for all interaction with developers and the public
- maintain, develop and expand the network based on agreed network standards
- reinforce the network in areas identified by the Network Planning team
- scope work and prepare suitable specifications to have work contracted
- prepare work plans and co-ordinate timing with the Operations Group
- plan work to avoid "peaks" where feasible
- regularly supply written reports to the Chief Operating Officer which will include project progress and associated costs
- formulate and co-ordinate the AMP, annual plans and budgets
- manage day to day construction and maintenance and authorise necessary work. This includes annual capital and maintenance budgets in the order of \$50m to \$60m
- co-ordinate underground conversion plans with relevant authorities and agencies
- request the Network Planning team to model network alternatives so the most appropriate solution takes account of network reliability and security outcomes, future options and uncertainties and asset lifecycle costs

- co-ordinate with Property Management on property issues, including in relation to the AMP forecasts
- arrange urgent work when required
- ensure that appropriate levels of network spares are appropriately planned, managed and available for emergency work
- arrange for purchases of electricity networks from developers that meet minimum standards in compliance with delegated authorities and Orion's new investment policy
- secure necessary local authority approvals for works
- manage network communications signalling systems (e.g. SCADA, ripple and protection) and co-ordinate resources (including internal IT people) to do so
- co-ordinate with Commercial to ensure appropriate alignment of new connection/investment policies and commercial pricing policies
- provide an efficient, simple customer focused process for new connections to the network
- develop strategic network plans, policies and processes to ensure network resilience (for example in the event of a major natural event)
- ensure that health, safety and environmental systems are appropriate to manage and operate work on the network – by employees and contractors.

3.11 Reticulation Asset Management (N52)

Reticulation Asset Management's objectives are to:

- determine maintenance and replacement priorities for all network cables, lines and associated equipment
- apply appropriate assessments and techniques to optimise lifecycle costs and to minimise safety risks.

Current staff: Nil

There is a forecast for an extra engineer to report to the Reticulation Asset Manager in FY15 for increased workloads associated with the city rebuild, SCIRT and Transpower spur asset acquisitions.

Proposed staff (FY15 – 19): 1 FTE employee

- Project Manager Electrical Construction

The services, aims, objectives and responsibilities associated with this group are as follows:

- inspect and test cables, overhead lines and switchgear by contract and preparation of condition reports to determine maintenance priorities
- commission surveys, testing and inspections to minimise asset failure and ensure compliance with regulations and codes of practice
- prepare suitable specifications for lines and cables contracts
- plan work and coordinate timing to ensure consistent works available for contractors
- monitor, update and report costs and project data
- assist in the formulation and coordination of the Asset Management Plan, Annual Reticulation Maintenance and Replacement Plan and budget
- responsible for the Reticulation Replacement and Maintenance budget including authorisation of necessary work
- review and action roadworks plans and arrange the relocation of plant associated with roadworks changes including negotiating new plant position and costs associated with this
- provide an interface to customers particularly where the placement of lines, cables and associated plant has become a problem. Negotiate new positions and associated costs
- analyse technical data and act on this information to minimise the risk of loss of supply to customers
- arrange urgent maintenance work when required
- identify, specify and maintain an appropriate level of reticulation spares.

3.12 Development Engineer

The Development Engineer's objectives are to:

- Scope and coordinate major reticulation projects, reinforcements, extensions and connections to the network.
- Apply appropriate assessments and techniques to optimise design and lifecycle costs and to minimise safety risks.

Current staff: Nil

There is a forecast for an extra engineer to report to the Development Engineer in FY15 for increased workloads associated with the city rebuild, SCIRT and Transpower spur asset acquisitions.

Proposed staff (FY15-19): 1 FTE employee

- Distribution Engineer

The services, aims, objectives and responsibilities associated with this group are as follows:

- Oversee the management and co-ordination of new reticulation reinforcement, new extensions and connections to the network.
- Commission network designs to ensure compliance with regulations and codes of practice.
- Provide engineering assistance to Distribution services team to ensure new extensions, connections and reinforcements are installed and connected to the network achieving optimal outcomes.
- Prepare suitable specifications for works contracts.
- Plan work and coordinate timing to ensure consistent works available for contractors.
- Monitor, update and report costs and project data.
- Assist in the formulation and coordination of the Asset Management Plan, Annual Reticulation Maintenance and Replacement Plan and budget.
- Responsible for the Reinforcement budget including authorisation of necessary work.
- Provide an interface to customers particularly where the interface to the network can pose possible technical, regulatory, network access and safety risks. Negotiate agreements where required.
- Analyse technical data and act on this information to minimise the risk of loss of supply to customers.

3.13 Substation Asset Management (N52)

Substation Asset Management's objectives are to:

- co-ordinate the planning, design, construction, replacement and maintenance of substation assets
- regularly review substation maintenance practices to reflect technology improvements with the aim to minimise lifecycle costs and improve reliability.

Current staff: 1 FTE employee

- Project Manager Electrical Construction

There is no forecast material change in these numbers out to FY19.

The services, aims, objectives and responsibilities associated with this group are as follows:

- initiate condition surveys, testing programmes and inspections to determine maintenance priorities, minimise asset failure and ensure compliance with safety regulations and codes of practice
- justify and plan substation maintenance to ensure asset lives are optimised and reliability is maximised at the lowest defensible cost
- prepare suitable specifications for substation contract work
- coordinate timing of planned substation works
- responsible for substation maintenance, replacement and construction
- ensure appropriate technical resource available for maintenance and operation of new substation equipment
- monitor, update and report costs and project data
- research latest trends in maintenance and replacement of substation assets and evaluate them with a view to inclusion in future Asset Management Plans
- responsible for authorisation of specific works
- analyse technical data and act on this information to minimise the risk of loss of supply to customers
- coordinate and update substation asset information
- arrange urgent repair work as necessary
- assist with maintaining an adequate level of system spares.

3.14 Distribution Services (N14)

Distribution Services' objective is to safely manage reticulation works contracts involving network upgrades, replacements, maintenance, additions and removals.

This requires processes to successfully manage contractor works, customer network connection works and customer/land owner related network information. The majority of this work involves the management of contractors by formal contract.

This team is led by the Distribution Services Manager.

