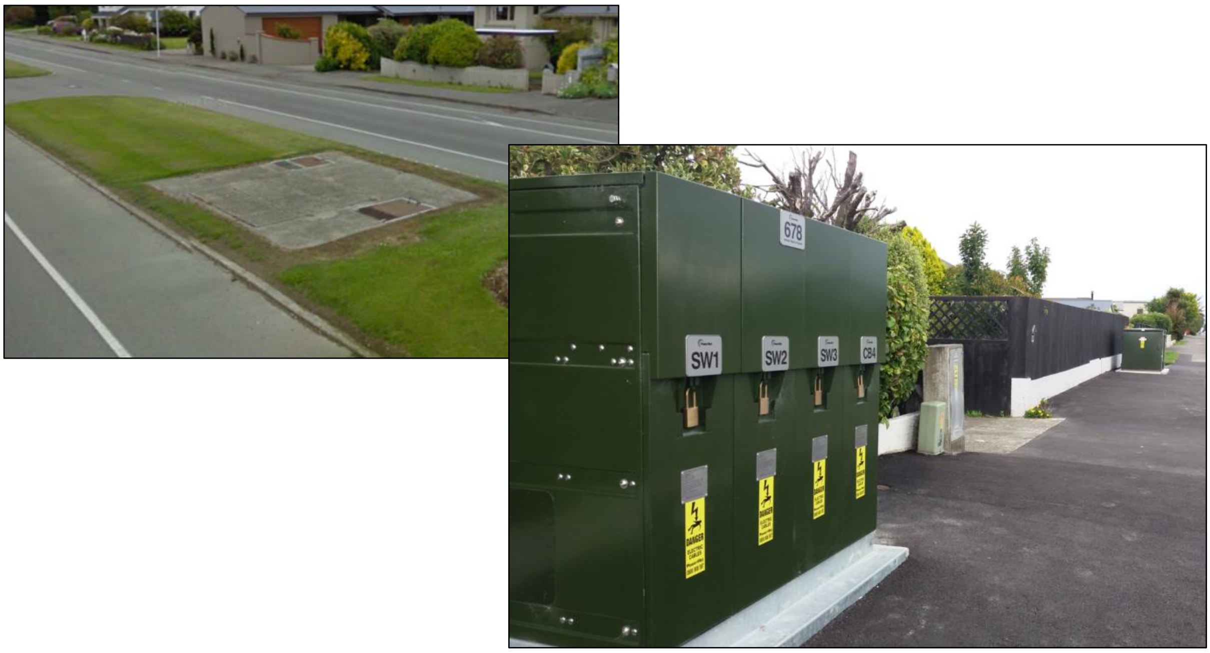
Electricity Invercargill Ltd



Underground Substation Replacement: 678 Herbert West of Carron

Asset Management Plan Update 2017 - 2027

Publicly disclosed in March 2017

Update Overview

EIL's Asset Management Plan update 2017-27 is presented as the sections shown below under contents, which have been updated from EIL's Asset Management Plan 2016-26. The headings shown in the contents retain the same numbering as the previous AMP for convenient referencing. Updates are highlighted by a green shaded background generally to indicate where project implementation timeframes have varied from those indicated in the previous AMP, where new projects have been added to the capital or maintenance programmes, or where projects have been completed and therefore do not form part of the updated work plan for future years.

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4.3 Development Programme

EIL's development programme is shown in Table 38 at the end of this section and is described in the remainder of this section, except for replacement and renewal capital expenditure programmes which are described in Lifecycle Planning.

New Connections

This budget provides allowance for new connections to the network including subdivisions where a large number of customers may require connection. Each specific solution will depend on location and customer requirements.

Planning for new connections uses averages based on historical trending, modified by any local knowledge if appropriate however customer requirements are generally unpredictable and quite variable. Larger customers especially, which have the greatest effect on the network, tend not to disclose their intentions until connection is required (perhaps trying to avoid alerting competitors to commercial opportunities), so cannot be easily planned for in advance.

Various options are considered generally to determine the least cost option for providing the new connection. Work required depends on the customer's location relative to existing network and the capacity of that network to supply the additional load. This can range from a simple LV connection at a fuse in a distribution pillar box at the customer's property boundary, to upgrade of LV cables or replacement of overhead lines with cables of greater rating, up to requirement for a new transformer site with associated 11kV extension if required. Even small customers can require a large investment to increase network capacity where existing capacity is already fully utilised.

The district plan requires all new network to be underground in Invercargill however Bluff may utilise overhead construction which tends to be a lower cost option.

Distributed generation as a network alternative tends to be intermittent so cannot be relied on without energy storage which could make an installation uneconomic. Some schemes may be becoming cost competitive with supply from the network however the upfront cost is generally not attractive to most customers and generally a connection to the network is still desired as backup, supplementation and sometimes the ability to sell surplus energy. Customers may be encouraged to better manage diversity of load within their facilities where details are known and there is perceived benefit to the customer or network.

Under $0.5M per annum on-going; CAPEX - Consumer Connections.

The budget for new subdivisions has been reduced to reflect the low probability of major subdivision developments within the EIL area. This budget line is used to separate major subdivisions out from standard single customer connections, so as to increase the accuracy of trending analysis; and it is expected that spend will be charged to this line only once every few years. No other material changes.

Radiator Additions and Zone Sub Tidy-up

Spey Street, a dual transformer AAA security fully indoor urban substation has been constructed over previous years and was commissioned in the 2015/16 year. The new substation is a replacement for the aged and earthquake risk prone Doon Street substation and increases capacity for Invercargill's central city substation to 72MVA and its firm rating to 36MVA. Refer to EIL's previous 2015 AMP for details of this project including alternative options considered and justification for substation as constructed.

This is a minor project to carryout tidy up after the completion of the Spey street substation construction. During installation of the cooling radiators on the Spey Street T2 transformer, corrosion was discovered in four of the ten radiators which were deemed unsuitable to be put into service. The transformer was commissioned with the serviceable radiators and is able to operate at a reduced rating which is sufficient for the current load on the unit. Replacement radiators are required to be supplied from the manufacturer but were not available in time for installation in the 2015/16 year.

This budget is required to establish the full rating of the T2 36MVA transformer at Spey Street by installing the replacement radiators when they become available. This budget also covers minor tidy-up work required at Spey Street such as completing as-built drawings for the substation. The budget for 2016/17 reflects EIL's expectation that cost for replacement of radiators will be met by the manufacturer.

Cost under $0.5M 2016/17; CAPEX – System Growth.

This project has now been completed.

Doon Street Reconfiguration

This project was previously managed and disclosed under the title "Extend Oil Filled 33kV Cable" and is described as follows.

Over the last year the 33kV oil cables previously supplying Doon Street substation were paralleled and extended with an XLPE cable to create a second feeder to the new Spey Street substation. Three options were being considered as at the disclosure date of the previous AMP; refer to EIL's 2015 AMP for details. The option to retain the overhead terminations in their present location was chosen as the least cost option due to the expense involved with creating transition joints from oil filled to XLPE cable. It also avoids the risk associated with moving and working on the aged paper-oil insulated cables. The XLPE extension cable was run up one pole structure and a short cable between the two structures used to parallel the two oil cables. The budget for 2016/17 covers costs for completion of as-built drawings for the work completed at Doon Street.

Additionally the planned demolition and reinstatement works for the remaining Doon Street site has been deferred until the 2019/20 year. Furan analysis of oil and DP testing of a paper sample from the 23MVA Doon Street T1 transformer indicate that the winding insulation is significantly aged. The unit was planned to be removed from site refurbished and stored until completion of upgrades at Southern substation where the unit would then be put back into service to complete the upgrade to

AAA security. However given the age indicators it is considered an unacceptable risk to spend the additional costs for the refurbishment, storage and transformer movements when the unit may still fail soon after installation. On the other hand the unit may provide several years of life allowing deferment of capital expenditure for a new 23MVA transformer. Deferring the demolition works at Doon Street allows the unit to remain in situ until Southern substation is upgraded and the Doon T1 transformer can be relocated to Southern substation for a reduced cost and more acceptable cost benefit risk level.

Cost under $0.5M 2016/17 and under $0.5M 2019/20; CAPEX – System Growth.

Drawings work has been completed under the Radiator Additions & Zone Sub project. The remaining Doon St works have been deferred to 2020/21 due to the delay of the Southern Substation project.

Southern Substation Upgrades

A major renewal and upgrade project has been planned for the Southern substation site as a combined solution for several development drivers. Several assets replacements are required at the substation as follows.

- The 11kV switchboard is due for fixed time replacement.
- The outdoor structures are showing signs of cracking and reinforcement rust.
- Air break switches and earth switches have reached expected life and show signs of deterioration.
- One of the two 33kV circuit breakers has reached end of expected life and the other has significant rusting (ex-Bluff).
- The control building is in need of significant maintenance.

Additionally seismic assessment determined the Southern substation building as at 17% of new building standard as well as the outdoor structures also being below sufficient strength for sufficient resilience in a significant earth quake.

The substation load was previously forecast to reach the threshold in EIL's security standard where upgrade to AAA security is required (no interruption for any single failure event). The latest revision of demand forecasts has pushed out this requirement approximately five years beyond the intended completion date. The scope will be reviewed prior to this project commencing however with the design now completed and spare assets available it is likely the AAA security provision will remain within the scope for this project.

Planned upgrades

A staged approach toward a fully indoor substation is planned providing for due replacements, seismic resilience and AAA security for the substations growing demand.

Initially a new 100% “new building standard” importance level 3 strength building is to be constructed on the existing site with an increased size to house both the previously planned new 11kV switchboard, auxiliary services and a new 33kV switchboard to replace the outdoor circuit breakers, CTs, air break switches, earth switches, VTs and associated structures. The backup 33kV supply available from the cable that tee’s off TPCL’s overhead subtransmission line on Rockdale Road becomes a normally in service supply to realise AAA security and will be metered to reconcile consumption between networks.

The two 23MVA transformers (one to be relocated ex-Doon Street) are open bushing units not suitable for locating indoors and as they have expected remaining lives of eight and ten years the enclosure of these units are delayed for approximately ten years until they are replaced with new cable entry transformers. The initial building design takes into account future extension requirements. The oil cable termination and associated pressure tanks would most likely remain outdoor but shielded from stone throwers (an ongoing issue at the site) until ultimately due for replacement well beyond the planning horizon.

Options Considered

Several options were identified and considered as alternative options;

“Do nothing” was ruled out as inappropriate due to safety, security and reliability concerns with an earthquake prone building and primary assets beyond end of life at site.

A new building would be similar cost to the strengthening and maintenance requirements for retaining the existing building and brings additional benefits associated with a new modern building and was therefore considered the better option.

Renewal and upgrade of the existing outdoor concept was compared with the preferred indoor option described above including several variations around these themes. While there would be a small immediate cost benefit in retaining the outdoor concept the benefits of the indoor substation were considered to outweigh the difference in cost which amounts to about 5% of replacement cost for the overall replacement cost of the substation ($3.5 - 4 million). The additional benefits are extended life of indoor 33kV switchgear and reduced maintenance costs, a more comprehensive protection scheme and importantly a more reliable substation with protection from environmental impacts. The indoor solution protects from weather impacts, windblown rubbish and birds or other animal-life which reduce reliability for outdoor structure mounted equipment.

For EIL network reliability is very good, however this means that single events have the potential to significantly affect SAIDI and SAIFI reliability measures. Therefore it is particularly important for EIL to look for any opportunities to design out failure modes which have the potential to affect a large proportion of customers. A complete outage at Southern substation (supplying about a third or EIL’s customers) would have a widespread impact on customers and there may be significant benefit for customers in terms of the “Value of Lost Load” which quickly adds up for an outage at a critical supply point such as a zone substation. Other benefits of the indoor option are improvements in public safety and visual perception.

Locating 33kV switchgear offsite was considered however the resulting configuration would require additional communications assisted protection eroding cost benefits and the overall relative reliability of the concept was not considered sufficient for EIL's network.

Building a fully indoor substation at another site was considered as an option to allow construction and an easy switchover before decommissioning of the existing site however the additional cost to reroute 33kV supply and 11kV feeder cables could not be justified while it is considered feasible to redevelop the existing site and utilising 11kV backup to load if necessary for brief periods. Another option was decommissioning the substation and extending feeders from a nearby substation were considered however again the impacts on reliability of grouping feeders is not considered appropriate for EIL and significant associated upgrade costs would mean little if any cost could be saved.

