Asset Management Plan Update 2014 - 2024

Publicly disclosed on 31st March 2014

Update Overview

EIL's Asset Management Plan update 2014-24 is presented as the sections shown below under contents, which have been updated from EIL's Asset Management Plan 2013-23. 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.

Contents

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4.8 Development Programme[A11.9, 11.10]

4.8.1 Current Projects[A11.10.1]

Projects scheduled for the 2014/15 year are as follows. These projects have a high certainty. Timing of projects in the 2015/16 year and beyond has been estimated based on currently available resources but may be brought forward depending how quickly contractors are able to respond to the increasing demands of EIL's works programme.

4.8.1.1 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 on the customers 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 storage which would 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 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.

4.8.1.2 New Spey Street Substation

The existing Doon Street substation is located in very close proximity to the old Invercargill water tower which is a large tall brick structure. A large concrete walled water storage reservoir is also located next to the substation. As highlighted by the recent Christchurch earthquakes, structures of these types may not survive in a large earthquake with brickwork or other parts of the structure falling from the tower or flooding from the water reservoir which could cause significant damage to the substation. The substation fence itself and part of the substation building is of an old brick construction and would also be likely to be damaged in a large earthquake. Also access to the Doon Street substation may not be allowed for some time if the surrounding structures are damaged or even suspected of being damaged until they are confirmed safe by inspection, support, strengthening or possibly demolition.

A decision was made to replace both 11.5/23MVA Doon Street transformers after one unit failed in service and it was determined that given the age of the unit, the extent of

repair required and risk that further undetected damage may cause another failure, it was uneconomic to repair. The new transformers will be upsized to 18/36MVA units to provide capacity for growth in Invercargill which is timely as the substation load has now reached 23MVA meaning firm supply of the full substation load would not be achieved at peak times with 23MVA units. This is presently being managed by transferring load onto other zone substations. A second new unit is necessary as running different sized transformers in parallel (if replacing only the failed transformer) is generally not practical (it is possible if designed to match but this would not provide ideal operational characteristics for the present and future network) and would not achieve the required security of supply as loss of the larger new unit would leave only the smaller unit's capacity. The dual transformer replacement option works well as, due to load growth, EIL's Southern substation has reached the 12MVA security trigger requiring a firm supply and a second transformer. The replacement and upsizing of both the Doon Street units means the remaining transformer will become spare and available for use at Southern substation. 11kV load transfers are being utilised short term to manage load below the security trigger until this spare unit is available.

An overall increase in capacity of 49MVA will be achieved between the scrapping of the failed transformer and installation of the two new larger units. Demand side control may be viewed as an alternative to capacity upsizing, however at present it is very difficult to provide customers with incentive to manage their consumption patterns due to repackaging of lines company charges by retailer billing methodologies. This may be more practical with the introduction of smart meters over the next few years. EIL has contributed to the improvement of consumption efficiency through the "Warm Homes" scheme which provides subsidy initiatives to help insulate customer's homes and install more energy efficient space heating alternatives. These initiatives are now being extended to market solar power installations to customers as a means of reducing power bills or even selling power back to the grid. It is hard to gauge how much load growth has been offset by these initiatives and how the status quo forecasts might be affected; however overall growth seen at the zone substation level is still positive and increased capacity is now necessary on the EIL network. This increased capacity is expected to provide for growth beyond the 10 year planning period.

The 11kV switchboard at Doon Street was installed in stages, with the first seven circuit breakers installed in 1964 and the remaining circuit breakers installed over the next few years. Therefore, in 2013 these circuit breakers will have reached or be beyond the standard ODV life of 45 years. Due to the impact failure of switchgear would have on service levels (which are regulated such that the very high reliability of EIL's network must be maintained) and EIL's strategy to "Replace critical assets near to their technical end-of-life" these units are programmed for replacement. EIL conducts regular tendering processes to ensure that the most economic replacement equipment which meets network design requirements is installed as replacements.

An alternative option to replacing switchgear is to retrofit existing circuit breaker trucks with modern units. However this would not renew all components and those remaining would continue to age leaving an increased risk of failure following a significant proportion of the replacement cost. Switchboards may fail explosively and damage may be extensive requiring lengthy repairs which may not even be possible depending on damage sustained. Extensive reconfiguration of the 11kV network would be required to restore supply which would take time and if the entire switchboard was affected complete restoration may not be possible with some customers left without supply for a prolonged period. The switchboard continuous capacity rating would also remain the same with a retrofit option while growth on the network requires greater capacity in the near future. Given that Doon Street substation provides a critical supply to a large part of Invercargill city including parts of the CBD and the considerations already mentioned, retrofitting is not considered an appropriate option. The "do nothing" option is to allow the switchboard to operate to failure which means the risks mentioned above would actually occur at

some point as well as greatly increase the risk of injury to field staff and is therefore not appropriate. Other cost saving options such as simplification of the switchboard (reducing number of replaced circuit breakers) would result in decreased service levels with faults affecting a greater number of customers which would not be acceptable. The replacement switchboard however had two spare circuit breakers which will not be replaced and instead room for expansion will be allowed for with the new switchboard.

Protection is provided by old electromechanical type relays which are mounted in the switchgear panels and are of generally the same vintage as the switchgear. These relays are therefore at the end of their intended life and their accuracy and functionality is not up to the modern standard. Modern digital relays are generally far superior in terms of accuracy and flexibility and also provide a lot of additional functionality including safety features such as arc flash. EIL has standardised on manufacturer to realise the benefits of staff familiarisation and training and in retaining spares for equipment across the network, otherwise the most economic option within the manufacturers range is chosen that provides the necessary features.

The substation building which houses the switchgear, protection and other minor auxiliary equipment also requires a major renovation or replacement due to seismic requirements and issues with asbestos.

Given that most of the major substation components are due for immediate renewal and considering the risk of damage posed by the neighbouring structures as well as potential site access issues resulting from a large earthquake, it has been decided that a new substation is to be built in the area but located safely away from large earthquake prone structures as replacement for the existing substation. Progress has been made in obtaining a site for the new substation at 217 Spey Street. The Spey Street site was one of a number of sites being considered as alternatives to the Queens Park site proposed in last year's AMP and is now looking to be a more appropriate location in terms of access, timely progression of the project and proximity to the load centre. The new substation will be entirely indoor with an exterior design to minimise visual impact and fit with the surrounding area buildings.