Current staff: 4 FTE direct report employees

- Senior Contract Manager Investigation
- Contract Works Manager (Customer Services)*
- Contract Works Manager (Connections)*
- Contract Works Manager (Distribution)*

Note that the areas above marked with an asterisk (*) are discussed in the following sections. This includes further staffing within those areas.

There is no forecast material change in these numbers out to FY19.

The services, aims, objectives and responsibilities associated with this group are as follows:

- manage contracts for network cables, lines and associated equipment – ensuring the safety of employees, contractors and the public as the top priority
- manage new customer connections
- manage temporary connections
- liaise with developers and contractors to ensure that quality standards and regulatory requirements are met
- ensure that processes (including safety), technical requirements and timeframes are clearly communicated
- ensure that new connection processes comply with the rules of the NZ electricity market
- ensure that ICP information is updated to the national registry
- ensure that access to roads and private land complies with regulation
- manage compliance (including notifications) with Tree Regulations
- manage projects and approve contractors' invoices
- co-ordinate responses to questions from developers and the public
- ensure that new connection agreements are completed prior to livening
- ensure that network spend for new connections and upgrades complies with Orion's new investment policy
- act as "Engineer to the Contract" in specific scheduled and non-scheduled contracts
- ensure that work is performed to approved budgets and in accordance with delegated authorities
- manage the emergency works contract, manage fault reports and prepare claims for third party damage to the network

- co-ordinate network extensions and connections with planned network maintenance and capex works
- provide input into the network AMP and annual budgets
- represent Orion on relevant industry issues.

3.15 Distribution Services (Customer Services)

The objectives here are to:

- manage and serve customers well
- manage trees that are close to power lines
- manage technical inspection services on private land
- provide an administration team that supports the other areas within Distribution Services (DS).

Current staff: 7 FTE employees

- Contract Manager (Vegetation)
- Inspection Coordinator
- 5 x Administrator

There is no forecast material change in these numbers out to FY19.

The services, aims, objectives and responsibilities associated with this team are as follows:

- assist in preparing project scopes of works and associated budgets identifying any special conditions of contract and reiterating the importance of meeting all compliance requirements, deadlines and budgets and ensure staff are working within their delegated authorities
- manage the administration team within DS, ensuring the DS administration function operates in a professional, customer focused, accurate and timely manner within deadlines. Ensuring administrators are capable of providing cover for one another during times of leave and sickness.
- effectively manage general customer enquiries and provide guidance and leadership to all interested parties if/when required. Provide an interface to customers to air and discuss issues
- provide effective leadership and support to the team, including development and coaching of team members and that individual staff performance reviews and development sessions are encouraged and undertaken as or when required
- provide a forum for a collective team approach to achieve a greater consistency between peers and to identify any potential staff issues or resources that may need attention to deliver objectives
- provide an interface and notifications regime in accordance with the tree regulations to customers and the general public, particularly where vegetation issues affecting our assets have become apparent
- undertake tree assessments and provide arboriculture reports as required
- monitor developing situations to clarify, review, and evaluate contract goals and objectives to maintain the interests of all parties including the collection of subject matter for preparation and report writing for others
- liaise with the network asset management project team as necessary, for issue awareness and/or permissions or where more complex issues have arisen or have to be resolved
- assist with problem solving at a strategic level, working with others to reach an agreed resolution

- ensure that all contractors/service providers are aware of carrying out their duties in a safe manner in accordance with current health and safety requirements and seek to improve overall awareness of health and safety in work and public places
- ensure that all recording elements of construction, auditing, quality assurances and safety observations are evaluated and captured for analysis and any non-conforming elements are addressed appropriately
- ensure all accidents and lost time incidents (LTI's) are captured for analysis and reviewed, recorded and any third party notifications and reporting is managed and delivered within the expected time frames
- enhance and maintain key relationships with all internal and external entities and stakeholders to achieve the overall contract objectives and desired outcomes and to be proactive in communicating with all affected parties where Orion is required to manage issues related to the performance of contracts and/or Orion assets
- be available for unplanned emergency work if required, including on-site management of the specific works
- protect Orion's financial and legal interests and manage any justified complaints.

3.16 Distribution Services (Connections)

The objective here is to provide the interface for the requirement of new and/or modified customer connections and extensions to Orion's electrical network.

This includes managing the co-ordination of technical, economic and the practical implementation of these changes to ensure they meet the customer's and Orion's expectations.

Current staff: 7 FTE employees

- 6 x Contract Managers (Connections)
- Contract Manager (Street Lighting and Subdivisions)

There is no forecast material change in these numbers out to FY19.

The services, aims, objectives and responsibilities associated with this team are as follows:

- assist in preparing and accepting design/build proposals, including budgetary sums, identifying any design configurations and capacity requests which may impact adversely on the network and third parties to ensure compliance with legislative and Orion and contract requirements
- reiterate the importance of meeting all compliance requirements, deadlines and budgets and to ensure staff are working within their delegated authorities
- provide effective leadership and support to the team, including development and coaching of team members and that individual staff performance reviews and development sessions are encouraged and undertaken as or when required
- provide a forum for a collective team approach to achieve a greater consistency between peers and to identify any potential staff issues or resources that may need attention to deliver objectives
- monitor developing situations to clarify, review, and evaluate contract goals and objectives to maintain the interests of all parties including the collection of subject matter for preparation and report writing for others
- liaise with the network asset management project team as necessary, for issue awareness and/or permissions or where more complex issues have arisen or have to be resolved
- assist with problem solving at a strategic level, working with others to reach an agreed resolution
- ensure that all contractors/service providers are aware of carrying out their duties in a safe manner in accordance with current health and safety requirements and seek to improve overall awareness of health and safety in work and public places
- ensure that all recording elements of construction, auditing, quality assurances and safety observations are evaluated and captured for analysis and any non-conforming elements are addressed appropriately
- ensure all accidents and lost time incidents (LTI's) are captured for analysis and reviewed, recorded and any third party notifications and reporting is managed and delivered within the expected time frames
- enhance and maintain key relationships with all internal and external entities and stakeholders to achieve the overall contract objectives and desired outcomes and

to be proactive in communicating with all affected parties where Orion is required to manage issues related to the performance of contracts and/or Orion assets

- be available for unplanned emergency work if required including on-site management of the specific works
- effectively manage general customer enquiries and provide guidance and leadership to all interested parties if/when required. Provide an interface to customers to air and discuss issues
- protect Orion financial and legal interests minimising any justified complaints.