Implementation

Design was completed in 2015/16 however construction has been deferred from the timeframe set out in the previous AMPs to manage project cost within capital revenue constraints. Asset procurement and construction will be completed in the year 2019/20.

Risks associated with continued operation of the 11kV switchboard beyond end of expected life are being managed by regular condition monitoring of the switchgear. Security arrangements will continue to be managed in the interim by utilising load transfers if necessary for brief periods where the 12MVA AAA security development trigger is reached. Seismic resilience risk has been accepted as tolerable over the short term with all other remaining substations on the EIL network built or strengthened to sufficient resilience levels and should be able to support the Southern substation load if required.

Cost $0.5M – 2.5M 2019/20; CAPEX – System Growth.

EIL will not commission the Southern Substation upgrade/renewal in the 2015-20 Regulatory Control Period (RCP).

Instead, EIL has reprioritised capital expenditure into safety-driven work. EIL became aware in 2016 of the heightened level of safety risk resulting from the combination of arc-flash and underground substations/confined spaces. Immediate steps were taken. A ban on live switching eliminated the immediate safety risk, but at the cost of extensive power interruptions in the CBD whenever fault response or planned work needed to be carried out in the area. EIL has therefore devoted $6.8M to the urgent relocation of these substations to above ground. A similar set of circumstances led to the urgent relocation of underground link boxes at a further cost of $3.0M. These actions generated a large variance for the 2015-20 RCP, given that EIL's entire RCP network CAPEX budget according to the 2014 AMP was only $13.8M.

Both the unanticipated safety-driven work associated with underground substations and link boxes, and the improved project costings for Southern Substation redevelopment (based on Spey Street substation construction), would result in a significantly greater capital cost, which would trigger a negative IRIS "retention adjustment" on income.

The IRIS interprets any negative variance between actual spend and (a percentage of) the 2014 AMP forecast as an inefficiency in one of the 2014 AMP projects. It does not make allowances for any of the other possible causes of a variance, such as the subsequent identification of safety-driven work.

Lower-priority projects have been deferred beyond the 2015-20 RCP to the maximum practical extent, however commissioning the Southern Substation upgrade any earlier than 2020/21 would have the impact of EIL absorbing an IRIS reduction on approximately 40% of its income from assets commissioned between 2015 and 2020.

The prioritising of safety-driven work with replacing link boxes and removing underground substations to above ground, and the mitigation in place for Southern Substation (managing seismic risk) has resulted in EIL managing the situation and deferring the Southern Substation redevelopment to a commissioning date of 2020/21.

The substation is overdue for an upgrade, with the switchgear beyond its Maximum Practical Life (EEA Health Indicator Guide), seismic issues with the switch room (being rated at 17% New Building Standard), demand exceeding the trigger for AAA reliability standard, and detailed load flow analysis showing the potential for reliability issues if there is a fault.

EIL has devised a method to manage the workplace safety risk associated with Southern Substation with the seismic reinforcement work on the switch room in 2017/18. EIL will accept the remaining reliability risk for the duration of the delay.

This project has been shifted from the System Growth category to the Asset Replacement and Renewal category to reflect the primary driver of the majority of the project cost. The forecast cost has also been updated in accordance with the design work completed so far.

Cost $2.5M-5M spread over 2017-21; CAPEX – Asset Replacement & Renewal.

Asset Relocation Projects

This budget captures costs for general minor relocation works required such as shifting a pole or pillar box to a more convenient location. Costs budgeted represent a long term average with actual spend being reactive and typically above or below budget in any year.

Under $0.5M per annum on-going; CAPEX – Asset Relocations

No material change.

Supply Quality Upgrades

On the LV network operation beyond capacity manifests as low voltage experienced by customers during periods of peak loading. This may occasionally require a new transformer site with associated 11kV extension if required. However in most cases replacing LV cables with larger cables will be a more economic option to maintain acceptable voltage for all customers. The minimum standard cable size which provides the existing and spare capacity for expected growth will be used.

An alternative to network upgrade is demand side management however cost incentives to reduce demand are proving ineffective due to the retailers repackaging of line charges into their billing. As EIL's 11kV feeders have high load density supplied over a relatively short distance, low voltage is not seen as an issue on these feeders. Harmonics have not caused any known issues to date.

Costs budgeted represent a long term average with actual spend being reactive typically being above or below in any year. The years 2016/17 and 2017/18 have increased budget to manage an increase in upgrades foreseen as the rollout of smart meters on the EIL network progresses and identifies voltage constraints.

Under $0.5M per annum on-going; CAPEX – Quality of Supply.

The anticipated increase in work from smart meter low voltage information has not yet eventuated, due to delays in smart meter rollout combined with difficulties in accessing the data. The allowance for this work is therefore now spread over the three year period from 2017/18 to 2019/20.

Network Automation Projects

This budget is to allow implementation of further network automation initiatives on the underground Invercargill network to add additional remote controllable switching points and automation technologies. This will contribute to improvements in reliability and aim to offset the reduction in reliability expected as the cable network is allowed to age back to the optimal average asset life remaining of 50% following the extensive underground programme and other recent or near future capital intensive projects.

This project was initiated last year targeting the overhead Bluff network which sees a relatively high number of faults. The associated field switchgear was installed over the past year however difficulties established communications have meant that the complete solution will be implemented in 2016/17. Automation technology application will target Invercargill starting 2017/18 and continue over the ten year planning horizon.

Under $0.5M per annum on-going; CAPEX – Quality of Supply.

No material change.

Substation Safety

Arc flash hazards have been identified around MV switchgear at zone substations, presenting a risk of harm to personnel inside substation buildings, especially during operation of the switchgear.

A retrofit arc-flash installation is planned to be completed on the Leven Street 11kV switchboard in the 2016/17 year after resource shortages have delayed installation. This involves replacing the switchboard incomer circuit breaker electromechanical relays with modern digital relay incorporating arc flash protection. Optical fibres will be run inside the switchboard to cover all compartments where an arc-flash might occur allowing the incomer relays to cover the entire switchboard. Supporting solutions may include additional PPE requirements, operational controls and protection improvements including retrofit of arc flash detection.

Design was completed between the 2014/15 and 2015/16 years. Installation in 2016/17 will coincide with the installation of the replacement Leven Street RTU which should allow some benefits in terms of installation efficiency.

Cost under $0.5M 2015/16; CAPEX – Other Reliability, Safety and Environmental.

This project has now been completed.

NER Installation at Substations

Neutral Earthing Resistors (NERs) are being installed at each zone substation to limit earth fault currents on the 11kV network. While NERs alone will not ensure network safety they will generally significantly reduce the earth potential rise which may appear on and around network equipment when an earth fault occurs. EIL considers NERs to be effectively a requirement of the EEA guide as when cost is considered to be distributed over all affected earth sites downstream of the zone substation this per site cost is quite low. The extent of work required at individual distribution sites to improve earth effectiveness is therefore reduced making the NER an overall cost effective solution.

Most of the EIL network in Invercargill is now underground which makes other impedance earthing options (installation of a ground fault neutraliser or Peterson coil) uneconomic as the cable network has very high capacitance which these inductive coil devices have to oppose. This means a very large coil would be required and would be many times more expensive than an NER installation. The large cable network does however mean that the entire Invercargill network, which includes the neighbouring TPCL Invercargill areas, creates a very large MEN (multiple earthed neutral) system which essentially interconnects all earths in Invercargill and provides another means to assist in controlling dangerous earth potential rise on the network.

The Bluff network is mostly overhead however Peterson Coils are still many times more expensive than an NER installation. The cost per distribution earth site of the NER is again more cost effective than the otherwise additional upgrades per site that would be required without the NER. Some benefit is gained by the Bluff MEN, however this is much smaller and may include smaller “islands” without the MV cables tying LV MEN systems together as happens in Invercargill.

The more resistance the NER has the greater the safety benefit and the smaller and therefore the lower the cost will be. However at a certain point the discrimination between network fuses and upstream feeder circuit breakers will be lost. Lost discrimination will have a large negative impact on network reliability with some outages being much more widespread so this effectively dictates the minimum NER size that can be installed. Two sizes have been standardised on, with the Spey Street and Leven Street substations requiring larger NERs since they supply larger transformers in the CBD and require higher rated fuses for protection.

The NER's will also provide an additional benefit in limiting damage to faulted equipment and in some situations allow lower rated equipment to be installed, for example light duty cable screens. Apart from reduced earth potential rise, improved general safety around downstream sites is a further benefit as the reduced earth fault levels are far less likely to result in arc-flash or explosion events for the majority of faults.

Two NERs were installed at Spey Street in 2014/15 as part of the new substation construction; one in service and the other as an onsite spare to minimise changeover time in the event of an NER failure. 200A NERs were also installed at each of Racecourse Road and Southern substations in the 2015/16 year while the NER affecting EIL's Bluff network was installed at the Bluff substation in 2015/16 as part of TPCL's roll out of NER installations.

The 2000A NER temporarily installed at Doon Street substation will be relocated to Leven Street substation in 2016/17. All major procurement costs were met in 2015/16. Civil works at Leven Street were initiated in 2015/16 however resource constraints have meant this installation will now be completed in 2016/17.

Under $0.5M 2016/17; CAPEX – Other Reliability, Safety and Environment.

This project has now been completed.

Earth Upgrades

Ineffective earthing may create, or fail to control, hazardous voltage that may occur on and around network equipment affecting safety for the public and for staff. Also other functional requirements may not be met preventing protection systems from operating correctly which may affect safety and reliability of the network. Routine earth site inspection and testing identifies any sites that require upgrades.

The analysis to determine what upgrade options are appropriate can be quite complex but essentially it looks to find the best trade-off between cost and risk reduction. Generally in EIL the earthing upgrades required will be minimal with safety being achieved by simple connection to the large urban MEN (multiple earthed neutral) system. However for sites where risk of potential exposure to EPR is high additional measures for example insulating barriers will be required to ensure public safety.

Routine testing is completed five yearly with the entire network tested in one year. Testing is next due in 2017/18.

Cost under $0.5M 2017/18, 2022/23 and five yearly thereafter; CAPEX – Other Reliability, Safety and Environmental.

Undergrounding Programme

While the great majority of the City network has been converted to underground cable, the westernmost conductor toward the airport and Otatara is currently overhead construction. This line runs along a stopbank which is scheduled for a major upgrade. The nature of the terrain is such that the stopbank upgrade cannot be completed without encroaching within an unsafe distance of the overhead conductors. Therefore the line must be de-energised for the duration of the upgrade project.

The line feeds emergency drainage pumps that are essential to the local flood protection scheme, and therefore cannot be de-energised for significant periods. The most economic option for providing an alternative supply to the pumps involves replacing a section of the overhead line with cable. The budget required is relatively small, as all earthworks associated with the installation will be carried out under the stopbank upgrade project with no expense to EIL.

Cost under $0.5M 2018/19; CAPEX – Asset Relocations.

Pillar Box Lid Upgrade

EIL has traditionally used concrete pillar boxes with aluminium lids on the front to enclose the fusing for individual customers' supplies. However in very rare cases the internal cables can come into physical contact with the lid, and the cable insulation can be gradually abraded, e.g. as a result of minute vibrations caused by nearby traffic. If the insulation were to abrade sufficiently between pillar box inspections, this situation could result in livening of the aluminium lid.

A supplier has been sourced for plastic lids that offer similar mechanical protection to the aluminium lids whilst being electrically nonconductive. These plastic lids will be installed as a part of the next inspection round, at a rate of 20% of the pillar box fleet per year.

Under $0.5M per annum 2017-22; CAPEX – Other Reliability, Safety and Environment.

Spey St Fibre Chamber/Cable

The fibre run outside Spey St substation follows a sufficiently tortuous path that two individual fibres were damaged when the fibre cable was installed. While there are sufficient surplus fibres in the cable to meet the current requirement, there remains the possibility that other fibres were pressed during installation and may fail prematurely in the future.

This budget provides for replacement of the damaged section of cable together with a new fibre chamber that will allow installation to occur over a less tortuous path.

Under $0.5M 2021/22; CAPEX – Other Reliability, Safety and Environment.

Neutral Earth Resistor Protection Upgrade

Open-circuited Neutral Earth Resistors (NERs) are a known problem in New Zealand that can lower fault current to the point that normal earth fault protection will not operate. EIL will upgrade its NER protection to detect and trip when a fault occurs on an open-circuited NER.

A new feature recently offered on the SEL 751 relay allows improved modelling of the heating and cooling of the NER. This feature allows thermal protection to be retained whilst lowering the risk of an NER tripping due to the current imbalance that can result when substations are paralleled for switching. EIL will take the opportunity to improve thermal protection whilst carrying out the upgrade for open-circuit protection.