The 11kV feeder cables out of the substation will be replaced in the immediate area surrounding the new Spey Street substation as rerouting these feeder cables requires a significant rearrangement. Some of these cables also need to be upgraded as their capacity is not sufficient to allow simple backup in contingency events with increasingly complex outage plans needing to be developed. Without upgrade these constraints will begin to have an unacceptable impact on restoration time and could cause further outages if cables are overloaded and fail. Cable will be replaced with a standard size allowing a supply capacity up to about 8MVA over which load should be transferred to other more lightly loaded feeders to manage impact on reliability. Replacements will also eliminate several cable joints which tend to be weak points in cables and should help maintain EIL's reliability as the network cable population ages.

Full replacement of existing equipment as opposed to refurbishment type renewals is further justified as relocation of equipment to a new site would be impractical without unacceptable outage periods or reduction in security. The only equipment retained will be an NER which was installed at Doon Street temporarily and will be relocated when required at Spey Street (see section 4.8.1.12).

Construction of the substation was scheduled to be completed within the 2013/14 year however land designation and consenting as well as resourcing constraints have impacted project implementation. Conditions of the consenting process have also impacted project costs due to changes in building design to fit within a residential area. The substation construction is now planned for completion in the 2014/15 year.

Cost $5M - $10M 2014/15; CAPEX – System Growth.

4.8.1.3 New Spey Street 33kV Cable

Reliability of the 33kV oil filled cables supplying Doon St and Southern substations has recently been investigated after learning of a possible systemic weakness in the joints of these cables. An increase in the thermal expansion of core conductors with use of aluminium conductor instead of copper are thought not to have been adequately accounted for in the earlier construction of the cable joints and this movement may cause damage to insulation over years of operation. Other distribution businesses have encountered issues with similar oil filled cables on their networks and have begun remedial actions. Options available to EIL range from doing nothing, to replacement of the cable joints or reinforcement (backup options), or even complete replacement of the cables with modern XLPE type cable.

There is also uncertainty around the understood ratings of the existing oil cables which are dependent on the cable trench backfill material; understood to be of poor thermal resistivity. The cables have therefore been de-rated as a temporary measure until this can be clarified. Assuming the lower applied cable ratings, capacity triggers for firm supply are now exceeded during periods of peak loading, although in a contingency scenario 11kV transfers could be utilised to manage loading to acceptable levels. The new substation at Spey Street will also require an increase in supply capacity of the 33kV cables from Transpower's Invercargill GXP with the existing 33kV cables sized for the 11.5/23MVA transformer rating.

The do nothing option is not appropriate as the security requirements for EIL's critical centrally located Spey Street substation would not be maintained with the continuing load growth on the network. Replacement of the oil cables would improve reliability however these cables are only at half of their expected life and abandoning these assets would not be economic.

It has been decided that due to the planned substation relocation and increased capacity for the new Spey Street substation that a new cable consisting of three single core 33kV XLPE, 800mm^2 aluminium cables will be installed between Invercargill GXP and the Spey Street substation site. This will allow enough capacity for a future 47MVA transformer which is the approximate level of load expected around the end of life of the cable; the new 18/36MVA transformers will be relocated when load reaches the full transformer rating. The oil cables will be retained and paralleled to provide a single 33kV feeder with double capacity and extended with the same 800mm^2 aluminium cable to Spey Street. This option allows remaining oil cable life to be utilised while ensuring a reliable backup is in place if condition begins to deteriorate. The new 33kV XLPE cable will be installed first which will then allow work to proceed to parallel and extend the oil cables to Spey Street as well as complete rating and condition analysis as detailed in section 5.5.1.17 to be carried out with less risk. The planned cable route is from Invercargill GXP down Yarrow Street, giving good separation from the oil cables which run down St Andrew Street to help prevent single localised events affecting both supply feeders.

Design and procurement costs for the new 33kV XLPE cable were completed within the year ending 31 March 2014 with the installation work to be completed in the 2014/15 year.

Cost under $0.5M - $2.5M 2014/15; CAPEX – System Growth

4.8.1.4 Extend Oil Filled 33kV Cable

As mentioned in section 4.8.1.3 a new XLPE cable will be installed from Transpower's Invercargill GXP directly to the new Spey Street substation while the existing 33kV oil cables will be paralleled and extended to create a second feeder to Spey Street.

At the supply end the oil cables are each fed from one of the Invercargill GXP 33kV circuit breakers via short extension XLPE cables. One of these extension cables will

need to be relocated at one end, moving the circuit breaker connection over to the other oil cable supply circuit breaker, paralleling the oil cables at the supply end and freeing up one of the GXP circuit breakers. This circuit breaker can then supply the new XLPE cable which will directly feed the new Spey Street substation.

The oil filled cables currently terminate at the Doon Street substation. When the Doon Street substation is decommissioned and all downstream equipment is removed from site an overhead bus structure will be constructed tying the two terminations together and a new XLPE extension cable will take supply from this bus between the oil cable terminations and run to the new Spey Street substation. This allows terminations to be easily accessed and disconnected in the event of an oil cable failure in future and avoids re-terminating or transition-jointing these cables which would be expensive to complete. A building will house the cable terminations, overhead bus structure and oil cable pressure tanks, prevent public access and reduce visual impact; being designed to fit with nearby historic buildings, while the rest of the substation site will be reinstated to fit with the city green belt surrounds. The risk of damage of the cable terminations during a seismic event is mitigated by having the new XLPE cable on a physically separate cable route able to supply the full Spey Street substation load. The XLPE extension cable from the oil cable terminations at Doon Street to the Spey Street substation will be generally of the same specification as the new cable between Invercargill GXP and Spey Street.

As previously mentioned this arrangement will utilise the remaining life of the 33kV oil cables while alongside the new 33kV XLPE cable will form part of a secure supply of greater capacity as required for the new Spey Street substation. Use of the XLPE extension, as opposed to new oil cable, is a deliberate move away from oil cable technology which while providing great life expectancy is more complex, requiring additional maintenance and oil processing equipment, pressure vessels and skilled staff to be available for repairs in the event of any faults resulting in an overall greater expense over the assets life.

Planning and design was completed in 2013/14 with work on site being completed within the 2014/15 year. Work on the oil cables can commence after the new 33kV XLPE Street cable is commissioned and supplying load via the new Spey Street substation.

Cost under $0.5M 2014/15; CAPEX – System Growth.