3.17 Distribution Services (Distribution)

The objective here is to manage maintenance, removal and reinforcement works associated with the overhead and underground reticulated network. This is predominantly done through managing skilled contractors.

Current staff: 8 FTE employees

- 2 x Senior Contract Managers
- 3 x Contract Managers
- Contract Auditor
- Contract Audit and Inspection Coordinator
- Contract Coordinator

There is no forecast material change in these numbers out to FY19.

The services, aims, objectives and responsibilities associated with this group are as follows:

- assist in preparing project scopes of works and associated budgets identifying any special conditions of contract and reiterating the importance of meeting all compliance requirements, deadlines and budgets and ensure staff are working within their delegated authorities
- provide effective leadership and support to the team, including development and coaching of team members and that individual staff performance reviews and development sessions are encouraged and undertaken as or when required
- provide a forum for a collective team approach to achieve a greater consistency between peers and to identify any potential staff issues or resources that may need attention to deliver objectives
- monitor developing situations to clarify, review, and evaluate contract goals and objectives to maintain the interests of all parties including the collection of subject matter for preparation and report writing for others
- liaise with the network asset management project team as necessary, for issue awareness and/or permissions or where more complex issues have arisen or have to be resolved
- assist with problem solving at a strategic level, working with others to reach an agreed resolution
- ensure that all contractors/service providers are aware of carrying out their duties in a safe manner in accordance with current health and safety requirements and seek to improve overall awareness of health and safety in work and public places
- ensure that all recording elements of construction, auditing, quality assurances and safety observations are evaluated and captured for analysis and any non-conforming elements are addressed appropriately
- ensure all accidents and lost time incidents (LTI's) are captured for analysis and reviewed, recorded and any third party notifications and reporting is managed and delivered within the expected time frames
- enhance and maintain key relationships with all internal and external entities and stakeholders to achieve the overall contract objectives and desired outcomes and to be proactive in communicating with all affected parties where Orion is required to manage issues related to the performance of contracts and/or Orion assets

- be available for unplanned emergency work if required including on-site management of the specific works
- effectively manage general customer enquiries and provide guidance and leadership to all interested parties if/when required. Provide an interface to customers to air and discuss issues
- protect Orion's financial and legal interests and manage any justified complaints.

3.18 Operations Management (N39)

Operations Management's objectives are to:

- ensure the efficient operation and responsive service from our Contact Centre
- ensure the efficient operation and responsive service from our centralised Control Centre
- in order to ensure a safe reliable service to our customers.
- provide safe operator and contractor access plans and authorisations to our network for maintenance, replacement, renewal and development
- monitor our network performance and quality
- manage network loadings to minimise network constraints and offset capital investment in the network
- manage our network faults service (our Operators).

This group is led by the Operations manager.

Current staff: 8 FTE direct report employees

- Administration Assistant
- Control Centre Manager
- Network Access Manager
- Operation Services Manager
- Release Planning Manager
- Field Response Manager
- Power On Trainer
- Power On Development Coordinator.

There is no forecast material change in these numbers out to FY19.

Key responsibilities for Operations are:

- Keeping the power on or minimise the effect of a network outage
- 24/7 operation and control of the network
- Responding to emergency services calls, customer fault calls and general enquires
- To manage planned switching for contractors, customers, Orion and Transpower while maintaining network security
- To ensure the network is operated within design limits and regulatory requirements to ensure the safety of staff, contractors and the public while maintaining services to our customers
- Control load to minimise Upper South Island RCPD charges
- Control load for network, Upper South Island and Transpower security issues
- Provide power quality services to ensure Orion operates within regulatory limits
- Ensure only competent staff and contractors gain to access the network
- Liaise with Civil Defence Emergency Management, emergency services and other lifeline utilities during a state of emergency.

Operations systems and procedures comply with:

- Electricity Act and Regulations
- Electricity (Safety) Regulations

- Electricity Authority Act, Code and Regulations
- Health & Safety in Employment Act and Regulations.
- Commerce Commission, Regulated Industries
- EEA Safety Rules and Industry Guides

Control Centre – provide 24/7 service to control all high voltage switching, load control and fault services.

Contact Centre – set up as a customer information centre to provide customers with timely information.

Release Planning – ensures security of supply is maintained while scheduling access to the network for construction and maintenance work.

Field Response – field operators switch the network for construction, maintenance and fault work.

Operations Services – manage power quality issues, embedded generation, standby generation, street lighting connection records and low voltage network status.

Network Access – ensures only competent staff and contractors gain access to the Orion network.

The Operations team is experienced and is able to deliver the outcomes sought, subject to further natural disasters. In the last few years the team has successfully replaced its three key legacy systems and added an additional load management system as follows:

The 25 year plus Foxbough SCADA master station has been replaced with a GE system in 2009.

Our totally manual network management process and our aging call management system have been replaced by a GE PowerOn network management (NMS) in 2010 and outage management system (OMS) in 2011. The PowerOn system links the SCADA with the NMS and the NMS with the OMS to provide a seamless system to manage planned and unplanned work plus reducing fault response times.

Three years ago the Upper South Island (USI) distributors developed a load control system to reduce Transpower RCPD charges. The system is maintained and operated by Orion. The system takes loading data from Transpower and the distributors, if the USI load limit has been exceeded it calculates the amount of shedding required by each distributor and signals their load control system to shed load.

Resources:

Resources required for the day to day operation of the network are employed, hired or purchased from the New Zealand market wherever possible.

3.19 Control Centre (N30)

The objectives here are to:

- control network access and switching to ensure power off time is minimised having due regard to safety.
- monitor network performance and take appropriate action to restore safe service to customers.
- arrange repairs to be performed by contractors.
- manage load control to agreed limits.

Current staff: 11 FTE employees

- 10 x Network Controllers
- Contact Centre Manager

With the increased workload associated with the city rebuild we have allowed for two extra Network Controllers in FY13 plus training and uniform costs.