EIL's Racecourse Road substation relies on the feeder breaker at the nearby Invercargill Grid Exit Point (GXP) for backup protection in the event of an 11 kV bus/winding fault. The installation of an NER reduces the effectiveness of this backup protection due to the lower level of fault current flowing at 33 kV. A redundant communications path between substation and GXP is required to ensure adequate backup protection.

This project addresses all three of the above issues on EIL's substations.

Cost under $0.5M 2017/18; CAPEX – Other Reliability, Safety and Environment.

Unspecified Projects

The unspecified projects budget is an estimate of costs for projects that are as yet unknown but from experience are considered likely to arise in the longer term (six to ten year time frame). Certainty for these estimates is obviously quite low.

$0.5M - $2.5M 2018 per annum onwards; System Growth.

The Southern and Spey St Substation upgrades are expected to meet EIL's growth needs for the remainder of the planning period. Future unspecified projects are more likely to focus on renewal projects, particularly ring main units and cables. The Unspecified Projects budget has therefore been recategorised to Asset Replacement & Renewal.

$0.5M - $2.5M per annum 2022/23 onwards; Asset Replacement & Renewal.

4.6 EIL's Forecast Capital Expenditure

The forecast capital expenditure for EIL is shown in Table 38. These figures are also provided in the information disclosure schedule 11a included in Appendix 1.

Table 38: EIL's Forecast Capital Expenditure

CAPEX: Consumer Connection ($000)	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Customer Connections (≤ 20kVA)	56	56	56	56	56	56	56	56	56	56
Customer Connections (21 to 99kVA)	50	50	50	50	50	50	50	50	50	50
Customer Connections (≥ 100kVA)	113	113	113	113	113	113	113	113	113	113
Distributed Generation Connection	2	2	2	2	2	2	2	2	2	2
New Subdivisions	3	3	3	3	3	3	3	3	3	3
	224	**224**	**224**	**224**	**224**	**224**	**224**	**224**	**224**	**224**

CAPEX: System Growth ($000)	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Doon Street Reconfiguration				358						
				358						

CAPEX: Asset Replacement and Renewal ($000)	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Underground Substation Replacements	2,432	2,432								
Link Box Replacement	907	907	147	147	147	147	147	147	147	147
RTU Replacement	130			154						
Southern Substation Upgrades	867		1,715	1,715						
Power Transformer Refurbishment	200			149	149					
Racecourse Road Switchboard Replacement			119	1,434						
Seismic Remedial Oil-Filled Cable Tanks	41									
Seismic Remedial Distribution				257	314	314	251			
Zone Substation Minor Replacement	4	4	4	4	4	4	4	4	4	4
Transformer Replacement - City	370	370	370	370	428	428	428	428	428	428
Transformer Replacement - Bluff	89	89	89	89	89	89	89	89	89	89
RMU Replacements	200	200	535	535	1,069	535	535	535	535	535
Reactive 11kV Cable Replacement	19	19	19	19	19	19	19	19	19	19
Planned 11kV Cable Replacement					267	267	267	267	267	267
Fibre Installation	30	30	30	30	30	30	30	30	30	30
General Technical Replacement	81	51	51	51	51	51	51	51	51	51
General Dist Replacement - City	19	19	19	19	19	19	19	19	19	19
General Dist Replacement - Bluff	180	180	180	180	180	180	180	180	180	180
LV Board Replacement	27	27	27	27	27	27	27	27	27	27
Pillar Box Replacement	65	65	65	65	65	65	65	65	65	65
Reactive LV Cable Replacement	63	63	63	63	63	63	63	63	63	63
Unspecified Asset Replacement & Renewal Projects						896	896	896	896	896
	5,727	**4,457**	**3,433**	**5,307**	**2,922**	**3,134**	**3,071**	**2,820**	**2,820**	**2,820**

CAPEX: Asset Relocations ($000)	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Asset Relocation Projects	6	6	6	6	6	6	6	6	6	6
Undergrounding Programme		20								
	6	**26**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**

CAPEX: Quality of Supply ($000)	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Supply Quality Upgrades - City	32	32	32	12	12	12	12	12	12	12
Supply Quality Upgrades - Bluff	6	6	1	1	1	1	1	1	1	1
Network Automation Projects	28	28	28	28	28	28	28	28	28	28
	67	**67**	**62**	**42**	**42**	**42**	**42**	**42**	**42**	**42**

CAPEX: Legislative and Regulatory ($000)	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

CAPEX: Other Reliability, Safety and Environment ($000)	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Earth Upgrades - City	13					13				
Earth Upgrades - Bluff	1					1				
Neutral Earth Resistor Protection Upgrade	93									
Pillar Box Lid Upgrade	87	87	87	87	87					
Spey St Fibre Chamber/Cable					16					
	194	**87**	**87**	**87**	**103**	**14**	**0**	**0**	**0**	**0**

Total Network CAPEX ($000)	6,218	4,861	3,812	6,024	3,297	3,420	3,343	3,092	3,092	3,092

5.2 Routine Corrective Maintenance & Inspection

Maintenance and Inspection Programmes

Budget descriptions for routine corrective maintenance and inspection activities are set out in Table 40 and forecasts are provided in Table 44 at the end of this section. These budgets tend to be ongoing at similar levels year after year but may be adjusted from time to time to allow for improvements in maintenance practice.

No material change to these budgets except where otherwise indicated.

Table 40: Routine and Corrective Maintenance and Inspection Budget Descriptions

Budget	Description	Expenditure Range/Type
Routine Distribution Inspections, Checks & Maintenance	Five yearly network inspections (20% inspected annually), other routine tests and minor maintenance works on distribution assets.	Cost Under $0.5M on-going; OPEX
Budget has been increased by $35k p.a. to reflect the change from a once-in-five-year, whole-of-network detailed pillar box inspection to an inspection of 20% of pillar boxes per year consistent with inspections of other assets.		
Minor Work Distribution Inspections, Checks & Maintenance	Generally reactive work undertaken to correct issues found during the routine distribution inspection. Also a general budget for all minor distribution work.	Cost Under $0.5M on-going; OPEX
This budget has been renamed “Planned Maintenance” to reflect that the budget covers planned work carried out on functional assets, in response to issues found during inspection.		
Routine Technical Inspections, Checks & Maintenance	Routine inspection and testing of assets at zone substations. Includes such things as oil DGA, breakdown, moisture and acidity, operation counts, protection testing etc. Also covers responses to maintenance triggers, such as oil processing or recalibration of relays.	Cost Under $0.5M on-going; OPEX
Minor Work Technical Inspections, Checks & Maintenance	Generally reactive work undertaken to correct issues found during the routine technical inspection. Also a general budget for all minor technical work.	Cost Under $0.5M on-going; OPEX
This budget has been renamed “Planned Maintenance” to reflect that the budget covers planned work carried out on functional assets, in response to issues found during inspection.		
Partial Discharge Survey	Routine partial discharge condition monitoring surveying of subtransmission cables, terminations and equipment to identify abnormal discharge levels before failure occurs.	Cost Under $0.5M on-going; OPEX
Budget has been reduced to $30k p.a. in accordance with recent actual costs.		

Budget	Description	Expenditure Range/Type
Infra-Red Survey	Routine Infra-Red condition monitoring survey of bus-work, connections, contacts etc. for abnormal heating as indication of poor electrical contact between current carrying components which may lead to voltage quality issues and/or failure of equipment.	Cost Under $0.5M on-going; OPEX
Budget has been increased to $10k p.a. to allow for planned additional infra-red work in Bluff.		
General Substation Maintenance	Routine maintenance at distribution substation assets such as cleaning, paint touch-ups and enclosure repairs.	Cost Under $0.5M on-going; OPEX
General RMU Maintenance	Routine maintenance for Ring Main Units such as cleaning, paint touch-ups and enclosure repairs.	Cost Under $0.5M on-going; OPEX
General Zone Substation Maintenance	Routine maintenance at zone substations such as grounds, fence and building maintenance, rust repair and paint touch-ups.	Cost Under $0.5M on-going; OPEX
Supply Quality Checks	Investigations into supply quality which are generally customer initiated.	Cost Under $0.5M on-going; OPEX
Spare Checks and Minor Maintenance	A budget for checks to confirm what equipment is kept in spares and perform minor maintenance required to ensure spares are ready for service.	Cost Under $0.5M on-going; OPEX
Customer Connections	Operational portion of expenditure for the customer connections process is captured in this budget.	Cost Under $0.5M on-going; OPEX
Earth Testing	Routine testing of earthing assets and connections to ensure safety and functional requirements are met completed five yearly, next due 2017/18.	Cost Under $0.5M 2017/18 and five yearly thereafter; OPEX

Reactive Maintenance

The former Incident Response budget (Service Interruptions and Emergencies category) has been separated into two components; the "Reactive Maintenance" budget is the component that covers permanent repairs carried out on faulted assets that have temporarily been made safe/functional.

This separation implements the final paragraph in the Information Disclosure Determination's definition of Service Interruptions & Emergencies: "Planned follow-up activities resulting from an event which were unable to be permanently repaired in the short term are to be included under routine and corrective maintenance and inspection".

Cost Under $0.5M on-going; OPEX

5.3 Asset Replacement and Renewal

The overall objective for replacement and renewal programmes is to get the most out of the network assets by replacing assets as close as possible to their economic end of life. This is balanced by the need to manage workforce resources in the short term and delivery of desired service levels over the long term.

Inspection and testing programmes identify assets that are reaching the end of their economic life while critical assets may be replaced on a fixed time basis. For example 11kV switchboards at zone substations are replaced at the end of their expected 45 year life. Less critical assets or assets provided with redundancy as part of security arrangements may be run to failure and replaced reactively. Assets such as cables may be run to failure several times and repaired before the fault frequency increases to a point that complete replacement is more economic. This approach requires monitoring of failure rates.

Apart from whole of lifecycle cost analysis there are several additional drivers for replacement (though they can often be reduced to a cost analysis) including operational or public safety, risk management, declining service levels, accessibility for maintenance, obsolescence and new technology providing options for additional features or alternative solutions. Replacement of assets may also be heavily influenced by the development drivers discussed in section Development Criteria.

Table 41 sets out the approach to making decisions around when to undertake replacements or renewals applicable to each network asset category.

Table 41: Replacement and Renewal Decisions by Asset Category

Asset Category	Sub Category	Replacement and Renewal Decision Approach
Subtransmission	O/H	Reactive replacements after failure due to external force. Poles replaced when structural integrity indicated as low by pole scan or visual inspection. Generally poles cross arms, pins, insulators, binders and bracing etc. replaced when inspection indicates deterioration that could cause failure prior to next inspection and maintenance is uneconomic. Conductor replaced when reliability declines to an unacceptable level or repairs become uneconomic.
	U/G	XLPE cables replaced when reliability declines to an unacceptable level or repairs become uneconomic. Oil cables may be damaged beyond economic repair depending on nature of failure.
	Distributed Sub Transmission Voltage Switchgear (ABSs)	When inspection indicates deterioration sufficient to lose confidence in continued reliable operation and maintenance is considered uneconomic.
Zone Substations	Sub Transmission Voltage Switchgear	Replaced at end of standard life (fixed time), may be delayed in conjunction with condition monitoring to achieve strategic objectives. Significant damage from premature failure could require replacement.