4.8.1.5 Southern Substation Upgrades

The 11kV switchboard replacement and relocation of the 23MVA Doon Street transformer as part of security upgrades were planned for southern substation in 2014/15. However seismic assessments over the past year have brought in additional resilience concerns for Southern Substation and therefore a major renewal and upgrade project has been planned for the site in line with three key drivers;

- Seismic strengthening requirements following control building assessment at 17% of new building standard and under strength outdoor structures.
- Assets at end of life; the 11kV switchboard is due for replacement in 2014, outdoor structures show signs of cracking and reinforcement rust, air break switches and earth switches have reached ODV life and show signs of deterioration, one 33kV circuit breaker at end of ODV life, the second 33kV circuit breaker has significant rusting (ex-Bluff) and the control building is in need of significant maintenance.
- The substation load has reached the threshold in EIL's security standard where upgrade to AAA security is required (no interruption for any single failure event). This has been deferred as long as possible by utilising load transfers to the other Invercargill zone substations.

Planned upgrades
A staged approach toward a fully indoor substation is planned combining the prior planned work with the new seismic requirements and incorporates opportunities to create a more secure, reliable and resilient supply point for the existing substation load equal to about a third of EIL's customer count.

Initially a new 100% "new building standard" strength building is to be constructed on the existing site with an increased area 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 refurbished and relocated from Doon Street) are open bushing units not suitable for locating indoors and as they have expected remaining lives of nine and eleven 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).

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) could quickly cause regulatory limits to be exceeded, as happened recently at Doon Street substation where a transformer failure significantly contributed to both SAIDI and SAIFI limits being exceeded in 2010 and ultimately to a breach of Commerce Commission regulatory requirements with a subsequent event the following year. Future breaches could incur costs if significant investigation is required. There may also 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
The project implementation is planned over the next two years with design, asset procurement and construction starting in 2014/15 and completion in 2015/16.

Cost under $0.5M 2014/15, $0.5M – 2.5M 2015/16; CAPEX – System Growth.

4.8.1.6 Queens Drive Realignment

This work was completed in the 2013/14 year as planned; refer to the EIL Asset Management Plan 2013-2023 for details of this project.

4.8.1.7 Asset Relocation Projects

This budget captures costs for smaller general 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 typically being above or below in any year.

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

4.8.1.8 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 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 capacity 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.

Electrical reticulation design to date requires estimates of consumption based on typical connection load profiles. Economic design therefore utilises a standard approach however some individual customer groups with larger than typical peak consumption may occasionally experience poor voltage quality. The only feedback for EIL about poor voltage comes in the form of customer complaints however often customers may be unaware of the issue or not recognise the symptoms. Therefore some increase in costs are expected in the two to five year planning period as the smart meter roll-out progresses and sub-optimal voltage is identified in areas.

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

4.8.1.9 Network Automation Projects

This budget is to allow implementation of further network automation initiatives which look to limit the effects of outages on network reliability when they do occur. Initially Bluff will be targeted as the Bluff area contributes significantly to annual reliability measures due to its overhead construction which contrasts with the inherently more reliable underground network in Invercargill.

In future years the Invercargill network will have additional remote controllable switching points and automation technologies added. 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.

This project will be initiated in the 2014/15 year and continue over the ten year planning horizon.

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

4.8.1.10 Earth Upgrades

Ineffective earthing may create or fail to control hazardous voltage which 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.

Compliance with the new EEA Guide to Power System Earthing Practice 2009 has been required since the end of March 2012 when the Safety Management System (SMS) came into force. This requires an assessment of the risk of exposure to any hazards that may be created at earth sites and hazard mitigation measures appropriate to the risk to be carried out.

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.

Some testing was completed over the year ending 31st March 2013 with the remainder of the network being completed in the 2013/14 year. This testing will now be completed five yearly with the entire network tested in one year. The next year of testing is planned for 2017/18.

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

4.8.1.11 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.

Solutions may include additional PPE requirements, operational controls and protection improvements including retrofit of arc flash detection.

Cost under $0.5M 2014/15 and 2015/16; CAPEX – Other Reliability, Safety and Environmental.

4.8.1.12 NER Installation at Substations

As part of compliance with the new EEA Guide to Power System Earthing Practice 2009, 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 these individual sites (section 4.8.1.6) to improve earth effectiveness is therefore reduced making the NER an overall more 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 per earth site cost of the NER is again more cost effective than the additional per site upgrades 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 NER affecting EIL's Bluff network will be installed at TPCL's Bluff substation which supplies this network area.

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 which require higher rated fuses for protection.

The NERs 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. The Spey Street NER has been purchased and installed at Doon Street temporarily as it has this additional benefit of limiting earth fault current below the old switchboard fault rating with the new lower impedance 18/36MVA transformer.

The NER and new transformer will be relocated to Spey Street substation and the remaining NER installations at Leven Street, Southern and Racecourse Road substations are to be completed in 2014/15.

Under $0.5M 2014/15; CAPEX – Other Reliability, Safety and Environment.

4.8.2 Planned Projects[A11.10.2]

Expected projects for years two to five (1 April 2015 to 31 March 2019) have moderate certainty. Timing of these projects has been estimated based on currently available resources but may be brought forward depending how quickly contractors are able to respond to the increasing demands of EIL's works programme. Note some projects

described above are on-going, these are not repeated in this section or the following Considered Projects section.

There are currently no projects planned to be initiated in the two to five year planning period.

4.8.3 Considered Projects[A11.10.3]

Projects expected for years six to ten (1 April 2019 to 31 March 2024) apart from those on-going described in previous sections.

4.8.3.1 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. Certainty for these estimates is obviously quite low.

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

4.8.4 Contingent Projects

The following projects are contingent on uncertain events. These have been excluded from EIL's spend plans until they become certain.

4.8.4.1 Oil Refineries

Possible major new industry that may require a new substation and subtransmission lines, but would most likely be connected onto the Transpower 220kV network.

4.8.5 Proposed Network Configuration

The planned network configuration in 2024 is shown in Figure 1.