Proposed staff (FY13 – 19): 13 FTE employees

The services, aims, objectives and responsibilities associated with this group are as follows:

- ensure all work is carried out in a safe manner and in compliance with all Health and Safety requirements
- be responsive to customer needs
- develop control centre staff and contact centre staff to provide the highest quality service to our customers
- emergency operating orders and contingency plans are in place, up to date; staff are trained and competent to carry them out
- ensure the Control Centre is adequately manned to provide a 24 hour control service for Network fault restoration, scheduled and unscheduled outage switching, building security requirements and customer service
- ensure the Contact Centre is staff appropriately, 24/7, and reception is managed effectively during the normal business day
- ensure USI and Orion load management systems are operated within prescribed guidelines
- monitor the status of the network and ensure the network management system represents the live network
- provide an oversight of the impact of Network Switching Requests on Network Security and prepare contingency plans where required or as requested by the Operations Manager
- provide accurate and timely statistical information
- support your team to perform at high levels by ensuring they are skilled, trained and resourced to do their jobs
- assist with the preparation of budgets
- ensure all work on the Network is carried out in accordance with the Safety Rules Electricity Industry, the appropriate Operating Standards and Work Procedures
- ensure the building/yard security and fire alarm systems are monitored and acted upon

- take appropriate steps where loading problems due to abnormal switching caused by release requests, fault situations and other situations as per *NW 20.30.01* and *NW 20.30.04*
- work to integrate the contact centre and control centre to ensure they work effectively together for the best customer outcomes.
- assist with the training of staff in operational procedures
- assist with the development and production of Standards, Training Modules and Procedures
- inform Energy Traders of supply interruptions as per the Network Delivery Agreement defined criteria.

3.20 Contact Centre (N33)

The objectives here are to:

- provide a 24/7 responsive information service to our customers, retailers and stake holders
- provide proactive communication with customers on behalf of the rest of the business.

Current staff: 8 FTE employees

- 12 x Customer Service Representatives

Two extra CSRs plus training costs, one FTE in FY13 and the second FTE in FY14 to allow for the increase in the volume of demolition and connection related enquires.

Proposed staff (FY13): 9 FTE employees

Proposed staff (FY14 – 19): 10 FTE employees

The services, aims, objectives and responsibilities associated with this group are as follows:

- a positive image is created for Orion and third parties with all telephone customers
- callers are satisfied at the first point of contact where they receive accurate information and advice
- calls that cannot be resolved at the first point of contact are redirected to the correct person in a way that meets the needs of both the caller and call recipient
- when safety issues are identified during customers calls:
 - callers are advised on how to avoid or manage them
 - Orion staff and contractors are informed of their existence
- correct procedures are followed in dealing with customer complaints
- procedures and service levels for the management of third party calls are adhered to
- flexibility is demonstrated in regard to the negotiation of alternative shifts
- Contact Centre performance meets or exceeds expectations
- Contact Centre is regarded by other departments as an essential partner in the management of customers
- customer complaints are managed in accordance with Orion's complaints management policies
- contracted third party organizations report satisfaction with the service their customers receive.
- answer and manage calls for Orion and contracted third parties
- undertake outbound calling for specific projects, to vulnerable customers in planned and unplanned outages, and in response to extensions to planned network outages
- liaise with Orion network controller about network faults
- receive customer complaints and process them according to Orion's complaints management process
- support the Education and Compliance Manager on all aspects of customer complaints management

- liaise with contracted third parties on issues concerning call content, process and performance
- assist GM Information Solutions in the negotiation of new and modified third party call management contracts

3.21 Field Response (N32)

The objective here is to provide a responsive as a 24 hour fault and restoration service for customers and the business.

This includes switching and isolating the network for contractors to safely work on it for maintenance, replacement or additions to it and restoring the network to normal after work is completed.

Current staff: 15 FTE employees

- 4 x Rural Operators
- 11 x Urban Operators

We have allowed for three extra operators, two in FY14 and another in FY16 to allow for increased volumes of work from the changes in network architecture and the Christchurch rebuild. Associated vehicle, equipment, training and uniform costs have been included.

Proposed staff (FY14 – 15): 17 FTE employees

Proposed staff (FY16 – 19): 18 FTE employees

The services, aims, objectives and responsibilities associated with this group are as follows:

- arrange ongoing education and training for all field operators to ensure they meet our overall operational objectives
- provision of regular meetings and individual feedback necessary to be an industry leader in the areas of safety and customer service
- timely, accurate collection and provision of fault information to allow recovery of third party costs and functional failure review to be undertaken
- co-ordinate emergency operational response with the Distribution Services Manager for significant emergencies
- regularly review performance of the group and to take action to improve overall efficiency
- answer questions and communicate with the public over external operational issues
- ensuring the operator roster is adequately manned to provide a service for network fault restoration, scheduled and unscheduled outage switching, building security requirements and customer service
- ensuring a high standard of adherence to the Health and Safety Act is maintained at all times
- develop Network Operations staff towards providing the highest quality service to our customers
- ensure quality service is delivered to the customer and to Orion
- assist with the preparation of budgets
- ensure all Network switching is carried out in accordance with the Safety Manual – Electricity Industry (SM-EI), the appropriate Operating Standards and Work Procedures
- carry out performance development for staff reporting to the position
- assist with the development and production of Standards, Training Modules and Procedures

- ensure operating staff provide a continual update of the field situation to the Network Controller with regard to broken power lines, damaged cables and other abnormal situations, particularly in respect to public safety
- ensure legible and accurate salary reallocation forms are provided by the Operators
- maintain a detailed personal knowledge of the Electrical Network in terms of equipment location, type and rating, particularly in regard to significant alterations or extensions
- ensure Operators maintain a reasonable appearance and wear appropriate PPE as required
- ensure the gathering of statistical information related to electrical network loadings and operation (i.e. demand readings, tap changer and line circuit breaker operation counters etc) and install voltage recorders on customer premises as requested
- ensure Operator vehicles are kept clean, tidy, fully equipped and within operating weight limits.

3.22 Network Access Management (N39)

The objective here is to ensure that we have safe access to the network for all staff and contractors that need to work on it. Regular training and assessment of all workers is essential to ensure stringent access control.

Current staff: 1 FTE employee

- Network Access Coordinator

There is no forecast material change in these numbers out to FY19.