Asset Category	Sub Category	Replacement and Renewal Decision Approach
	Power Transformers	Major refurbishment for transformers is undertaken when units reach half of their expected life. Replaced after failure causing significant damage that is not economic to repair; most units will be allowed to run to failure to utilise entire lifespan unless failure risk is unacceptable. May be replaced if tank and fittings are deteriorating, spare parts are unavailable and not economic to maintain for aged units. May be scrapped if not economic to relocate (transport and installation costs) after aged transformers displaced e.g. for a larger unit. Paper, Furan or DGA analysis used to indicate insulation remaining life.
	Distribution Voltage Switchgear	Replaced at end of standard life (fixed time), may be delayed in conjunction with condition monitoring to achieve strategic objectives. Significant damage from premature failure could require replacement.
	Other (Buildings, RTU, Relays, Batteries, Meters)	Instrumentation/Protection at end of manufacturers stated life (fixed time) or when obsolete/unsupported or otherwise along with other replacements as economic e.g. protection replaced with switchboard or transformer. Batteries replaced prior to the manufacturers stated life expectancy (typically 10 years) or on failure of testing. Buildings and fences when not economic to maintain after significant accumulating deterioration or seismic resilience concerns. Bus work and conductors Not economical to maintain. Greater than Standard Life and maintenance required.
Distribution Network	O/H	Reactive replacements after failure due to external force. Poles replaced when structural integrity indicated as low by pole scan or visual inspection. Generally poles cross arms, pins, insulators, binders and bracing etc. replaced when inspection indicates deterioration that could cause failure prior to next inspection and maintenance is uneconomic. Conductor replaced when reliability declines to an unacceptable level or repairs become uneconomic.
	U/G	XLPE or paper lead cables replaced when reliability declines to an unacceptable level or repairs become uneconomic.
	Distributed Distribution Voltage Switchgear	Replaced at end of standard life (fixed time), may be delayed in conjunction with condition monitoring to achieve strategic objectives. Significant damage from premature failure could require replacement.
Distribution Substations	Distribution Transformers	Often replaced if rusting is advanced or other deterioration/damage is significant and maintenance becomes uneconomic. Otherwise units generally run to failure but transformers

Asset Category	Sub Category	Replacement and Renewal Decision Approach
		supplying critical loads may be replaced early based age or as part of other replacements at site. Units removed from service <100kVA and older than 20yrs are scrapped otherwise tested and if satisfactory recycled as stock.
	Distribution Voltage Switchgear (RMUs)	Replaced at end of standard life (fixed time), may be delayed in conjunction with condition monitoring to achieve strategic objectives. Significant damage from premature failure could require replacement.
	Other	Instrumentation/Protection at end of manufacturers stated life (fixed time) or when obsolete/unsupported or otherwise along with other replacements as economic e.g. protection replaced with switchboard or transformer. Batteries replaced prior to the manufacturers stated life expectancy (typically 10 years) or on failure of testing. Enclosures not economic to maintain after significant accumulating deterioration or seismic resilience concerns.
LV Network	O/H	Reactive replacements after failure due to external force. Poles replaced when structural integrity indicated as low by pole scan or visual inspection. Generally poles cross arms, pins, insulators, binders and bracing etc. replaced when inspection indicates deterioration that could cause failure prior to next inspection and maintenance is uneconomic. Conductor replaced when reliability declines to an unacceptable level or repairs become uneconomic.
	U/G	Generally run to failure. Replaced when condition declines to an unreliable level e.g. embrittlement of insulation.
	Link and Pillar Boxes	Replaced if damaged or deterioration is advanced and could lead to failure before next inspection (or if public safety concerns exist).
Other	SCADA & Communications	RTUs or radios at end of manufacturers stated life (fixed time) or when obsolete/unsupported or otherwise along with other replacements as economic.
	Earths	Replaced when inspections find non-standard arrangements, deteriorated components or test results are not acceptable.
	Ripple Plant	Becoming obsolete as smart meters are installed across the network. Run to failure but security provided by backup plant.

Non-Routine Replacement and Renewal Projects

Replacement and renewal projects that are not ongoing are described in Table 42 and often represent one-off replacement or renewal of significant assets that have reached end of life or a significant milestone in its life. Other projects may target a number of assets of similar age that will be replaced or renewed as part of short or medium term programme.

Table 42: Non-routine Replacement and Renewal Projects

Project and Description	Cost and Timing
Underground Substation Replacements: EIL owns several underground distribution substations in and around the Invercargill CBD. These substations contain 11kV switchgear, distribution transformers, LV distribution boards and several other minor components. Equipment has now reached end of life at some sites and requires replacement as risk of failure increases to ensure acceptable service levels are maintained. Each underground substation is a fully enclosed space with limited access. They have been deemed "confined spaces" due to the risk of toxic or oxygen deficient atmosphere and the difficulties of rescuing an unconscious person due to an accident or health condition. Extensive measures have been put in place to manage these risks however some residual risk remains and accessing these sites has become rather cumbersome and ultimately expensive. EIL sees that the best option is to relocate these sites above ground and while finding suitable locations within the Invercargill CBD will be difficult it is the only way to eliminate the confined space risks. Negotiating sites within carparks is desirable as this will also help avoid future traffic management in the busy CBD, pavement disruption and pavement reinstatement works (often stylized with paving stones) when working around these sites in future. This programme was initiated in 2014/15 with the first substation replacement completed over the last year. The Kelvin Hotel substation was replaced with an above ground substation in the Southland Times building carpark. A smaller substation was already located at this new site and the replacement substation has a larger capacity to replace and supply the load of both sites. The replacement programme will continue with four underground sites relocated and replaced per year until the remaining twelve underground distribution substations are removed. Four of the fourteen underground substations have been replaced, with another four currently under action.	CAPEX Cost $0.5-2.5M 2016/17, 2017/18 and 2019/20
Link-box Replacements: These LV link boxes have been identified as a safety issue due to their below ground arrangement, the nature of having to work above exposed conductors and the potential for items to fall into the link-box creating arc-flash incidents. While the conductors are protected from ground water by a bell arrangement the outer enclosure of the link boxes are often found filled with water making them difficult to access. These link boxes are also aged with significant rusting and the pitch insulation melting indicating insufficient rating at higher load. With regard to the above issues, especially the safety concerns, these below ground link boxes are being replaced with urgency. Consideration is given to rationalising the number of link-boxes on the LV network to provide sufficient switching flexibility as each is identified for replacement. However for the most part the existing link-boxes are providing a necessary function and are simply replaced with an above ground equivalent. The link-boxes are generally shifted a few metres from the pavement to a convenient location to the councils requirements. For example the link-boxes replaced along Esk Street were incorporated into recreational features to minimise clutter and visual impact. This replacement programme began last year with 12 link boxes replaced to date. Approximately 53 underground link boxes remain in the Invercargill CBD with 13 scheduled to be replaced in 2016/17, a further 20 in 2017/18 and the remaining 20 in 2018/19. A portion of the budgeted cost is required to extend cables to a new offset location and associated ground works and reinstatement. 37 underground link boxes now remain to be completed under this project.	CAPEX Under $0.5M 2016/17, $0.5-2.5M 2017/18 & 2018/19

Project and Description	Cost and Timing
RTU Replacements: RTUs provide the SCADA interface between PowerNet's System Control room and the devices located at remote substations. They allow remote indication and control for connected devices such as the ability to open and close circuit breakers, view their status and receive alarms (for example a circuit breaker trip). RTUs are a critical part of maintaining service levels on the network as their remote indication and ability to remotely operate the network greatly reduces the time to respond to faults on the network. The RTU at the Leven Street zone substation is at the end of its expected life and a fixed time replacement for this equipment is scheduled for the 2016/17 year to avoid increasing probability of a failure which could have a large impact on network reliability due to the loss of indication and ability to control substation equipment. The RTU is Harris D20M which EIL is unable to get support for creating a significant risk if the equipment should fail. A modern RTU based on SEL devices will be utilised in line with EIL's standardisation. As part of this replacement fibre will be installed between Leven Street substation and Spey Street substation (which has fibre communication links back to System Control at Racecourse Road). This is part of a migration away from the copper multicore cable communication medium which is aging and has inherently limited bandwidth. The additional bandwidth afforded by a fibre connection will allow much greater functionality with benefits such as remote access to relay settings and event files, enhanced and more secure protection systems and options for remote video surveillance. Installation of the fibre was started near the end of the past 2015/16 year.	CAPEX Under $0.5M 2016/17,
EIL also have eight mini GPT RTUs located at eight automated distribution substations in the Invercargill CBD. These units are beyond expected end of life and are becoming less reliable. Failure of these RTUs would result in loss of control of network equipment affecting EIL's service levels so full remote control needs to be maintained. Replacement of RTU's with modern units will provide greater reliability and added functionality. All but three of these RTUs will be replaced as part of the underground substation replacements; these three remaining units will be replaced under this budget scheduled for the 2017/18 year. Again communications will be based on fibre media as replacement for the existing copper multicore cable increasing bandwidth and functionality. The fibre installation will be relatively economic making use of existing buried ducts for most of their installation length.	Under $0.5M 2017/18,
The Kingfisher RTU at Racecourse Road substation will be at end of life in 2019/20 and its fixed time replacement is scheduled for this year as per the considerations discussed above for the Leven Street substation RTU.	Under $0.5M 2020/21
The new Leven St RTU was commissioned in November 2016. No material changes.	
Power Transformer Refurbishment: EIL has recently introduced a strategy to refurbish power transformers beyond half of their expected life. This refurbishment is aimed at ensuring the expected life of transformers and potentially extending life to defer replacements to achieve cost efficiencies in maintaining service for EIL's customers. Four of EIL's 23MVA zone substation transformers are beyond their midlife and are therefore due to be refurbished however the ex-Doon Street transformer which is to be relocated to Southern substation will not be refurbished. Furan and paper sample analysis show that this unit's insulation is approaching end of life and therefore the cost of refurbishment is considered uneconomic given the risk of minimal remaining life. The other three transformers due for refurbishment were intended to be deferred until after April 2020 to best manage capital investment in respect of the regulator imposed revenue limits. However the unit at Racecourse Road has advanced rusting and requires more immediate attention to avoid irreparable damage or failure. This unit is now scheduled for refurbishment in 2017/18.	CAPEX Cost Under $0.5M 2017/18, 2020/21 and 2021/22

Project and Description	Cost and Timing
The older of the Leven Street units is scheduled for refurbishment in 2020/21 and the Southern substation transformer is scheduled for refurbishment in 2021/22. These refurbishments will catch up EIL's zone substation transformer fleet with this new strategy. The budget for 2017/18 has been increased to allow for replacement of the Racecourse Road transformer pitch-filled cable box, and expenses associated with maintaining power supply through a single-transformer site.	
Racecourse Road Switchboard Replacement: The 11kV switchboard at Racecourse Road substation consisting of 12 circuit breaker cubicles will reach the end of its expected life in the year 2020/21. Its fixed time replacement is scheduled for this year with design costs allowed for in the previous year 2019/20. The fixed time replacement approach is preferred to manage risk of failure as the probability of failure begins to increase beyond its expected life. Failure of the switchboard could have a major impact on network reliability and security, potentially over an extended period depending on the nature of the damage. Replacement will be based on a modern equivalent selected through a tender process to obtain the best price for equipment able to meet the functional requirements for the new switchboard. The number of circuit breakers will be reviewed prior to tendering to ensure to optimum number which supports the desired network service levels for minimum cost. No material change.	CAPEX Cost Under $0.5M 2019/20 and $0.5-2.5M 2020/21
Seismic Remedial Distribution: This project will implement seismic remedial solutions at EIL's distribution substations following seismic assessments. Various options will be available depending on the site characteristics and include strengthening of buildings, enclosures or structures or replacement with self-contained freestanding equipment if more economic. Many sites are unique however there are several common "themes" to enclosures used for ground mounted distribution substations and therefore common solutions can be applied to groups of sites. This programme has been deferred until the next price path period (from April 2020) to best manage capital investment in respect of the regulator imposed revenue limits as well as available resource being utilised on higher risk management programmes. The probability of an earth quake in the interim remains low and as the damage from a credible earthquake in this period is not expected to be catastrophic across the network the risk is considered acceptable. Remedial work will be spread across three years to manage workload; beginning in 2020/21 and being completed in the 2022/23 year. Additional budget has been allowed in 2023/24 for two specific sites that have been highlighted as requiring replacement rather than strengthening. Measurements for each common "theme" of site are currently being gathered to support detailed design and hence more precise costings in following AMPs.	CAPEX Cost Under $0.5M 2020/21, 2021/22 and 2022/23

Seismic Remedial Oil-Filled Cable Tanks

The majority of EIL's seismic remedial work has been deferred to the 2020-25 price path period, in order to reduce the impact of responding to underground substation/link box safety risks under the regulator imposed revenue limitations.

However remediation for the oil-filled cable tanks at Doon St is relatively straightforward, and failure has an environmental as well as a reliability consequence. The strengthening of these tanks will therefore be carried out in the 2017/18 financial year.

Under $0.5M 2017/18; CAPEX – Asset Replacement and Renewal.

Fibre Installation

The copper communications network used for protection and SCADA in the Invercargill CBD is approaching end-of-life. Much of the existing network is not ducted; therefore excavation would be required for replacement, which is expensive and disruptive in the CBD environment. Solutions involving radio communications or lease of existing fibre have been investigated and found not to be practical.

However several utilities maintain underground services in the CBD that need to be excavated on occasion for maintenance or renewal. Where such excavations coincide with a communications path needing replacement, there is an opportunity for EIL to co-operate and lay fibre/duct at reduced cost.