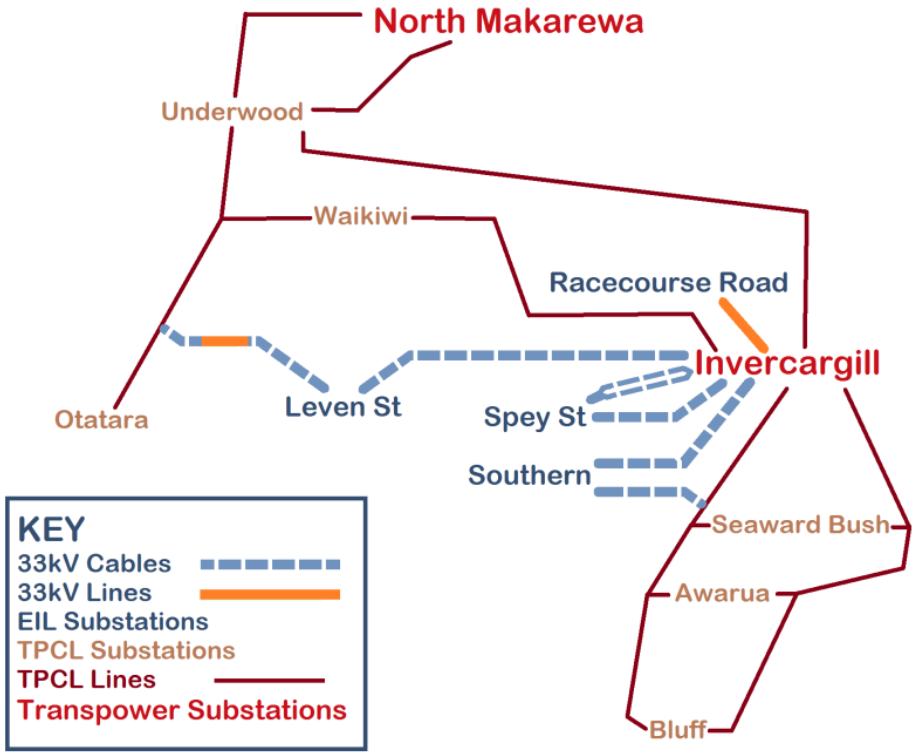

Figure 1: Proposed Network Configuration 2024

4.8.6 Capital Budget

The estimated capital budget for EIL is given below in Figure 2.

CAPEX: Consumer Connection	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Customer Connections (≤ 20kVA)	82,224	82,224	82,224	82,224	82,224	82,224	82,224	82,224	82,224	82,224
Customer Connections (21 to 99kVA)	82,224	82,224	82,224	82,224	82,224	82,224	82,224	82,224	82,224	82,224
Customer Connections (≥ 100kVA)	11,746	11,746	11,746	11,746	11,746	11,746	11,746	11,746	11,746	11,746
Distributed Generation Connection	11,746	11,746	11,746	11,746	11,746	11,746	11,746	11,746	11,746	11,746
New Subdivisions	11,746	11,746	11,746	11,746	11,746	11,746	11,746	11,746	11,746	11,746
	199,688	**199,688**	**199,688**	**199,688**	**199,688**	**199,688**	**199,688**	**199,688**	**199,688**	**199,688**

CAPEX: System Growth	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
New Spey Street Substation	5,513,133	-	-	-	-	-	-	-	-	-
New Spey Street 33kV Cable	1,617,000	-	-	-	-	-	-	-	-	-
Extend Oil Filled 33kV Cable	462,000	-	-	-	-	-	-	-	-	-
Southern Substation Upgrades	231,000	2,564,100	-	-	-	-	-	-	-	-
Unspecified Projects	-	-	-	-	-	693,000	693,000	982,328	982,328	982,328
	7,823,133	**2,564,100**	**-**	**-**	**-**	**693,000**	**693,000**	**982,328**	**982,328**	**982,328**

CAPEX: Asset Replacement and Renewal	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
General Dist Replacement - City	17,620	17,620	17,620	17,620	17,620	17,620	17,620	17,620	17,620	17,620
General Dist Replacement - Bluff	180,894	120,120	120,120	120,120	120,120	120,120	120,120	120,120	120,120	120,120
LV Board Replacement	61,081	61,081	61,081	61,081	61,081	61,081	61,081	61,081	61,081	61,081
Link Box Replacement	129,210	129,210	129,210	129,210	129,210	129,210	129,210	129,210	129,210	129,210
Pillar Box Replacement	86,625	28,875	18,480	18,480	18,480	18,480	18,480	18,480	18,480	18,480
Reactive LV Cable Replacement	93,971	93,971	93,971	93,971	93,971	93,971	93,971	93,971	93,971	93,971
Zone Substation Minor Replacement	3,524	3,524	3,524	3,524	3,524	3,524	3,524	3,524	3,524	3,524
Transformer Replacement - City	346,500	346,500	346,500	346,500	346,500	346,500	346,500	346,500	346,500	346,500
Transformer Replacement - Bluff	82,224	82,224	82,224	82,224	82,224	82,224	82,224	82,224	82,224	82,224
RMU Replacements	187,942	187,942	187,942	187,942	187,942	187,942	187,942	187,942	187,942	187,942
Reactive 11 kV Cable Replacement	17,620	17,620	17,620	17,620	17,620	17,620	17,620	17,620	17,620	17,620
Planned 11kV Cable Replacement	57,750	-	-	-	-	23,100	23,100	40,425	51,975	69,300
General Technical Replacement	46,985	46,985	46,985	46,985	46,985	46,985	46,985	46,985	46,985	46,985
UG Substation Replacement	346,500	346,500	346,500	346,500	346,500	346,500	346,500	346,500	346,500	346,500
Siesmic Remedial Zone Substations	28,875	-	-	-	-	-	-	-	-	-
Siesmic Remedial Distribution	490,875	490,875	490,875	-	-	-	-	-	-	-
Power Transformer Refurbishment	-	144,375	144,375	144,375	-	-	-	-	-	-
RTU Replacement	138,600	69,300	-	-	-	-	57,750	-	-	-
Racecourse Road Switchboard Replacement	-	-	-	-	-	115,500	1,386,000	-	-	-
	2,316,795	**2,186,721**	**2,107,026**	**1,616,151**	**1,471,776**	**1,610,376**	**2,938,626**	**1,512,201**	**1,523,751**	**1,541,076**

CAPEX: Asset Relocations	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Queens Drive Realignment	-	-	-	-	-	-	-	-	-	-
Asset Relocation Projects	5,873	5,873	5,873	5,873	5,873	5,873	5,873	5,873	5,873	5,873
	5,873	**5,873**	**5,873**	**5,873**	**5,873**	**5,873**	**5,873**	**5,873**	**5,873**	**5,873**