The services, aims, objectives and responsibilities associated with this team are as follows:

- produce network documents, specifically:
 - Operating Procedures
 - Operating Standards
 - Technical Specifications (Operational Aspects)
 - Operations Reports and Audits
 - Switchgear Operating Instructions
 - Training and Performance requirements
 - Orion/Transpower interface
- produce modules to support the Network Operating Standards
- keep up to date with industry, Transpower and Orion requirements
- establish and maintain good relationships with other business units and with contractors
- train and assess staff and contractors for access to and work on the Orion network
- organise training and assessment for access into Transpower Restricted Areas and operation on Transpower's system up to Class B level
- provide training and assessment of Class L, Class LV and Class S operating
- provide training consultancy for other power companies to meet Transpower Operating Certification criteria
- work with other South Island networks to develop the Christchurch Polytechnic Institute of Technology (CPIT) Tradefit training facility
- maintain accurate training and assessment records
- assist CPIT in the development and management of Tradefit training facility.

3.23 Operations Services (N18)

The objectives are to:

- support the Operations group during major events and to manage our portable generation units including their deployment and maintenance.
- monitor and respond to customer power quality and operational power supply concerns.

Current staff: 2 FTE employees

- Operations Services Coordinator
- Power Quality Officer.

One extra Power Quality Officer has been budgeted for FY14. We expect an increase in power quality issues in areas where the load has increases due to the shift of people from the eastern suburbs.

Proposed staff (FY14 – 19): 3 FTE employees

The services, aims, objectives and responsibilities associated with this team are as follows:

- ensure network operational compliance information is provided by Contract Managers
- monitor and update the low voltage overhead/underground schematic maps for correct open points, circuit identification and correct installation. Including site visits
- label all on site equipment to defined standards, including procedure development to ensure accuracy and reliability
- arrange and update all LV Schematics with the Mapping Centre
- co-ordinate the updating of Network LV Schematics and to integrate the use of computer based mapping into the Control Centre
- assist in development of the computer based mapping tools
- clearance of voltage complaints to an agreed level
- liaise with customers and consultants Orion's requirements for distributed generation
- quality of service delivered to the customer and Orion
- preparation of operational standards and procedures
- establish and maintain good relationships with other Orion divisions and external Contractors
- assist the Operations Manager/Control Centre Manager in preparing business plans and budgets.

3.24 Release Planning (N31)

The objectives here are to manage and coordinate release of the network with Transpower's Release Planning group and to manage and coordinate release of the network with Orion's Contractors and Asset Management staff. The focus is to minimise outages by planning and minimising network risk.

Current staff: 3 FTE employees

- 3 x Operations Planners

One extra Operations Planner in FY14 for the extra work associated with the city rebuild.

Proposed staff (FY14 – 19): 4 FTE employees

The services, aims, objectives and responsibilities associated with this team are as follows:

- key communications role, focused on finding solutions for customers while balancing the limitations of the Network
- be responsive to Contact Centre and customer needs
- coordinate Orion's annual work plan with the Engineering group
- coordinate and schedule the switching of Transpower's annual plan with Orion's and all other Transpower assets under Orion control
- compile/write Orion upper network and Transpower GXP switching schedules to meet Orion's security standard and provide documentation to record any security breach
- in conjunction with control centre staff evaluate incoming network releases and provide switching schedules to meet Orion's security standard
- plan and coordinate, Orion's and Transpower's network releases so as to achieve isolations at the times requested by the Contract Managers/Job Organisers and ensure the integrity of supply of both systems are not compromised
- set up and maintain contingency plans and switching schedules for loss of critical equipment, either Transpower's or Orion's
- incoming Transpower and Orion requests are checked for adherence to the maintenance windows, financial approval and minimal impact on SAIDI & SAIFI statistics without compromising safety
- responsible for approving/declining release requests if the network is put at undue risk
- operate the upper network under normal and fault conditions when appropriate
- organise staff resources required to carry out timed shutdowns, such as to achieve isolation at the advertised time
- ongoing communication with Transpower, Local Area Operator and Contract Managers
- assist with the gathering of statistical information regarding fault outages and electrical loading
- ensure that all work is carried out in a safe manner and in compliance with all Health and Safety requirements
- approve the co-ordination of network releases associated with a number of Contractors on one site

- keep the Operations Manager and Control Centre Manager fully informed of any changes / problems that may arise on the network due to all the above network requirements
- where required, take over delegated responsibility in the absence of the Control Centre Manager.

3.25 Engineering Support (N72)

The objectives here are to

- support the Strategic Planning, Asset Management and Operations groups to achieve their outcomes
- develop and manage of protection and communications standards
- liaise with technical service providers
- assess new equipment prior to entering the network
- help develop our engineers.

This group is led by our Engineering Support Manager.

Current staff: 3 FTE employees

- Control, Protection and Systems Development Engineer
- Technical Support Engineer
- Technical Manager

There is a forecast for two extra FTE employees in FY14 to support the protection systems area. There is a minor fluctuation in employee numbers over the following years as two employees are forecast to move to part time roles prior to their retirements. The new staff will be a Senior Technical Engineer (Protection) and a Technical Solutions Manager.

Proposed staff (FY14 – 19): 5 FTE employees

The services, aims, objectives and responsibilities associated with this team are as follows:

- provide safe, responsive and customer focused engineering solutions to ensure the safety of employees, contractors and the public
- research, provide advice and develop standards for control and protection systems and provide engineering support to improve safety, security and performance of the network
- manage the Ground Fault Neutralizer (GFN) integration to the core network and provide options and support to external parties to maximise our value in this investment. This includes ensuring there is an economic justification for installation on a case by case basis
- develop case by case justification for proposed Orion GFN installations
- provide technical support for external GFN purchasers
- monitor and improve GFN performance
- negotiate contracts with GFN suppliers
- review and challenge engineering proposals to ensure maximum public, worker safety and a robust network that delivers a safe, secure and cost effective supply of electricity to our customers
- help develop network communications, and protection strategies, standards and management processes and ensure they documented in the AMP
- research new products, keep network managers informed and where appropriate introduce these technologies in an inclusive way
- manage protection settings and ensure information is secure
- investigate ways to improve network reliability and safety

- guide and support engineering trainees
- scope and prepare suitable specifications for work on the network
- represent Orion on various committees and technical forums
- assist in the maintenance and development of SCADA and load management, including the USI load management
- provide engineering support and expertise to other business units and contractors
- assist in the development and maintenance of network standards and specifications to ensure a consistent and up to date approach.