$30k p.a. has been set aside to allow EIL to take advantage of such opportunities as they arise, effectively taking a piecewise approach to replacing the copper network while it is still within its operating life. This figure may be revised in future AMPs as the level of incidence of such opportunities becomes clearer.

Under $0.5M per annum on-going; CAPEX – Asset Replacement and Renewal.

Ongoing Replacement and Renewal Programmes

The remaining replacement and renewal budgets are for ongoing work that tends to require about the same expenditure year after year. These budgets are listed and described in Table 43 and expenditure forecasts are provided in Table 38 (CAPEX) and Table 44 (OPEX).

No material change to these budgets except where otherwise indicated.

Table 43: Replacement and Renewal Programmes

Budget	Description	Expenditure
Zone Substation Minor Replacement	On-going replacement of minor components at zone substations such as LTAC panels and battery banks.	Annual CAPEX Cost Under $0.5M
Transformer Replacement	On-going replacements of distribution transformers which are generally identified during distribution inspections and targeted inspections based on age. Some removed units are refurbished.	Annual CAPEX Cost Under $0.5M
RMU Replacements	On-going replacement of Ring Main Units as they reach end of life and risk of failure increases at distribution substations to maintain reliability of supply and safety in the vicinity of the substation.	Annual CAPEX Cost Under $0.5M
Budget increased in 2019/20 and 2021/22 to meet asset replacement targets on above-ground RMU replacements that had been deferred to make room for underground substation/link box replacements in terms of resource constraints and regulator-imposed revenue limitations.		
Reactive 11kV Cable Replacement	On-going reactive replacement of 11kV cables as identified by condition after fault occurrence.	Annual CAPEX Cost Under $0.5M
Planned 11kV Cable Replacement	An ongoing programme to proactively identify and replace 11kV cables as they reach their economic end of life rather than continue to patch repair old cables beyond this point.	Annual CAPEX Cost Under $0.5M (Initiating 2021/22)
General Technical Replacement	On-going replacement of assets other than transformers, RMUs an LV boards as they reach end of life and risk of failure increases at distribution substations to maintain reliability of supply and safety in the vicinity of the substation.	Annual CAPEX Cost Under $0.5M
An extra allowance in 2017/18 is provided for replacement of substation data switches that have compatibility issues with modern SCADA systems.		
General Distribution Replacement	On-going replacements of distribution assets other than cables. These are identified through routine inspection.	Annual CAPEX Cost Under $0.5M
LV Board Replacement	Replacement of hazardous old LV distribution boards with modern touch safe boards – on-going for 10 years.	Annual CAPEX Cost Under $0.5M
Link Box Replacement	On-going replacement of above ground link boxes, beyond the priority replacement of the underground link-boxes described above, which have deteriorated with age or have been damaged and are unfit for service/unsafe.	Annual CAPEX Cost Under $0.5M (from 2019/20)
Budget has been increased to focus on the removal of the remaining 21 open-bus Lucy link boxes on the network; besides the safety risk from exposed live parts, those units connected to the larger sites must be de-energised prior to switching due to arc-flash risk.		
Pillar Box Replacement	On-going replacement of pillar boxes which have deteriorated with age or have been damaged and are unfit for service or unsafe.	Annual CAPEX Cost Under $0.5M
Budget has been increased in anticipation of increased rate of replacement under a new inspection regime that will commence in 2017/18. This budget may require tuning in future AMPs based on the results of these inspections.		

Budget	Description	Expenditure
Reactive LV Cable Replacement	On-going replacement of LV cables as identified by condition after fault occurrence.	Annual CAPEX Cost Under $0.5M
General Distribution Refurbishment	Refurbishment works for plant other than that located at distribution substations which won't impact on the valuation of the distribution asset. Covers items like crossarms, insulators, strains, re-sagging lines, stay guards, straightening poles, pole caps, ABS handle replacements etc.	Annual OPEX Cost Under $0.5M
Transformer Refurbishment	Refurbishment of distribution transformers such as rust repairs, paint touch-up, oil renewal, replacement of minor parts such as bushings, seals etc.	Annual OPEX Cost Under $0.5M
Zone Substation Refurbishment	A budget to allow refurbishment works that won't impact on the valuation of the substation assets. Covers items like earth sticks, safety equipment, buildings, battery systems etc.	Annual OPEX Cost Under $0.5M
General Technical Refurbishment	Refurbishment works at distribution substations that won't impact on the valuation of the asset. Identified through routine inspection.	Annual OPEX Cost Under $0.5M

5.4 EIL's Forecast Operational Expenditure

The forecast operational expenditure for EIL is shown in Table 44. These figures are also provided in the information disclosure schedule 11b included in Appendix 1. Two further categories not described earlier complete EIL's forecasted operational expenditure budget as follows.

Vegetation Management

Annual tree trimming in the vicinity of overhead network is required to prevent contact with lines maintaining network reliability. The first trim of trees has to be undertaken at EIL's expense as required under the Electricity (Hazards from Trees) Regulations 2003. While some customers have received their first free trim, some are disputing the process and additional costs are occurring to resolve the situation. As EIL's network is mostly underground, tree issues are minimal and therefore costs are relatively low. This OPEX cost is budgeted at $1,400 per annum.

Service Interruptions and Emergencies

This budget provides for the provision of staff, plant and resources to be ready for faults and emergencies. Fault staff respond to make the area safe, isolate the faulty equipment or network section and undertake repairs to restore supply to all customers. This OPEX cost is budgeted at $0.70 million per annum.

The former Incident Response budget has been separated into two components; the "Incident Response" budget that remains is the component that covers actions immediately taken to make the site safe and restore power to customers. Any follow-up actions necessary to make permanent repairs are now covered by the new "Reactive Maintenance" budget described in Section 5.2.

This separation implements the final paragraph in the Information Disclosure Determination's definition of Service Interruptions & Emergencies: "Planned follow-up activities resulting from an event which were unable to be permanently repaired in the short term are to be included under routine and corrective maintenance and inspection".

The distinction between "Incident Response" and "Incident Additional Time" budgets has been removed as it reflects an internal charging structure that is no longer in force. The overall combined budget for Incident Response and Reactive Maintenance has been lowered by $100k in line with recent costs.

Cost Under $0.5M on-going; OPEX

Outage Management System

Non-network operational expenditure is forecast to increase over the AMP period due to the development of an Outage Management System (OMS) by PowerNet. It is planned that OMS will be deployed in a multi-year implementation in 3 major stages. Stage 1 will implement the core OMS, Stage 2 will involve integrating the OMS to other systems including SCADA, the Asset Management System (Maximo), the customer notification system (TVD avalanche), and the customer information system. Stage 3 will involve taking the OMS into the field with mobility.

It is expected that the OMS will provide a number of benefits including

- increased outage data accuracy
- reduced fault location identification time
- greater access to information (both in the field and in the control room)
- operating efficiencies
- improved operational safety
- increased customer engagement
- improved auditing functionality

The capital expenditure of the OMS will be reflected in the charges to EIL (by PowerNet) in the System Operations and Network Support non-network operational expenditure category.

Cost Under $0.5M per annum 2018/19 onward; Non-Network OPEX.

Table 44: EIL's Forecast Operational Expenditure

OPEX: Asset Replacement and Renewal ($000)	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
General Dist Refurbishment - City	14	14	14	14	14	14	14	14	14	14
General Dist Refurbishment - Bluff	9	9	9	9	9	9	9	9	9	9
Transformer Refurbishment	10	10	10	10	10	10	10	10	10	10
Zone Substation Refurbishment	17	17	17	17	17	17	17	17	17	17
General Technical Refurbishment - City	44	44	44	44	44	44	44	44	44	44
General Technical Refurbishment - Bluff	11	11	11	11	11	11	11	11	11	11
	105	**105**	**105**	**105**	**105**	**105**	**105**	**105**	**105**	**105**

OPEX: Vegetation Management ($000)	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Vegetation Management - City	1	1	1	1	1	1	1	1	1	1
Vegetation Management - Bluff	1	1	1	1	1	1	1	1	1	1
	1	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**

OPEX: Routine and Corrective Maintenance and Inspection ($000)	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Routine Dist Insp Check & Mtce - City	79	79	79	79	79	79	79	79	79	79
Routine Dist Insp Check & Mtce - Bluff	7	7	7	7	7	7	7	7	7	7
Routine Tech Insp Check & Mtce - City	150	150	150	150	150	150	150	150	150	150
Routine Tech Insp Check & Mtce - Bluff	1	1	1	1	1	1	1	1	1	1
Dist Planned Maintenance - City	56	56	56	56	56	56	56	56	56	56
Dist Planned Maintenance - Bluff	22	22	22	22	22	22	22	22	22	22
Tech Planned Maintenance - City	169	169	169	169	169	169	169	169	169	169
Tech Planned Maintenance - Bluff	2	2	2	2	2	2	2	2	2	2
Dist Reactive Maintenance - City	28	28	28	28	28	28	28	28	28	28
Dist Reactive Maintenance - Bluff	21	21	21	21	21	21	21	21	21	21
Tech Reactive Maintenance - City	118	118	118	118	118	118	118	118	118	118
Tech Reactive Maintenance - Bluff	10	10	10	10	10	10	10	10	10	10
Earth Testing - City	16					16				
Earth Testing - Bluff	13					13				
Partial Discharge Survey	30	30	30	30	30	30	30	30	30	30
Infra Red Surveys	10	10	10	10	10	10	10	10	10	10
General Substation Maintenance	36	36	36	36	36	36	36	36	36	36
General RMU Maintenance	203	203	203	203	203	203	203	203	203	203
General Zone Substation Maintenance	33	33	33	33	33	33	33	33	33	33
Supply Quality Checks - City	2	2	2	2	2	2	2	2	2	2
Supply Quality Checks - Bluff	1	1	1	1	1	1	1	1	1	1
Spares Checks and Minor Maintenance	1	1	1	1	1	1	1	1	1	1
Customer Connections	24	24	24	24	24	24	24	24	24	24
	1,034	**1,005**	**1,005**	**1,005**	**1,005**	**1,034**	**1,005**	**1,005**	**1,005**	**1,005**

OPEX: Service Interruptions and Emergencies ($000)	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Incident Response Dist - City	256	256	256	256	256	256	256	256	256	256
Incident Response Dist - Bluff	86	86	86	86	86	86	86	86	86	86
Incident Response Tech - City	79	79	79	79	79	79	79	79	79	79
Incident Response Tech - Bluff	10	10	10	10	10	10	10	10	10	10
	431	**431**	**431**	**431**	**431**	**431**	**431**	**431**	**431**	**431**

Network Operational Expenditure Total ($000)	1,571	1,542	1,542	1,542	1,542	1,571	1,542	1,542	1,542	1,542
System Operations and Network Support	894	1,047	1,104	1,110	1,110	1,110	1,110	1,110	1,110	1,082
Business Support	2,337	2,339	2,333	2,333	2,333	2,333	2,333	2,333	2,333	2,333
AMP Total Operational Expenditure ($000)	**4,802**	**4,928**	**4,979**	**4,986**	**4,986**	**5,015**	**4,986**	**4,986**	**4,986**	**4,957**

Appendix 1 – Disclosure Schedules

Schedule 11a. – Capital Expenditure Forecast

Company Name	Electricity Invercargill Limited
AMP Planning Period	1 April 2017 – 31 March 2027

SCHEDULE 11a: REPORT ON FORECAST CAPITAL EXPENDITURE

This schedule requires a breakdown of forecast expenditure on assets for the current disclosure year and a 10 year planning period. The forecasts should be consistent with the supporting information set out in the AMP. The forecast is to be expressed in both constant price and nominal dollar terms. Also required is a forecast of the value of commissioned assets (i.e., the value of RAB additions)
EDBs must provide explanatory comment on the difference between constant price and nominal dollar forecasts of expenditure on assets in Schedule 14a (Mandatory Explanatory Notes).
This information is not part of audited disclosure information.