CAPEX: Quality of Supply	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Supply Quality Upgrades - City	11,550	34,650	57,750	57,750	57,750	11,550	11,550	11,550	11,550	11,550
Supply Quality Upgrades - Bluff	1,155	3,465	5,775	5,775	5,775	1,155	1,155	1,155	1,155	1,155
Network Automation Projects	109,725	57,750	40,425	40,425	40,425	40,425	40,425	40,425	40,425	40,425
	122,430	**95,865**	**103,950**	**103,950**	**103,950**	**53,130**	**53,130**	**53,130**	**53,130**	**53,130**

CAPEX: Legislative and Regulatory	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
	-	-	-	-	-	-	-	-	-	-
	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

CAPEX: Other Reliability, Safety and Environment	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Earth Upgrades - City	-	-	-	11,550	-	-	-	-	11,550	-
Earth Upgrades - Bluff	-	-	-	1,155	-	-	-	-	1,155	-
Substation Safety	57,750	57,750	-	-	-	-	-	-	-	-
NER Installations	98,175	-	-	-	-	-	-	-	-	-
	155,925	**57,750**	**-**	**12,705**	**-**	**-**	**-**	**-**	**12,705**	**-**

Total Network Capital Expenditure	10,623,844	5,109,997	2,416,537	1,938,367	1,781,287	2,562,067	3,890,317	2,753,220	2,777,475	2,782,095

Figure 2: Capital Budget

5.5.1 Current Renewal Projects[A12.3.3]

Renewal projects planned for the 2014/15 year.

5.5.1.1 Underground Substation Replacements

EIL owns several underground distribution substations in and around the Invercargill CBD containing 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.

These underground substations are typically immediately in front of, and in some cases under, large commercial buildings creating a potential public safety risk if not managed appropriately. The current substations also typically have characteristics of a confined space and therefore the safety of personnel required to enter these substations is an important consideration in equipment selection and design. Low explosion, low fire risk and arc flash rated equipment will be used with sprinkler systems and any additional fire protection features that may be necessary to manage risk appropriately.

Due to their location and related access difficulties it is planned to undertake all equipment replacements together as a single project per substation site. This will ultimately be the most economic approach for renewal as accessing these substations for main equipment replacements will require traffic management in the busy CBD, pavement disruption, pavement reinstatement works (often stylized with paving stones) and potentially street verandas may need to be removed for crane access.

Equipment investigation and concept planning have progressed over 2013/14 with the replacement programme to be initiated in the 2014/15 year and continuing over the following years toward the end of the ten year planning horizon.

Cost Under $0.5M 2014/15 to 2023/24; CAPEX – Asset Replacement and Renewal.

5.5.1.2 Seismic Remedial - Zone Substations

Structural assessments, strengthening design and associated costing has been completed over the 2013/14 year.

From this work it was found costs for strengthening Southern substation, on top of building maintenance costs and additional security and asset replacement drivers for this substation meant that a major renewal and upgrade project was appropriate for this site. A redevelopment toward a fully indoor substation has been proposed as detailed in Section 4.8 and will address structural issues for the site.

Racecourse Road was identified as requiring significant strengthening work to the building and outdoor structure and a decision has been made to defer these costs until 2020/21 when the switchboard is due for replacement and at this time replace both the switchboard and the building.

Leven Street will have relatively minor structural strengthening work completed over the 2014/15 year.

Under $0.5M 2014/15; CAPEX – Asset Replacement and Renewal.

5.5.1.3 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 the most economic solution but include strengthening of buildings, enclosures or structures or replacement with self-contained freestanding equipment. Many sites are unique however there are several common "themes" to enclosures used

for ground mounted distribution substations and therefore a common solution can be applied to a large proportion of sites.

Remedial work will be spread across three years to manage workload; beginning in 2014/15 and being completed in the 2016/17 year.

Cost Under $0.5M 2014/15 to 2016/17; CAPEX – Asset Replacement and Renewal.

5.5.1.4 Power Transformer Refurbishment

EIL's new strategy to refurbish power transformers at midlife will commence in 2014/15 with the Racecourse Road transformer. The Southern Substation transformer will be refurbished in 2015/16 and the older Leven Street unit in 2016/17. These refurbishments will catch up EIL's zone substation transformer fleet with this new strategy aimed at preventing premature failures through identification of design weaknesses or developing faults and undertaking and repairs or modifications necessary to achieve expected or extend life of these units.

Cost Under $0.5M 2014/15 to 2016/17; CAPEX – Asset Replacement and Renewal.

5.5.1.5 SCADA RTU Replacement

Present GPT mini RTU units are just beyond expected end of life and are becoming less reliable. Without replacement, quality of operational data capture would suffer and loss of control of network equipment would affect EIL's service levels therefore full remote control needs to be maintained. Replacement of RTU's at the eight automated distribution substations with modern units would also provide greater reliability and added functionality. Design and replacements will be completed over the 2014/15 year.

Zone substation RTUs will be due for replacement at Leven Street in 2015/16 and at Racecourse Road in 2020/21.

Under $0.5M 2014/15, 2015/16 & 2020/21; CAPEX – Asset Replacement and Renewal.

5.5.1.6 General Distribution Replacement

On-going replacements of distribution assets other than cables. These are identified through routine inspection.

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

5.5.1.7 LV Board Replacement

Replacement of hazardous old LV distribution boards with modern touch safe boards – on-going for 10 years.

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

5.5.1.8 Link Box Replacement

On-going replacement of link boxes which have deteriorated with age or have been damaged and are unfit for service or unsafe.

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

5.5.1.9 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.

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

5.5.1.10 Reactive LV Cable Replacement

On-going replacement of 11kV cables as identified by condition after fault occurrence.

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

5.5.1.11 Zone Substation Minor Replacement

On-going replacement of minor components at zone substations such as LTAC panels and battery banks.

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

5.5.1.12 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.

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

5.5.1.13 RMU Replacements

On-going replacement of Ring Main Units as they reach end of life and risk of failure increases at distribution substations outside of the CBD area to maintain reliability of supply and safety in the vicinity of the substation.

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

5.5.1.14 Reactive 11kV Cable Replacement

On-going reactive replacement of 11kV cables as identified by condition after fault occurrence.

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

5.5.1.15 Planned 11kV Cable Replacement

Planned replacement of 11kV cables identified as at end-of-life through condition monitoring.

Cost Under $0.5M 2014/15, under $0.5M 2019/20 and thereafter; CAPEX – Asset Replacement and Renewal.

5.5.1.16 General Technical Replacement

On-going replacement of switchgear other than RMUs as they reach end of life and risk of failure increases at distribution substations outside of the CBD area to maintain reliability of supply and safety in the vicinity of the substation.