3.26 Technical Management (N72)

The objectives here are to provide:

- provide technical and engineering support to Infrastructure
- provide project management expertise for larger projects.
- research and search for product solutions
- set engineering standards for the network.

Current staff: 5 FTE employees

- Senior Technical Engineer Lines
- Technical Engineer Lines
- Technical Engineer Underground Distribution
- Technical Engineer Protection
- Technical Engineer Substations

There is no forecast material change in these numbers out to FY19.

The services, aims, objectives and responsibilities associated with this team are as follows:

- set and maintain Engineering standards for materials and work methods associated with establishing, maintaining and developing network assets
- set and maintain documentation associated with establishing, maintaining and developing network assets
- research and review industry developments worldwide for new products and alternative options with a view to maximising network safety performance and reliability and minimising lifetime cost
- see new products are installed in the network by providing training to Orion staff and Contractors to ensure understanding has reached all involved
- manage our succession planning program of Network Trainees in training, study and work assignments with high requirements for regular mentoring
- be able to lead and problem solve in complex situations
- investigate plant failure, manage protection data and keep the integrity of control and protection at high levels by working with contractors to achieve the highest levels of pre job planning leading to the development of Inspection and test plans
- review Network spares including regular auditing of contractors to ensure spares availability
- set procurement standards to ensure equipment lives are optimized and reliability is maximised at the lowest defensible cost
- establish a process by which suppliers and others can propose solutions and have them evaluated in a timely and professional manner
- develop and review and update of Design Standards and Technical Specifications to ensure a secure reliable network
- overview projects to ensure compliance with standards
- establish and maintain quality documentation
- assist in the formulation and coordination of the development of the Asset Management Plan

- research latest trends in maintenance and replacement of assets and evaluate these with a view to include them in future Asset Management Plans
- develop and maintain essential spares and minimum stock levels necessary to limit the risk of asset failure. This includes coordination, identification, location, audit and security of essential spares
- assist in development of team members knowledge and skills especially lines cables, transformers switchgear, protection and Control
- assist with update of Network Asset Valuation
- analyse technical data and act on this information to minimise the risk of loss of supply
- provide technical support and direction in the absence other staff
- arrange urgent maintenance work when required
- assist with the integration of the Ground Fault Neutralizer to the Orion network
- provide Ground Fault Neutralizer support to external consultants and customers.

4 Earthquake consequences

Impact upon staff from the earthquakes - context:

- staff subjected to four significant earthquakes greater than magnitude six
 - 4 September 2010
 - 22 February 2011
 - 13 June 2011
 - 23 December 2011
- many witnessed the death and destruction during the 22 February earthquake and were actively involved in saving lives from the rubble directly after this quake
- physically moved to an onsite back up temporary call centre and control centre to start restoring power
- working within the CBD red zone for the whole period since the initial earthquake and being surrounded by continued destruction
- staff subjected to over 10,000 after shocks
- destruction and demolition of workshops onsite and both our administration buildings with the loss of many records, files and personal effects (too dangerous to reoccupy)
- many witnessed further buildings falling during the subsequent aftershocks
- staff relocated to a 1930's workshop building on site that had to have repairs to ensure that it was not earthquake prone while they continued to work in it
- the loss of shops, offices, service stations and food outlets within the city
- subjected to three significant snow falls during 2011 and 2012 and two significant rainfall events in 2012
- almost all staff having damage to their homes that is largely unresolved as yet
- about half of our staff having suffered significant home and land damage
- few of our staff have negotiated an acceptable solution with their insurers and many continue to live in their broken homes.

The impacts of the earthquake on our people and our network caused:

- high challenging workloads
- staff dealing with continual change and the emotionally stressed public
- high levels of staff stress resulting in fatigue and sickness
- fight or flight decisions - rethinking of private priorities and work life balance
- higher staff turnover at all levels
- less efficient staff - the employment of many new untrained staff placing additional burden on those remaining
- higher levels of activity as the city struggles to recover
- reluctance of potential employees and their families to move to Christchurch.

To help manage the heavy impact upon staff the company has:

- provided meals to staff
- helped with legal advice for staff and contractors
- worked on keeping moral up
- planned for a new building and site office outside the CBD

- assisted getting specialist help where necessary for issues such as sleep deprivation
- insistence that staff take some time off to recover.

Longer term issues:

- keeping our staff safe while under constant pressure to perform
- keeping the public safe with the many new contractors arriving here
- building resilience into the eastern suburbs means building back our 66kV cable network so the two temporary overhead lines can be removed by 2014
- bringing forward the northern 66kV ring to allow further support and diversity to the eastern suburbs
- working closely with the many agencies and their new additional staff to get agreement on a way forward, especially SCIRT, CERA and Geotech engineers
- planning for the rebuild, improving resilience and conveying this message to developers working with city planners
- safely connecting customers, adding new subdivisions and operating and livening the network
- keeping power on to existing customers while red zone land is returned to nature
- keeping power on while CERA develop the CBD and Frame. This includes the physical relocation of city substations
- relocation from the Armagh site to a new administration building housing our control and contact centre's
- perception from those outside Christchurch that the earthquake impact has passed.

5 Links to other projects

This programme is related to all of Orion's other infrastructure opex and capex programmes as it provides management for the infrastructure that the other programmes will take place within.

6 Programme deliverability

The majority of the programmes forecasted expenditure is fixed as it relates to employee remuneration for current FTE employees. Any additional FTE employees required will be recruited using normal human resource practices. By forecasting staffing requirements based on expected workloads we are able to have time to ensure the right candidate is chosen for the required role.

6.1 Prioritisation

Ensuring the safety of the public and our personnel around our assets: We give priority to reducing risk and acting on any deficiencies identified that would pose a danger to either the public or our personnel (continual improvement).

Satisfying individual or collective consumer expectations: Priority is given to items which will help satisfy consumer expectations. We aim to do this by focussing on expenditure that will:

- Keep the lights on.
- Restore the network to its pre earthquake standard.

- Build resilience into our network in line with the National Infrastructure Plan.
- Review our architecture to ensure it is optimal.
- Connect new customers.

Management of employees' workloads: The prioritisation of this expenditure is primarily based on the expected workloads of our current employees. Priority is given to expenditure which will reduce the workload for employees who have high challenging workloads. In situations where the current employees' workloads are not considered unreasonably high forecasted expenditure has been deferred until it is predicted that it will be necessary.