sch ref			Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
8		for year ended	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26	31 Mar 27
9		**11a(i): Expenditure on Assets Forecast**	**$000 (in nominal dollars)**										
10		Consumer connection	225	224	229	234	238	243	248	253	258	263	269
11		System growth	189	-	-	-	381	-	-	-	-	-	-
12		Asset replacement and renewal	3,226	5,727	4,546	3,575	5,638	3,169	3,467	3,466	3,246	3,311	3,377
13		Asset relocations	7	6	26	6	6	6	6	6	7	7	7
14		Reliability, safety and environment:											
15		Quality of supply	28	67	68	64	44	45	46	47	48	49	50
16		Legislative and regulatory	-	-	-	-	-	-	-	-	-	-	-
17		Other reliability, safety and environment	176	194	89	91	93	112	15	-	-	-	-
18		**Total reliability, safety and environment**	204	261	157	155	137	157	62	47	48	49	50
19		**Expenditure on network assets**	3,851	6,218	4,958	3,970	6,399	3,576	3,783	3,772	3,558	3,629	3,702
20		Expenditure on non-network assets	-	-	-	-	-	-	-	-	-	-	-
21		**Expenditure on assets**	3,851	6,218	4,958	3,970	6,399	3,576	3,783	3,772	3,558	3,629	3,702
22													
23	*plus*	Cost of financing	-	-	-	-	-	-	-	-	-	-	-
24	*less*	Value of capital contributions	114	67	89	70	71	73	74	76	77	79	81
25	*plus*	Value of vested assets	-	-	-	-	-	-	-	-	-	-	-
26													
27		**Capital expenditure forecast**	3,737	6,150	4,869	3,899	6,328	3,503	3,709	3,696	3,481	3,550	3,621
28													
29		Assets commissioned	3,770	5,283	4,869	1,989	9,747	3,503	3,709	3,696	3,481	3,550	3,621
30			Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
31		for year ended	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26	31 Mar 27
32			**$000 (in constant prices)**										
33		Consumer connection	225	224	224	224	224	224	248	253	258	263	269
34		System growth	189	-	-	-	358	-	-	-	-	-	-
35		Asset replacement and renewal	3,226	5,727	4,457	3,433	5,307	2,922	3,467	3,466	3,246	3,311	3,377
36		Asset relocations	7	6	26	6	6	6	6	6	7	7	7
37		Reliability, safety and environment:											
38		Quality of supply	28	67	67	62	42	42	46	47	48	49	50
39		Legislative and regulatory	-	-	-	-	-	-	-	-	-	-	-
40		Other reliability, safety and environment	176	194	87	87	87	103	15	-	-	-	-
41		**Total reliability, safety and environment**	204	261	154	149	129	145	62	47	48	49	50
42		**Expenditure on network assets**	3,851	6,218	4,861	3,812	6,024	3,297	3,783	3,772	3,558	3,629	3,702
43		Expenditure on non-network assets	-	-	-	-	-	-	-	-	-	-	-
44		**Expenditure on assets**	3,851	6,218	4,861	3,812	6,024	3,297	3,783	3,772	3,558	3,629	3,702
45													
46		**Subcomponents of expenditure on assets (where known)**											
47		Energy efficiency and demand side management, reduction of energy losses	-	-	-	-	-	-	-	-	-	-	-
48		Overhead to underground conversion	-	-	20	-	-	-	-	-	-	-	-
49		Research and development	-	-	-	-	-	-	-	-	-	-	-
50													

Row			Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
52		for year ended	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26	31 Mar 27
53	**Difference between nominal and constant price forecasts**		$000										
54	Consumer connection		-	-	4	9	14	19	-	-	-	-	-
55	System growth		-	-	-	-	22	-	-	-	-	-	-
56	Asset replacement and renewal		-	-	89	142	330	247	-	-	-	-	-
57	Asset relocations		-	-	1	0	0	0	-	-	-	-	-
58	Reliability, safety and environment:												
59	Quality of supply		-	-	1	3	3	4	-	-	-	-	-
60	Legislative and regulatory		-	-	-	-	-	-	-	-	-	-	-
61	Other reliability, safety and environment		-	-	2	4	5	9	-	-	-	-	-
62	**Total reliability, safety and environment**		-	-	3	6	8	12	-	-	-	-	-
63	**Expenditure on network assets**		-	-	97	158	375	279	-	-	-	-	-
64	Expenditure on non-network assets		-	-	-	-	-	-	-	-	-	-	-
65	**Expenditure on assets**		-	-	97	158	375	279	-	-	-	-	-
66													

Row				Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
67			for year ended	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22
68		**11a(ii): Consumer Connection**							
69		*Consumer types defined by EDB**		$000 (in constant prices)					
70		Customer Connections (≤ 20kVA)		51	56	56	56	56	56
71		Customer Connections (21 to 99kVA)		82	50	50	50	50	50
72		Customer Connections (≥ 100kVA)		82	113	113	113	113	113
73		Distributed Generation Connection		-	2	2	2	2	2
74		New Subdivisions		11	3	3	3	3	3
75		**include additional rows if needed*							
76		**Consumer connection expenditure**		225	224	224	224	224	224
77	*less*	Capital contributions funding consumer connection		114	67	67	67	67	67
78		**Consumer connection less capital contributions**		111	157	157	157	157	157
79		**11a(iii): System Growth**							
80		Subtransmission		-	-	-	-	-	-
81		Zone substations		189	-	-	-	358	-
82		Distribution and LV lines		-	-	-	-	-	-
83		Distribution and LV cables		-	-	-	-	-	-
84		Distribution substations and transformers		-	-	-	-	-	-
85		Distribution switchgear		-	-	-	-	-	-
86		Other network assets		-	-	-	-	-	-
87		**System growth expenditure**		189	-	-	-	358	-
88	*less*	Capital contributions funding system growth		-	-	-	-	-	-
89		**System growth less capital contributions**		189	-	-	-	358	-
90									

11a(iv): Asset Replacement and Renewal

for year ended	Current Year CY 31 Mar 17	CY+1 31 Mar 18	CY+2 31 Mar 19	CY+3 31 Mar 20	CY+4 31 Mar 21	CY+5 31 Mar 22
	$000 (in constant prices)					
Subtransmission	-	-	-	-	-	-
Zone substations	11	1,113	4	1,838	3,302	153
Distribution and LV lines	453	199	199	199	199	199
Distribution and LV cables	42	82	82	82	82	350
Distribution substations and transformers	2,072	3,330	3,170	1,071	1,482	1,978
Distribution switchgear	-	-	-	-	-	-
Other network assets	647	1,002	1,002	242	242	242
Asset replacement and renewal expenditure	3,226	5,727	4,457	3,433	5,307	2,922
less Capital contributions funding asset replacement and renewal	-	-	-	-	-	-
Asset replacement and renewal less capital contributions	3,226	5,727	4,457	3,433	5,307	2,922

11a(v):Asset Relocations

for year ended	Current Year CY 31 Mar 17	CY+1 31 Mar 18	CY+2 31 Mar 19	CY+3 31 Mar 20	CY+4 31 Mar 21	CY+5 31 Mar 22
*Project or programme**	$000 (in constant prices)					
Asset Relocation Projects	7	6	6	6	6	6
Undergrounding Programme	-	-	20	-	-	-
**include additional rows if needed*						
All other project or programmes - asset relocations	-	-	-	-	-	-
Asset relocations expenditure	7	6	26	6	6	6
less Capital contributions funding asset relocations	-	-	20	-	-	-
Asset relocations less capital contributions	7	6	6	6	6	6

11a(vi):Quality of Supply

for year ended	Current Year CY 31 Mar 17	CY+1 31 Mar 18	CY+2 31 Mar 19	CY+3 31 Mar 20	CY+4 31 Mar 21	CY+5 31 Mar 22
*Project or programme**	$000 (in constant prices)					
Supply Quality Upgrades - City	-	32	32	32	12	12
Supply Quality Upgrades - Bluff	-	6	6	1	1	1
Network Automation Projects	28	28	28	28	28	28
**include additional rows if needed*						
All other projects or programmes - quality of supply	-	-	-	-	-	-
Quality of supply expenditure	28	67	67	62	42	42
less Capital contributions funding quality of supply	-	-	-	-	-	-
Quality of supply less capital contributions	28	67	67	62	42	42

11a(vii): Legislative and Regulatory

for year ended	Current Year CY 31 Mar 17	CY+1 31 Mar 18	CY+2 31 Mar 19	CY+3 31 Mar 20	CY+4 31 Mar 21	CY+5 31 Mar 22
*Project or programme**	$000 (in constant prices)					
**include additional rows if needed*						
All other projects or programmes - legislative and regulatory	-	-	-	-	-	-
Legislative and regulatory expenditure	-	-	-	-	-	-
less Capital contributions funding legislative and regulatory	-	-	-	-	-	-
Legislative and regulatory less capital contributions	-	-	-	-	-	-

11a(viii): Other Reliability, Safety and Environment

for year ended	Current Year CY 31 Mar 17	CY+1 31 Mar 18	CY+2 31 Mar 19	CY+3 31 Mar 20	CY+4 31 Mar 21	CY+5 31 Mar 22
*Project or programme**	$000 (in constant prices)					
Earth Upgrades - City	-	13	-	-	-	-
Substation Safety	73	-	-	-	-	-
NER Installations	104	-	-	-	-	-
Neutral Earth Resistor Protection Upgrade	-	93	-	-	-	-
Pillar Box Lid Upgrade	-	87	87	87	87	87
**include additional rows if needed*						
All other projects or programmes - other reliability, safety and environment	-	1	-	-	-	16
Other reliability, safety and environment expenditure	176	194	87	87	87	103
less Capital contributions funding other reliability, safety and environment	-	-	-	-	-	-
Other reliability, safety and environment less capital contributions	176	194	87	87	87	103

11a(ix): Non-Network Assets

for year ended	Current Year CY 31 Mar 17	CY+1 31 Mar 18	CY+2 31 Mar 19	CY+3 31 Mar 20	CY+4 31 Mar 21	CY+5 31 Mar 22
Routine expenditure						
*Project or programme**	$000 (in constant prices)					
**include additional rows if needed*						
All other projects or programmes - routine expenditure	-	-	-	-	-	-
Routine expenditure	-	-	-	-	-	-
Atypical expenditure						
*Project or programme**						
**include additional rows if needed*						
All other projects or programmes - atypical expenditure	-	-	-	-	-	-
Atypical expenditure	-	-	-	-	-	-
Expenditure on non-network assets	-	-	-	-	-	-

Schedule 11b. – Operational Expenditure Forecast

Company Name: **Electricity Invercargill Limited**
AMP Planning Period: **1 April 2017 – 31 March 2027**

SCHEDULE 11b: REPORT ON FORECAST OPERATIONAL EXPENDITURE

This schedule requires a breakdown of forecast operational expenditure for the disclosure year and a 10 year planning period. The forecasts should be consistent with the supporting information set out in the AMP. The forecast is to be expressed in both constant price and nominal dollar terms.
EDBs must provide explanatory comment on the difference between constant price and nominal dollar operational expenditure forecasts in Schedule 14a (Mandatory Explanatory Notes).
This information is not part of audited disclosure information.

sch ref		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
8	for year ended	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26	31 Mar 27
9	**Operational Expenditure Forecast**	**$000 (in nominal dollars)**										
10	Service interruptions and emergencies	648	431	439	448	457	467	476	486	495	505	516
11	Vegetation management	3	1	1	2	2	2	2	2	2	2	2
12	Routine and corrective maintenance and inspection	545	1,034	1,025	1,047	1,067	1,090	1,144	1,134	1,157	1,180	1,203
13	Asset replacement and renewal	111	105	107	110	112	114	116	119	121	124	126
14	**Network Opex**	1,307	1,571	1,573	1,606	1,638	1,673	1,738	1,740	1,775	1,810	1,847
15	System operations and network support	859	894	1,068	1,150	1,180	1,204	1,228	1,253	1,278	1,304	1,295
16	Business support	2,337	2,337	2,386	2,430	2,478	2,530	2,581	2,633	2,685	2,739	2,794
17	**Non-network opex**	3,196	3,231	3,453	3,579	3,658	3,735	3,809	3,885	3,963	4,042	4,089
18	**Operational expenditure**	4,503	4,802	5,026	5,185	5,296	5,407	5,547	5,626	5,738	5,853	5,935

sch ref		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
20	for year ended	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26	31 Mar 27
21		**$000 (in constant prices)**										
22	Service interruptions and emergencies	648	431	431	431	431	431	431	431	431	431	431
23	Vegetation management	3	1	1	1	1	1	1	1	1	1	1
24	Routine and corrective maintenance and inspection	545	1,034	1,005	1,005	1,005	1,005	1,034	1,005	1,005	1,005	1,005
25	Asset replacement and renewal	111	105	105	105	105	105	105	105	105	105	105
26	**Network Opex**	1,307	1,571	1,542	1,542	1,542	1,542	1,571	1,542	1,542	1,542	1,542
27	System operations and network support	859	894	1,047	1,104	1,110	1,110	1,110	1,110	1,110	1,110	1,082
28	Business support	2,337	2,337	2,339	2,333	2,333	2,333	2,333	2,333	2,333	2,333	2,333
29	**Non-network opex**	3,196	3,231	3,386	3,437	3,443	3,443	3,443	3,443	3,443	3,443	3,415
30	**Operational expenditure**	4,503	4,802	4,928	4,979	4,986	4,986	5,015	4,986	4,986	4,986	4,957
31	**Subcomponents of operational expenditure (where known)**											
32–33	Energy efficiency and demand side management, reduction of energy losses	125	125	125	125	125	125	125	125	125	125	125
34	Direct billing*	-	-	-	-	-	-	-	-	-	-	-
35	Research and Development	-	-	-	-	-	-	-	-	-	-	-
36	Insurance	93	106	106	106	106	106	106	106	106	106	106