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

5.5.1.17 Oil Filled Cable Maintenance

This work is aimed at getting the most out of the three 33kV oil filled cables, two of which will be paralleled to form part of one feeder supplying the new Spey Street substation and the third which supplies Southern substation.

Temperature monitoring will be installed on each of the oil cables to provide useful data for accurately estimating the ratings of these cables. Presently these cables have been temporarily de-rated as the cable trench backfill has been identified as having poor thermal characteristics affecting design ratings. Understanding the temperature variation as these cables are loaded will help understand the practical rating of these cables so that overload can be avoided while making the most of their capacity.

The cables will also each have one of their joints inspected to determine if problems encountered on other New Zealand networks could be an issue for EIL as discussed in section 4.8.1.3. Results of this testing should help provide increased confidence in the remaining life of the cables or otherwise direct any remedial actions required.

This condition analysis work will be completed in the 2014/15 year after the new 33kV XLPE cable is commissioned and supplying load via the new Spey Street substation.

Cost Under $0.5M 2014/15; OPEX – Routine and Corrective Maintenance and Renewal

5.5.1.18 Seismic Checks

A budget for carrying out checks to determine what remedial strengthening work is required to ensure seismic requirements are met for EIL's distribution substations. This work will be carried out of the next two years prior to seismic remedial work being undertaken (section 5.5.1.3).

Cost Under $0.5M 2014/15 and 2015/16; OPEX – Routine and Corrective Maintenance and Inspection.

5.5.1.19 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 – Routine and Corrective Maintenance and Inspection.

5.5.1.20 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 – Routine and Corrective Maintenance and Inspection.

5.5.1.21 Earth Testing

Routine testing of earthing assets and connections to ensure safety and functional requirements are met.

Cost Under $0.5M 2017/18 and five yearly thereafter; OPEX – Routine and Corrective Maintenance and Inspection.

5.5.1.22 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 – Routine and Corrective Maintenance and Inspection.

5.5.1.23 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 – Routine and Corrective Maintenance and Inspection.

5.5.1.24 Condition and Data Assessment

This work was completed in the 2013/14 year as planned; refer to the EIL Asset Management Plan 2013-2023 for details of this project.

5.5.1.25 Partial Discharge Survey

Routine partial discharge condition monitoring survey of subtransmission cables, terminations and equipment to identify abnormal discharge levels before failure occurs.

Cost Under $0.5M on-going; OPEX – Routine and Corrective Maintenance and Inspection.

5.5.1.26 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 – Routine and Corrective Maintenance and Inspection.

5.5.1.27 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 – Routine and Corrective Maintenance and Inspection.

5.5.1.28 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 – Routine and Corrective Maintenance and Inspection.

5.5.1.29 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 – Routine and Corrective Maintenance and Inspection.

5.5.1.30 Supply Quality Checks

Investigations into supply quality which are generally customer initiated.

Cost Under $0.5M on-going; OPEX – Routine and Corrective Maintenance and Inspection.

5.5.1.31 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 – Routine and Corrective Maintenance and Inspection.

5.5.1.32 Customer Connections

Operational portion of expenditure for the customer connections process is captured in this budget.

Cost Under $0.5M on-going; OPEX – Routine and Corrective Maintenance and Inspection.

5.5.1.33 Vegetation Control

On-going tree trimming in the vicinity of overhead network to prevent contact with lines maintaining network reliability, mainly in the Bluff area.

Cost Under $0.5M on-going; OPEX – Vegetation Management

5.5.1.34 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.

Cost Under $0.5M on-going; OPEX – Asset Replacement and Renewal

5.5.1.35 Transformer Refurbishment

Refurbishment of distribution transformers such as rust repairs, paint touch-up, oil renewal, replacement of minor parts such as bushings, seals etc.

Cost Under $0.5M on-going; OPEX – Asset Replacement and Renewal

5.5.1.36 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.

Cost Under $0.5M on-going; OPEX – Asset Replacement and Renewal

5.5.1.37 General Technical Refurbishment

Refurbishment works at distribution substations that won't impact on the valuation of the asset. Identified through routine inspection.

Cost Under $0.5M on-going; OPEX – Asset Replacement and Renewal

5.5.1.38 Incident Response

Initial response budget up to three hours for safety, isolation and onsite repairs after fault occurrence and additional time budget thereafter.

Cost $0.5M – $2.5M on-going; OPEX – Service Interruptions and Emergencies

5.5.2 Planned Projects[A12.3.4]

No additional projects are planned in the next two to five year period (2015/16 - 2018/19) other than those ongoing from previous years.

5.5.3 Future Projects[A12.3.5]

5.5.3.1 Racecourse Road Switchboard Replacement

The Racecourse Road 11kV switchboard will be due for replacement in 2020/21. This Project will also include replacement of the building which has been assessed as requiring significant structural strengthening to achieve sufficient resilience to large seismic events. Estimates for building strengthening have shown these costs are similar to replacement with a new building which is considered the better option. Sufficient backup for this substation is available on the 11kV network and therefore delaying the building replacement to coincide with the switchboard replacement is considered an acceptable risk. Design is planned for 2019/20 and switchboard and building replacement is planned for 2020/21.

Cost Under $0.5M 2019/20 and $0.5 to $2.5M 2020/21; CAPEX – Asset Replacement and Renewal

5.5.4 Renewal Budget

CAPEX renewals are budgeted in the capital budget, see section 4.8.6.

5.10 EIL's Maintenance Budget[A12.2.3]

Estimated expenditure on maintaining the assets are given in Figure 3. Target is maintaining the ratio of maintenance at about 4.0% or less of the total network replacement cost. This budget covers both Operation and Maintenance areas.