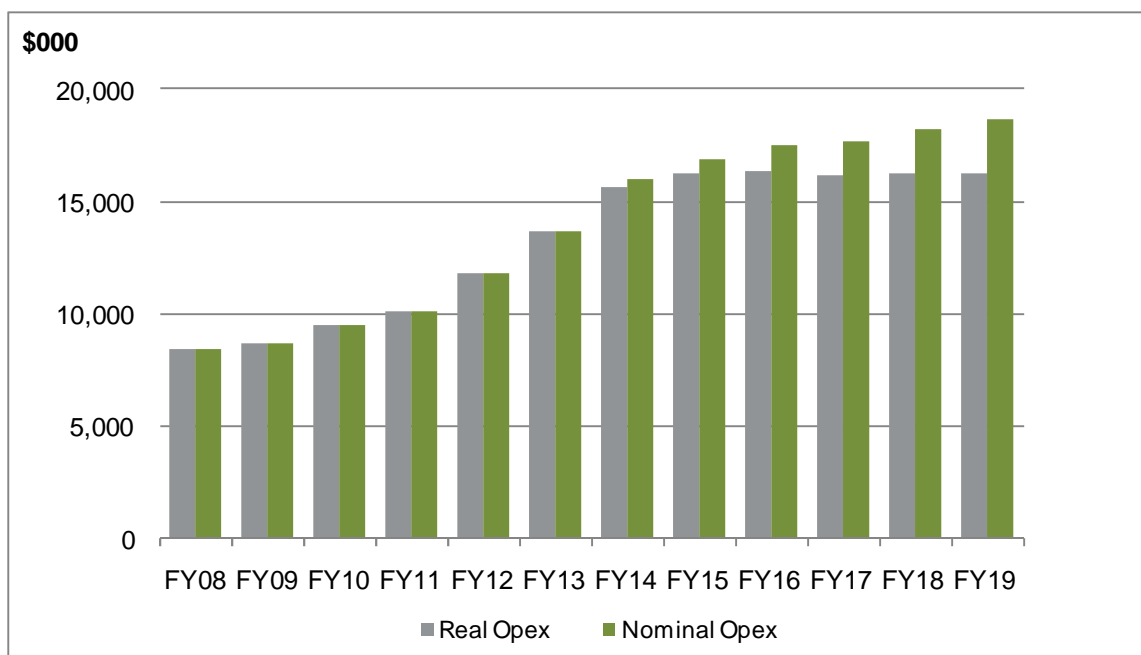
7 Expenditure plan

The main cost in all these areas is fixed with around 85% being employee remuneration from FY08 to FY12 and also forecast out to FY19. The remaining 15% is made up of a mixture of:

- Consultants
- Contractors
- Training
- Vehicle
- Equipment
- Uniform costs
- Recruitment costs
- Any other employment costs (such as fringe benefit taxes).

The following chart shows our historical and forecast expenditure in both real and nominal terms. The real terms have been escalated as per methodology outlined in the CPP proposal to ascertain the nominal terms.

Historical and forecast operating expenditure



The increase in costs in FY12 was caused by additional FTE employees being required due to the Canterbury earthquakes in September 2010 and February 2011.

Expenditure is forecast to increase during FY13 – FY15 due to additional FTE employees required for the rebuild of Christchurch following the earthquakes. Following this, the costs are expected to remain relatively constant.

These expenditure forecasts do not include any contingencies.

The following tables summarise our historical and forecast expenditure in both real and nominal terms (\$000).

Historical operating expenditure

	Nominal \$000				
	FY08	FY09	FY10	FY11	FY12
Operations	3,073	3,282	3,637	4,010	4,416
Connection and contract management	1,491	1,546	1,731	1,702	1,859
Other asset management services	3,846	3,884	4,130	4,410	5,520
Total	8,410	8,712	9,498	10,122	11,795

Forecast operating expenditure (real)

	Real FY13 \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Operations	5,308	5,749	5,796	5,971	6,018	6,071	6,114
Connection and contract management	2,404	2,698	2,704	2,704	2,704	2,704	2,704
Other asset management services	5,969	7,218	7,726	7,651	7,438	7,433	7,458
Total	13,681	15,665	16,226	16,326	16,160	16,208	16,276

Forecast operating expenditure (nominal)

	Nominal \$000						
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Operations	5,308	5,869	6,044	6,398	6,598	6,809	7,016
Connection and contract management	2,404	2,752	2,814	2,890	2,954	3,019	3,086
Other asset management services	5,969	7,368	8,057	8,199	8,154	8,337	8,558
Total	13,681	15,989	16,916	17,487	17,706	18,166	18,661

7.1 Breakdown of expenditure

The following tables show the breakdown of the expenditure for FY12 to FY19 into salaries and wages and other expenditure:

Forecast operations operating expenditure (real)

	Real FY13 \$000							
	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Salaries and wages	3,961	4,452	4,828	4,882	5,028	5,082	5,128	5,178
Other expenditure	455	856	921	914	943	936	943	936
Total operations expenditure	4,416	5,308	5,749	5,796	5,971	6,018	6,071	6,114
FTEs		51	56	56	57	57	57	57
Salaries and wages per FTE		87	86	87	88	89	90	91

Forecast connection and contract management expenditure (real)

	Real FY13 \$000							
	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Salaries and wages	1,499	1,947	2,192	2,192	2,192	2,192	2,192	2,192
Other expenditure	360	457	506	512	512	512	512	512
Total connection and contract management expenditure	1,859	2,404	2,698	2,704	2,704	2,704	2,704	2,704
FTEs		28	29	29	29	29	29	29
Salaries and wages per FTE		70	76	76	76	76	76	76

Forecast other asset management services expenditure (real)

	Real FY13 \$000							
	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Salaries and wages	4,588	5,251	6,006	6,481	6,546	6,431	6,431	6,431
Other expenditure	932	718	1,212	1,245	1,105	1,007	1,002	1,027
Total other asset management services expenditure	5,520	5,969	7,218	7,726	7,651	7,438	7,433	7,458
FTEs		50	54	58	59	59	59	59
Salaries and wages per FTE		105	111	112	111	109	109	109

Total forecast expenditure (real)