37 ** Direct billing expenditure by suppliers that direct bill the majority of their consumers*

sch ref		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
40	for year ended	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26	31 Mar 27
41	**Difference between nominal and real forecasts**	**$000**										
42	Service interruptions and emergencies	-	-	9	18	27	36	46	55	65	75	85
43	Vegetation management	-	-	0	0	0	0	0	0	0	0	0
44	Routine and corrective maintenance and inspection	-	-	20	42	63	85	110	129	152	175	198
45	Asset replacement and renewal	-	-	2	4	7	9	11	14	16	18	21
46	**Network Opex**	-	-	31	64	96	130	167	198	233	268	304
47	System operations and network support	-	-	21	46	69	94	118	143	168	193	214
48	Business support	-	-	47	97	145	197	248	299	352	406	461
49	**Non-network opex**	-	-	68	142	214	291	366	442	520	599	674
50	**Operational expenditure**	-	-	99	206	310	422	533	640	753	867	979

Schedule 12a. – Asset Condition

Company Name	**Electricity Invercargill Limited**
AMP Planning Period	**1 April 2017 – 31 March 2027**

SCHEDULE 12a: REPORT ON ASSET CONDITION

This schedule requires a breakdown of asset condition by asset class as at the start of the forecast year. The data accuracy assessment relates to the percentage values disclosed in the asset condition columns. Also required is a forecast of the percentage of units to be replaced in the next 5 years. All information should be consistent with the information provided in the AMP and the expenditure on assets forecast in Schedule 11a. All units relating to cable and line assets, that are expressed in km, refer to circuit lengths.

sch ref					Asset condition at start of planning period (percentage of units by grade)						
7											
8											
9	**Voltage**	**Asset category**	**Asset class**	**Units**	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**	**Grade unknown**	**Data accuracy (1–4)**	**% of asset forecast to be replaced in next 5 years**
10	All	Overhead Line	Concrete poles / steel structure	No.	-	5.00%	75.00%	20.00%	-	3	5.00%
11	All	Overhead Line	Wood poles	No.	10.00%	70.00%	20.00%	-	-	3	10.00%
12	All	Overhead Line	Other pole types	No.	-	-	100.00%	-	-	3	-
13	HV	Subtransmission Line	Subtransmission OH up to 66kV conductor	km	-	-	100.00%	-	-	3	-
14	HV	Subtransmission Line	Subtransmission OH 110kV+ conductor	km	N/A	N/A	N/A	N/A	N/A	N/A	N/A
15	HV	Subtransmission Cable	Subtransmission UG up to 66kV (XLPE)	km	-	-	70.00%	30.00%	-	4	-
16	HV	Subtransmission Cable	Subtransmission UG up to 66kV (Oil pressurised)	km	-	-	100.00%	-	-	4	-
17	HV	Subtransmission Cable	Subtransmission UG up to 66kV (Gas pressurised)	km	N/A	N/A	N/A	N/A	N/A	N/A	N/A
18	HV	Subtransmission Cable	Subtransmission UG up to 66kV (PILC)	km	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19	HV	Subtransmission Cable	Subtransmission UG 110kV+ (XLPE)	km	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20	HV	Subtransmission Cable	Subtransmission UG 110kV+ (Oil pressurised)	km	N/A	N/A	N/A	N/A	N/A	N/A	N/A
21	HV	Subtransmission Cable	Subtransmission UG 110kV+ (Gas Pressurised)	km	N/A	N/A	N/A	N/A	N/A	N/A	N/A
22	HV	Subtransmission Cable	Subtransmission UG 110kV+ (PILC)	km	N/A	N/A	N/A	N/A	N/A	N/A	N/A
23	HV	Subtransmission Cable	Subtransmission submarine cable	km	N/A	N/A	N/A	N/A	N/A	N/A	N/A
24	HV	Zone substation Buildings	Zone substations up to 66kV	No.	15.00%	15.00%	25.00%	45.00%	-	4	15.00%
25	HV	Zone substation Buildings	Zone substations 110kV+	No.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
26	HV	Zone substation switchgear	22/33kV CB (Indoor)	No.	-	-	100.00%	-	-	4	-
27	HV	Zone substation switchgear	22/33kV CB (Outdoor)	No.	100.00%	-	-	-	-	4	100.00%
28	HV	Zone substation switchgear	33kV Switch (Ground Mounted)	No.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
29	HV	Zone substation switchgear	33kV Switch (Pole Mounted)	No.	30.00%	40.00%	30.00%	-	-	3	20.00%
30	HV	Zone substation switchgear	33kV RMU	No.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
31	HV	Zone substation switchgear	50/66/110kV CB (Indoor)	No.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
32	HV	Zone substation switchgear	50/66/110kV CB (Outdoor)	No.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
33	HV	Zone substation switchgear	3.3/6.6/11/22kV CB (ground mounted)	No.	25.00%	15.00%	25.00%	35.00%	-	4	25.00%
34	HV	Zone substation switchgear	3.3/6.6/11/22kV CB (pole mounted)	No.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
35											

	Voltage	Asset category	Asset class	Units	Asset condition at start of planning period (percentage of units by grade)						
35											
36											
37					Grade 1	Grade 2	Grade 3	Grade 4	Grade unknown	Data accuracy (1–4)	% of asset forecast to be replaced in next 5 years
38											
39	HV	Zone Substation Transformer	Zone Substation Transformers	No.	-	17.00%	33.00%	50.00%	-	4	-
40	HV	Distribution Line	Distribution OH Open Wire Conductor	km	2.00%	23.00%	70.00%	5.00%	-	3	5.00%
41	HV	Distribution Line	Distribution OH Aerial Cable Conductor	km	N/A	N/A	N/A	N/A	N/A	N/A	N/A
42	HV	Distribution Line	SWER conductor	km	N/A	N/A	N/A	N/A	N/A	N/A	N/A
43	HV	Distribution Cable	Distribution UG XLPE or PVC	km	2.00%	2.00%	88.00%	8.00%	-	3	5.00%
44	HV	Distribution Cable	Distribution UG PILC	km	2.00%	5.00%	93.00%	-	-	3	5.00%
45	HV	Distribution Cable	Distribution Submarine Cable	km	N/A	N/A	N/A	N/A	N/A	N/A	N/A
46	HV	Distribution switchgear	3.3/6.6/11/22kV CB (pole mounted) - reclosers and sectionalisers	No.	-	-	100.00%	-	-	4	-
47	HV	Distribution switchgear	3.3/6.6/11/22kV CB (Indoor)	No.	5.00%	25.00%	60.00%	10.00%	-	4	25.00%
48	HV	Distribution switchgear	3.3/6.6/11/22kV Switches and fuses (pole mounted)	No.	5.00%	15.00%	70.00%	10.00%	-	2	10.00%
49	HV	Distribution switchgear	3.3/6.6/11/22kV Switch (ground mounted) - except RMU	No.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
50	HV	Distribution switchgear	3.3/6.6/11/22kV RMU	No.	10.00%	10.00%	70.00%	10.00%	-	4	10.00%
51	HV	Distribution Transformer	Pole Mounted Transformer	No.	3.00%	7.00%	75.00%	15.00%	-	3	10.00%
52	HV	Distribution Transformer	Ground Mounted Transformer	No.	5.00%	9.00%	71.00%	15.00%	-	4	5.00%
53	HV	Distribution Transformer	Voltage regulators	No.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
54	HV	Distribution Substations	Ground Mounted Substation Housing	No.	-	10.00%	90.00%	-	-	4	10.00%
55	LV	LV Line	LV OH Conductor	km	5.00%	10.00%	80.00%	5.00%	-	3	5.00%
56	LV	LV Cable	LV UG Cable	km	2.00%	3.00%	90.00%	5.00%	-	3	5.00%
57	LV	LV Streetlighting	LV OH/UG Streetlight circuit	km	1.00%	4.00%	85.00%	10.00%	-	3	5.00%
58	LV	Connections	OH/UG consumer service connections	No.	1.00%	4.00%	85.00%	10.00%	-	3	5.00%
59	All	Protection	Protection relays (electromechanical, solid state and numeric)	No.	25.00%	15.00%	25.00%	35.00%	-	4	25.00%
60	All	SCADA and communications	SCADA and communications equipment operating as a single system	Lot	-	20.00%	80.00%	-	-	4	20.00%
61	All	Capacitor Banks	Capacitors including controls	No.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
62	All	Load Control	Centralised plant	Lot	-	100.00%	-	-	-	3	-
63	All	Load Control	Relays	No.	-	5.00%	10.00%	5.00%	80.00%	3	-
64	All	Civils	Cable Tunnels	km	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Schedule 12b. – Capacity Forecast

Company Name: **Electricity Invercargill Limited**
AMP Planning Period: **1 April 2017 – 31 March 2027**

SCHEDULE 12b: REPORT ON FORECAST CAPACITY

This schedule requires a breakdown of current and forecast capacity and utilisation for each zone substation and current distribution transformer capacity. The data provided should be consistent with the information provided in the AMP. Information provided in this table should relate to the operation of the network in its normal steady state configuration.

sch ref

7	**12b(i): System Growth - Zone Substations**									
8	*Existing Zone Substations*	**Current Peak Load (MVA)**	**Installed Firm Capacity (MVA)**	**Security of Supply Classification (type)**	**Transfer Capacity (MVA)**	**Utilisation of Installed Firm Capacity %**	**Installed Firm Capacity +5 years (MVA)**	**Utilisation of Installed Firm Capacity + 5yrs**	**Installed Firm Capacity Constraint +5 years (cause)**	**Explanation**
9	Spey Street	24	36	N-1	40	67%	36	71%	No constraint within +5 years	
10	Leven Street	20	23	N-1	25	85%	23	90%	No constraint within +5 years	Short interruption for changeover (N.O. supply from alt GXP)
11	Racecourse Road	11	-	N	12	-	-	-	No constraint within +5 years	No firm capacity
12	Southern	17	-	N	12	-	23	80%	No constraint within +5 years	Upgrade to N-1 security in 5 yrs time; limited ability for long-term transfer of load in the meantime due to effect on feeder lengths/ reliability
13						-				
14						-				
15						-				
16						-				
17						-				
18						-				
19						-				
20						-				
21						-				
22						-				
23						-				
24						-				
25						-				
26						-				
27						-				
28						-				
29	[1] *Extend forecast capacity table as necessary to disclose all capacity by each zone substation*									

Schedule 12c. – Demand Forecast

		Company Name	Electricity Invercargill Limited				
		AMP Planning Period	1 April 2017 – 31 March 2027				

SCHEDULE 12C: REPORT ON FORECAST NETWORK DEMAND

This schedule requires a forecast of new connections (by consumer type), peak demand and energy volumes for the disclosure year and a 5 year planning period. The forecasts should be consistent with the supporting information set out in the AMP as well as the assumptions used in developing the expenditure forecasts in Schedule 11a and Schedule 11b and the capacity and utilisation forecasts in Schedule 12b.

sch ref							
7	**12c(i): Consumer Connections**						
8	*Number of ICPs connected in year by consumer type*			Number of connections			
9		*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
10	for year ended	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**
11	*Consumer types defined by EDB**						
12	Customer Connections <20 kVA	63	52	52	52	52	52
13	Customer Connections 21-99 kVA	19	16	16	16	16	16
14	Customer Connections > 100 kVA	3	2	2	2	2	2
15							
16							
17	**Connections total**	85	70	70	70	70	70
18	**include additional rows if needed*						
19	**Distributed generation**						
20	Number of connections	6	10	15	15	20	20
21	Capacity of distributed generation installed in year (MVA)	0	0	0	0	0	0
22	**12c(ii) System Demand**						
23		*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
24	**Maximum coincident system demand (MW)** — for year ended	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**
25	GXP demand	61	58	59	59	60	61
26	*plus* Distributed generation output at HV and above	-	-	-	-	-	-
27	**Maximum coincident system demand**	61	58	59	59	60	61
28	*less* Net transfers to (from) other EDBs at HV and above	(2)	(2)	(2)	(2)	(2)	(2)
29	**Demand on system for supply to consumers' connection points**	63	60	60	61	62	63
30	**Electricity volumes carried (GWh)**						
31	Electricity supplied from GXPs	256	257	257	258	259	259
32	*less* Electricity exports to GXPs	-	-	-	-	-	-
33	*plus* Electricity supplied from distributed generation	0	-	-	-	-	-
34	*less* Net electricity supplied to (from) other EDBs	(15)	(18)	(18)	(18)	(18)	(18)
35	**Electricity entering system for supply to ICPs**	271	275	275	276	277	278
36	*less* Total energy delivered to ICPs	257	260	261	262	262	263
37	**Losses**	14	14	14	14	14	14
38							
39	**Load factor**	49%	53%	52%	52%	51%	51%
40	**Loss ratio**	5.3%	5.2%	5.2%	5.2%	5.2%	5.2%

Schedule 12d. – Reliability Forecast

Note: These forecasts are presented using the SAIDI/SAIFI calculation method detailed in the Electricity Distribution Services Default Price-Quality Path Determination 2015. As such they correlate with the Compliance Statement and the majority of publications in the public domain, but do not correlate with Schedule 10 of year-end disclosures. A rough correlation with Schedule 10 may be obtained through multiplying the Class B figures in rows 11 and 14 by a factor of 2.