OPEX: Asset Replacement and Renewal	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
General Dist Refurbishment - City	13,815	13,815	13,815	13,815	13,815	13,815	13,815	13,815	13,815	13,815
General Dist Refurbishment - Bluff	9,509	9,509	9,509	9,509	9,509	9,509	9,509	9,509	9,509	9,509
Transformer Refurbishment	10,085	10,085	10,085	10,085	10,085	10,085	10,085	10,085	10,085	10,085
Zone Substation Refurbishment	16,781	16,781	16,781	16,781	16,781	16,781	16,781	16,781	16,781	16,781
General Technical Refurbishment - City	88,748	44,748	44,748	44,748	44,748	44,748	44,748	44,748	44,748	44,748
General Technical Refurbishment - Bluff	11,187	11,187	11,187	11,187	11,187	11,187	11,187	11,187	11,187	11,187
	150,124	**106,124**	**106,124**	**106,124**	**106,124**	**106,124**	**106,124**	**106,124**	**106,124**	**106,124**

OPEX: Vegetation Management	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Vegetation Management - City	895	895	895	895	895	895	895	895	895	895
Vegetation Management - Bluff	559	559	559	559	559	559	559	559	559	559
	1,454	**1,454**	**1,454**	**1,454**	**1,454**	**1,454**	**1,454**	**1,454**	**1,454**	**1,454**

OPEX: Routine and Corrective Maintenance and Inspection	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Routine Dist Insp Check & Mtce - City	43,993	43,993	43,993	43,993	43,993	43,993	43,993	43,993	43,993	43,993
Minor Work Dist Insp Check & Mtce - City	55,935	55,935	55,935	55,935	55,935	55,935	55,935	55,935	55,935	55,935
Routine Dist Insp Check & Mtce - Bluff	7,383	7,383	7,383	7,383	7,383	7,383	7,383	7,383	7,383	7,383
Minor Work Dist Insp Check & Mtce - Bluff	22,374	22,374	22,374	22,374	22,374	22,374	22,374	22,374	22,374	22,374
Earth Testing - City	-	-	-	16,500	-	-	-	-	16,500	-
Earth Testing - Bluff	-	-	-	13,200	-	-	-	-	13,200	-
Routine Tech Insp Check & Mtce - City	151,250	151,250	151,250	151,250	151,250	151,250	151,250	151,250	151,250	151,250
Minor Work Tech Insp Check & Mtce - City	175,065	170,665	209,165	175,065	198,165	175,065	198,165	175,065	198,165	175,065
Routine Tech Insp Check & Mtce - Bluff	1,264	1,264	1,264	1,264	1,264	1,264	1,264	1,264	1,264	1,264
Minor Work Tech Insp Check & Mtce - Bluff	2,305	2,305	2,305	2,305	2,305	2,305	2,305	2,305	2,305	2,305
Condition and Data Assessment	-	-	-	-	-	-	-	-	-	-
Partial Discharge Survey	50,342	50,342	50,342	50,342	50,342	50,342	50,342	50,342	50,342	50,342
Infra Red Surveys	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500
General Substation Maintenance	35,798	35,798	35,798	35,798	35,798	35,798	35,798	35,798	35,798	35,798
General RMU Maintenance	168,364	168,364	168,364	168,364	168,364	168,364	168,364	168,364	168,364	168,364
General Zone Substation Maintenance	33,561	33,561	33,561	33,561	33,561	33,561	33,561	33,561	33,561	33,561
Oil Filled Cable Maintenance	242,000	-	-	-	-	-	-	-	-	-
Supply Quality Checks - City	2,305	2,305	2,305	2,305	2,305	2,305	2,305	2,305	2,305	2,305
Supply Quality Checks - Bluff	1,152	1,152	1,152	1,152	1,152	1,152	1,152	1,152	1,152	1,152
Spares Checks and Minor Maintenance	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119
Seismic Checks	27,500	27,500	-	-	-	-	-	-	-	-
Customer Connections	24,052	24,052	24,052	24,052	24,052	24,052	24,052	24,052	24,052	24,052
	1,051,262	**804,862**	**815,862**	**811,462**	**804,862**	**781,762**	**804,862**	**781,762**	**834,562**	**781,762**

OPEX: Service Interruptions and Emergencies	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Incident Response Dist - City	266,772	266,772	266,772	266,772	266,772	266,772	266,772	266,772	266,772	266,772
Incident Additional Time Dist - City	83,903	83,903	83,903	83,903	83,903	83,903	83,903	83,903	83,903	83,903
Incident Response Dist - Bluff	131,149	131,149	131,149	131,149	131,149	131,149	131,149	131,149	131,149	131,149
Incident Additional Time Dist - Bluff	3,356	3,356	3,356	3,356	3,356	3,356	3,356	3,356	3,356	3,356
Incident Response Tech - City	44,871	44,871	44,871	44,871	44,871	44,871	44,871	44,871	44,871	44,871
Incident Additional Time Tech - City	170,535	170,535	170,535	170,535	170,535	170,535	170,535	170,535	170,535	170,535
Incident Response Tech - Bluff	12,641	12,641	12,641	12,641	12,641	12,641	12,641	12,641	12,641	12,641
Incident Additional Time Tech - Bluff	2,305	2,305	2,305	2,305	2,305	2,305	2,305	2,305	2,305	2,305
	715,531	**715,531**	**715,531**	**715,531**	**715,531**	**715,531**	**715,531**	**715,531**	**715,531**	**715,531**

Operational Expenditure Total	**1,918,371**	**1,627,971**	**1,638,971**	**1,634,571**	**1,627,971**	**1,604,871**	**1,627,971**	**1,604,871**	**1,657,671**	**1,604,871**
System Operation and Network Support	892,000	892,000	892,000	892,000	892,000	892,000	892,000	892,000	892,000	892,000
Direct OPEX	**2,810,371**	**2,519,971**	**2,530,971**	**2,526,571**	**2,519,971**	**2,496,871**	**2,519,971**	**2,496,871**	**2,549,671**	**2,496,871**

Figure 3: EIL Maintenance Budget

A. Appendix – Schedule 11a

Company Name: Electricity Invercargill Limited
AMP Planning Period: 1 April 2014 – 31 March 2024

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)
Units 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 14	31 Mar 15	31 Mar 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24
9	**11a(i): Expenditure on Assets Forecast**	$000 (in nominal dollars)										
10	Consumer connection	192	205	216	230	240	247	253	260	269	279	238
11	System growth	2,631	7,823	2,779	-	-	-	878	904	1,324	1,370	1,173
12	Asset replacement and renewal	1,386	2,317	2,370	2,424	1,641	1,823	2,044	1,822	2,038	2,128	1,846
13	Asset relocations	36	6	6	6	6	7	7	7	8	8	7
14	Reliability, safety and environment:											
15	Quality of supply	17	122	104	130	125	129	62	66	72	74	63
16	Legislative and regulatory	-	-	-	-	-	-	-	-	-	-	-
17	Other reliability, safety and environment	104	156	63	-	13	-	-	-	-	14	-
18	**Total reliability, safety and environment**	121	278	166	130	140	129	67	66	72	92	63
19	**Expenditure on network assets**	4,409	10,624	5,538	2,786	2,338	2,206	3,251	5,060	3,711	3,829	3,322
20	Non-network assets	198	711	212	923	941	225	245	231	239	244	286
21	**Expenditure on assets**	4,607	11,335	5,749	3,709	3,280	2,432	3,492	5,291	3,950	4,123	3,610
22												
23	*plus* Cost of financing	334	822	417	268	237	176	253	384	286	298	262
24	*less* Value of capital contributions	93	37	38	40	42	43	43	43	47	49	43
25	*plus* Value of vested assets	-	-	-	-	-	-	-	-	-	-	-
26												
27	**Capital expenditure forecast**	4,906	12,121	6,128	3,930	3,474	2,565	3,695	5,631	4,189	4,371	3,830
28												
29	Value of commissioned assets	2,488	14,648	6,339	3,930	3,468	2,565	3,573	5,749	4,189	4,372	3,830