	Real FY13 \$000							
	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Salaries and wages	10,048	11,650	13,026	13,555	13,766	13,705	13,751	13,801
Other expenditure	1,747	2,031	2,639	2,671	2,560	2,455	2,457	2,475
Total	11,795	13,681	15,665	16,226	16,326	16,160	16,208	16,276
FTEs	120	129	139	143	145	145	145	145
Salaries and wages per FTE	84	90	94	95	95	95	95	95

The step change in other expenditure from FY13 – FY14 is made up of the following:

- Compensation claims - \$150k increase from \$35k in FY13 to \$185k pa in FY14-FY19 - Recent legislative changes, including the introduction of the Participation Code in the Electricity Industry Act 2010 and the pending introduction of the Consumer Law Reform Bill, have increased our potential liability for damages claims under the Consumer Guarantees Act. The Electricity and Gas Complaints Commissioner now has a ceiling to award compensation increased from \$20k of \$50k. With our agreement she can consider claims for up to a \$100k penalty where she finds us liable for damage to customer equipment. We are now also required to indemnify the retailer for the remedy cost of customer compensation claims under certain circumstances. The increased budget provision is a contingency against these increases in potential liability
- Consultancy and legal expenses (increase of \$0.09m – drops by \$0.05m from FY16 onwards) – This increase is driven by the compensation rise described above, the retirement of a key employee who was a registered surveyor and expected land issues with CERA.
- Reduction in recoveries (increase in net expenditure of \$0.2m). In FY13 we allowed \$0.2m for recoveries of overheads relating to the Ground Fault Neutraliser programme we had running which has subsequently been transferred to Connetics Limited. The recoveries are related to Steve MacDonald and Craig Wong's salaries and direct opex expenditure. As these two have been reallocated to other roles within the infrastructure there is no saving of costs, however the associated recovery will be lost from FY14 onwards.
- The balance is made up of small increases in various in costs such as training and vehicles which are driven by the increase in FTE employees.

7.2 Basis for expenditure

The remuneration for each current FTE employee has been calculated using their salary as at December 2012 and no adjustment has been made for expected inflation or performance based pay rises.. Some FTE employees have some set pay rises included in their contracts which are triggered after they have worked a certain amount of time with Orion. These pay rises are in addition to any inflation/performance based changes and have been included in the forecast expenditure. Any expenditure on additional FTE employees has been forecast using the FY12 remuneration for FTE employees in the same or similar roles. Numbers identified have been converted to FTEs.

Our expenditure forecast for the non-salary costs for FY13 has been based on a budget prepared on a bottom-up basis during FY12. This budget was prepared by the business unit manager in charge of the expenditure and was reviewed by their corporate manager and the CEO. Any significant changes from prior years were reviewed by senior accounting staff who challenged any items which appear incorrect or unnecessary.

The expenditure forecasts for FY14 – FY19 have been prepared using the FY13 budget as a base.

7.3 Key assumptions

We have prepared the expenditure forecasts using several key assumptions. In particular, we have assumed that the business environment remains stable for the forecast period and that Orion continues to operate in the same manner as it currently does. Some critical components of these assumptions are:

- No further significant earthquakes or aftershocks
- A continued investment in technology
- A continuation of higher post-quake levels of communication with our customers as we keep them updated on the state of the rebuild and future plans
- A similar regulatory environment with Orion returning to a more active involvement in wider industry issues than has been the case in recent years

We expect that there will be an increase in business activity in areas of the business associated with recovery and new developments (central city and new subdivisions). Apart from scale we do not expect there will be a significant change in the kinds of activities undertaken.

As the main assumptions mean that for the CPP period Orion will continue to operate in the same manner and in a similar environment to the one we are currently operating in, there is no impact on the expenditure forecasts resulting from these assumptions.

We have also made some assumptions regarding our FTE employees and their replacement:

- A majority of current FTE employees stay on for the medium-long term. If this does not happen we expect there will be little impact on the expenditure forecasts as we expect we will be able to fill the job with a suitable candidate on a similar salary. There may be a small reduction in future years as the new FTE employee will not be eligible for the contractual pay increase until later than the current FTE employee.
- Any FTE employees who leave are able to be replaced with a suitable candidate in a timely manner. Any change to this assumption would not have a significant impact on the expenditure forecasts. If a suitable candidate cannot be found then we are generally able to cover the vacant position using a combination of temporary staff and reallocation of duties to existing FTE employees.

- The job market stays reasonably similar with FY12, for example the remuneration expected for these roles does not significantly change. Any change in expected remuneration will have a significant impact on the expenditure forecasts. However, there is currently no reason to believe that there will be significant changes in the job market.

These calculations would change if the company:

- Grows in size/complexity (for example if the company lists on the stock exchange, enters into mergers/acquisitions, arranges significant debt financings or undertakes complex earthquake insurance claims and negotiations);
- Is required to undertake more regulatory imposts; and/or
- Is affected by any further catastrophic events such as the earthquakes.

7.4 Expenditure reduction initiatives

We do not have any specific expenditure reduction initiatives for the expenditure in this programme. However, efficiencies are achieved through the competitive nature of the contracting model that we use. As we routinely tender the works, the suppliers will include initiatives and work process efficiencies within their pricing. Other initiatives are included when reviewing the lifecycle of the different assets and the assessment of new products.

A major part of the budgeting process which was used to forecast the FY13 non-staff costs (as described in section 7.1) was the review of all costs by several different people within Orion. Any expenditure which seemed excessive or incorrect was questioned and needed to be justified.

No specific cost benchmarking or cost-benefit analyses have been undertaken by Orion.

7.5 Alternatives considered

The alternatives we have identified are using temporary staff and contractors. We currently use a combination of FTE employees, temporary staff and contractors to achieve optimal outcomes.

In order to function as effectively and efficiently as possible the majority of staff we employ need to be skilled and experienced. Following the earthquakes it has become significantly more difficult to attract staff with the relevant skills and experience, particularly on a temporary basis. This means that our ability to use temporary staff or contractors is limited. However, we expect the use of temporary staff to increase towards the end of the CPP period as expected retirements occur in roles which are not expected to be required for long following the CPP period.

Additionally, we consider that for the positions included in this programme FTE employees are the most appropriate alternative given the ongoing nature of the roles and their importance to Orion.

We do not consider the non-salary items included in the expenditure to have any realistic alternatives.