Company Name **Electricity Invercargill Limited**

AMP Planning Period **1 April 2017 – 31 March 2027**

Network / Sub-network Name

SCHEDULE 12d: REPORT FORECAST INTERRUPTIONS AND DURATION

This schedule requires a forecast of SAIFI and SAIDI for disclosure and a 5 year planning period. The forecasts should be consistent with the supporting information set out in the AMP as well as the assumed impact of planned and unplanned SAIFI and SAIDI on the expenditures forecast provided in Schedule 11a and Schedule 11b.

sch ref		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
8							
9	for year ended	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22
10	**SAIDI**						
11	Class B (planned interruptions on the network)	5.0	2.7	2.7	2.7	2.7	2.7
12	Class C (unplanned interruptions on the network)	8.5	18.7	18.6	18.4	18.4	18.4
13	**SAIFI**						
14	Class B (planned interruptions on the network)	0.03	0.01	0.01	0.01	0.01	0.01
15	Class C (unplanned interruptions on the network)	0.26	0.58	0.57	0.57	0.57	0.58

Schedule 13. – Asset Management Maturity Assessment Tool

Q No.	Function	Question	Score	Maturity Description
3	Asset management policy	To what extent has an asset management policy been documented, authorised and communicated?	2	The organisation has an asset management policy, which has been authorised by top management, but it has had limited circulation. It may be in use to influence development of strategy and planning but its effect is limited.
10	Asset management strategy	What has the organisation done to ensure that its asset management strategy is consistent with other appropriate organisational policies and strategies, and the needs of stakeholders?	2	Some of the linkages between the long-term asset management strategy and other organisational policies, strategies and stakeholder requirements are defined but the work is fairly well advanced but still incomplete.
11	Asset management strategy	In what way does the organisation's asset management strategy take account of the lifecycle of the assets, asset types and asset systems over which the organisation has stewardship?	2	The long-term asset management strategy takes account of the lifecycle of some, but not all, of its assets, asset types and asset systems.
26	Asset management plan(s)	How does the organisation establish and document its asset management plan(s) across the life cycle activities of its assets and asset systems?	2	The organisation is in the process of putting in place comprehensive, documented asset management plan(s) that cover all life cycle activities, clearly aligned to asset management objectives and the asset management strategy.
27	Asset management plan(s)	How has the organisation communicated its plan(s) to all relevant parties to a level of detail appropriate to the receiver's role in their delivery?	2	The plan(s) are communicated to most of those responsible for delivery but there are weaknesses in identifying relevant parties resulting in incomplete or inappropriate communication. The organisation recognises improvement is needed as is working towards resolution.
29	Asset management plan(s)	How are designated responsibilities for delivery of asset plan actions documented?	3	Asset management plan(s) consistently document responsibilities for the delivery actions and there is adequate detail to enable delivery of actions. Designated responsibility and authority for achievement of asset plan actions is appropriate.
31	Asset management plan(s)	What has the organisation done to ensure that appropriate arrangements are made available for the efficient and cost effective implementation of the plan(s)? (Note this is about resources and enabling support)	2	The organisation has arrangements in place for the implementation of asset management plan(s) but the arrangements are not yet adequately efficient and/or effective. The organisation is working to resolve existing weaknesses.
33	Contingency planning	What plan(s) and procedure(s) does the organisation have for identifying and responding to incidents and emergency situations and ensuring continuity of critical asset management activities?	3	Appropriate emergency plan(s) and procedure(s) are in place to respond to credible incidents and manage continuity of critical asset management activities consistent with policies and asset management objectives. Training and external agency alignment is in place.
37	Structure, authority and responsibilities	What has the organisation done to appoint member(s) of its management team to be responsible for ensuring that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s)?	3	The appointed person or persons have full responsibility for ensuring that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s). They have been given the necessary authority to achieve this.
40	Structure, authority and responsibilities	What evidence can the organisation's top management provide to demonstrate that sufficient resources are available for asset management?	2	A process exists for determining what resources are required for its asset management activities and in most cases these are available but in some instances resources remain insufficient.
42	Structure, authority and responsibilities	To what degree does the organisation's top management communicate the importance of meeting its asset management requirements?	3	Top management communicates the importance of meeting its asset management requirements to all relevant parts of the organisation.
45	Outsourcing of asset management activities	Where the organisation has outsourced some of its asset management activities, how has it ensured that appropriate controls are in place to ensure the compliant delivery of its organisational strategic plan, and its asset management policy and strategy?	2	Controls systematically considered but currently only provide for the compliant delivery of some, but not all, aspects of the organisational strategic plan and/or its asset management policy and strategy. Gaps exist.
48	Training, awareness and competence	How does the organisation develop plan(s) for the human resources required to undertake asset management activities - including the development and delivery of asset management strategy, process(es), objectives and plan(s)?	2	The organisation has developed a strategic approach to aligning competencies and human resources to the asset management system including the asset management plan but the work is incomplete or has not been consistently implemented.
49	Training, awareness and competence	How does the organisation identify competency requirements and then plan, provide and record the training necessary to achieve the competencies?	2	The organisation is the process of identifying competency requirements aligned to the asset management plan(s) and then plan, provide and record appropriate training. It is incomplete or inconsistently applied.
50	Training, awareness and competence	How does the organization ensure that persons under its direct control undertaking asset management related activities have an appropriate level of competence in terms of education, training or experience?	2	The organization is in the process of putting in place a means for assessing the competence of person(s) involved in asset management activities including contractors. There are gaps and inconsistencies.
53	Communication, participation and consultation	How does the organisation ensure that pertinent asset management information is effectively communicated to and from employees and other stakeholders, including contracted service providers?	3	Two way communication is in place between all relevant parties, ensuring that information is effectively communicated to match the requirements of asset management strategy, plan(s) and process(es). Pertinent asset information requirements are regularly reviewed.
59	Asset Management System documentation	What documentation has the organisation established to describe the main elements of its asset management system and interactions between them?	2	The organisation in the process of documenting its asset management system and has documentation in place that describes some, but not all, of the main elements of its asset management system and their interaction.
62	Information management	What has the organisation done to determine what its asset management information system(s) should contain in order to support its asset management system?	1	The organisation is aware of the need to determine in a structured manner what its asset information system should contain in order to support its asset management system and is in the process of deciding how to do this.
63	Information management	How does the organisation maintain its asset management information system(s) and ensure that the data held within it (them) is of the requisite quality and accuracy and is consistent?	2	The organisation has developed a controls that will ensure the data held is of the requisite quality and accuracy and is consistent and is in the process of implementing them.
64	Information management	How has the organisation ensured its asset management information system is relevant to its needs?	2	The organisation has developed and is implementing a process to ensure its asset management information system is relevant to its needs. Gaps between what the information system provides and the organisations needs have been identified and action is being taken to close them.
69	Risk management process(es)	How has the organisation documented process(es) and/or procedure(s) for the identification and assessment of asset and asset management related risks throughout the asset life cycle?	2	The organisation is in the process of documenting the identification and assessment of asset related risk across the asset lifecycle but it is incomplete or there are inconsistencies between approaches and a lack of integration.
79	Use and maintenance of asset risk information	How does the organisation ensure that the results of risk assessments provide input into the identification of adequate resources and training and competency needs?	2	The organisation is in the process ensuring that outputs of risk assessment are included in developing requirements for resources and training. The implementation is incomplete and there are gaps and inconsistencies.
82	Legal and other requirements	What procedure does the organisation have to identify and provide access to its legal, regulatory, statutory and other asset management requirements, and how is requirements incorporated into the asset management system?	2	The organisation has procedure(s) to identify its legal, regulatory, statutory and other asset management requirements, but the information is not kept up to date, inadequate or inconsistently managed.
88	Life Cycle Activities	How does the organisation establish implement and maintain process(es) for the implementation of its asset management plan(s) and control of activities across the creation, acquisition or enhancement of assets. This includes design, modification, procurement, construction and commissioning activities?	3	Effective process(es) and procedure(s) are in place to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning.
91	Life Cycle Activities	How does the organisation ensure that process(es) and/or procedure(s) for the implementation of asset management plan(s) and control of activities during maintenance (and inspection) of assets are sufficient to ensure activities are carried out under specified conditions, are consistent with asset management strategy and control cost, risk and performance?	2	The organisation is in the process of putting in place process(es) and procedure(s) to manage and control the implementation of asset management plan(s) during this life cycle phase. They include a process for confirming the process(es)/procedure(s) are effective and if necessary carrying out modifications.
95	Performance and condition monitoring	How does the organisation measure the performance and condition of its assets?	2	The organisation is developing coherent asset performance monitoring linked to asset management objectives. Reactive and proactive measures are in place. Use is being made of leading indicators and analysis. Gaps and inconsistencies remain.
99	Investigation of asset-related failures, incidents and nonconformities	How does the organisation ensure responsibility and the authority for the handling, investigation and mitigation of asset-related failures, incidents and emergency situations and non-conformances is clear, unambiguous, understood and communicated?	2	The organisation is in the process of defining the responsibilities and authorities with evidence. Alternatively there are some gaps or inconsistencies in the identified responsibilities/authorities.
105	Audit	What has the organisation done to establish procedure(s) for the audit of its asset management system (process(es))?	2	The organisation is establishing its audit procedure(s) but they do not yet cover all the appropriate asset-related activities.
109	Corrective & Preventative action	How does the organisation instigate appropriate corrective and/or preventive actions to eliminate or prevent the causes of identified poor performance and non-conformance?	2	The need is recognized for systematic instigation of preventive and corrective actions to address root causes of noncompliance or incidents identified by investigations, compliance evaluation or audit. It is only partially or inconsistently in place.
113	Continual Improvement	How does the organisation achieve continual improvement in the optimal combination of costs, asset related risks and the performance and condition of assets and asset systems across the whole life cycle?	1	A Continual Improvement ethos is recognised as beneficial, however it has just been started, and or covers partially the asset drivers.
115	Continual Improvement	How does the organisation seek and acquire knowledge about new asset management related technology and practices, and evaluate their potential benefit to the organisation?	3	The organisation actively engages internally and externally with other asset management practitioners, professional bodies and relevant conferences. Actively investigates and evaluates new practices and evolves its asset management activities using appropriate developments.

Appendix 2 – Directors Approval

We, Thomas Campbell and Ross Lindsay Smith, being directors of Electricity Invercargill Limited certify that, having made all reasonable enquiry, to the best of our knowledge-

a) The following attached information of Electricity Invercargill Limited prepared for the purposes of clause 2.6.3 and clause 2.6.6 of the Electricity Distribution Information Disclosure Determination 2012 in all material respects complies with that determination.

b) The prospective financial or non-financial information included in the attached information has been measured on a basis consistent with regulatory requirements or recognised industry standards.

c) The forecasts in Schedules 11a, 11b, 12a, 12b and 12c are based on objective and reasonable assumptions which both align with Electricity Invercargill Limited corporate vision and strategy and are documented in retained records.

T Campbell

R L Smith

Date: 30 March 2017