		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
	for year ended	31 Mar 14	31 Mar 15	31 Mar 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24
		$000 (in constant prices)										
	Consumer connection	192	200	200	200	200	200	200	200	200	200	200
	System growth	2,631	7,823	2,564	-	-	-	691	691	982	981	982
	Asset replacement and renewal	1,386	2,317	2,187	2,107	1,616	1,472	1,616	2,039	1,512	1,524	1,541
	Asset relocations	36	6	6	6	6	6	6	7	6	6	6
	Reliability, safety and environment:											
	Quality of supply	17	122	96	104	104	104	51	51	51	51	51
	Legislative and regulatory	-	-	-	-	-	-	-	-	-	-	-
	Other reliability, safety and environment	104	156	58	-	13	-	-	-	-	14	-
	Total reliability, safety and environment	121	278	154	104	117	104	51	51	51	66	51
	Expenditure on network assets	4,409	10,624	5,110	2,417	1,938	1,781	2,562	3,890	2,753	2,777	2,782
	Non-network assets	198	677	198	844	844	198	208	208	208	206	208
	Expenditure on assets	4,607	11,301	5,308	3,261	2,782	1,979	2,770	4,098	2,961	2,985	2,990
	Subcomponents of expenditure on assets (where known)											
	Energy efficiency and demand side management, reduction of energy losses											
	Overhead to underground conversion											
	Research and development											

		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
	for year ended	31 Mar 14	31 Mar 15	31 Mar 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24
	Difference between nominal and constant price forecasts	$000										
	Consumer connection	-	-	17	31	40	48	54	60	69	79	39
	System growth	-	-	215	-	-	-	186	213	342	390	191
	Asset replacement and renewal	-	-	183	317	225	351	431	883	526	604	299
	Asset relocations	-	-	0	1	1	1	2	3	2	2	1
	Reliability, safety and environment:											
	Quality of supply	-	-	8	26	21	25	11	15	18	23	12
	Legislative and regulatory	-	-	-	-	-	-	-	-	-	-	-
	Other reliability, safety and environment	-	-	5	-	3	-	-	-	-	5	-
	Total reliability, safety and environment	-	-	13	26	23	25	11	15	18	28	12
	Expenditure on network assets	-	-	428	384	292	425	689	1,170	957	1,101	540
	Non-network assets	-	34	14	78	97	27	22	27	31	36	80
	Expenditure on assets	-	34	441	440	487	452	712	1,197	989	1,137	620

		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
	for year ended	31 Mar 14	31 Mar 15	31 Mar 16	31 Mar 17	31 Mar 18	31 Mar 19
	11a(ii): Consumer Connection	$000 (in constant prices)					
	*Consumer types defined by EDB**						
	Customer Connections (≤ 30kVA)	83	82	82	83	82	82
	Medium Connections (21 to 99kVA)	83	82	82	83	82	82
	>100kVA Customer Connections	129	12	12	12	12	12
	Distributed Generation Connection	-	12	12	12	12	12
	New Subdivisions	-	12	12	12	12	12
	**Include additional rows if needed*						
	Consumer connection expenditure	215	200	200	200	200	200
less	Capital contributions funding consumer connection	50	35	35	35	35	35
	Consumer connection less capital contributions	200	165	165	165	165	165
	11a(iii): System Growth						
	Subtransmission	568	2,079	-	-	-	-
	Zone substations	2,063	5,743	2,564	-	-	-
	Distribution and LV lines	-	-	-	-	-	-
	Distribution and LV cables	-	2,481	-	-	-	-
	Distribution substations and transformers	-	-	-	-	-	-
	Distribution switchgear	-	-	-	-	-	-
	Other network assets	-	-	-	-	-	-
	System growth expenditure	2,631	7,823	2,564	-	-	-
less	Capital contributions funding system growth	-	-	-	-	-	-
	System growth less capital contributions	2,631	7,823	2,564	-	-	-

		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
	for year ended	31 Mar 14	31 Mar 15	31 Mar 16	31 Mar 17	31 Mar 18	31 Mar 19
	11a(iv): Asset Replacement and Renewal	$000 (in constant prices)					
	Subtransmission	-	93	148	148	148	4
	Zone substations	412	161	120	130	120	120
	Distribution and LV lines	231	403	287	277	277	277
	Distribution substations and transformers	646	1,420	1,357	1,288	797	797
	Distribution switchgear	93	275	275	253	275	275
	Other network assets	-	-	-	-	-	-
	Asset replacement and renewal expenditure	1,386	2,317	2,187	2,107	1,616	1,472
less	Capital contributions funding asset replacement and renewal	-	-	-	-	-	-
	Asset replacement and renewal less capital contributions	1,386	2,317	2,187	2,107	1,616	1,472
	11a(v):Asset Relocations						
	*Project or programme**						
	Queens Drive Realignment	30	-	-	-	-	-
	Asset Relocation Projects	-	6	6	6	6	6
	[Description of material project or programme]						
	[Description of material project or programme]						
	[Description of material project or programme]						
	**Include additional rows if needed*						
	All other asset relocations projects or programmes	-	-	-	-	-	-
	Asset relocations expenditure	36	6	6	6	6	6
less	Capital contributions funding asset relocations	-	-	-	-	-	-
	Asset relocations less capital contributions	36	6	6	6	6	6
	11a(vi):Quality of Supply						
	*Project or programme**						
	Supply Quality Upgrades - City	16	12	35	58	58	58
	Supply Quality Upgrades - Bluff	1	1	3	6	6	6
	Network Automation Projects	-	110	58	40	40	40
	[Description of material project or programme]						
	[Description of material project or programme]						
	**Include additional rows if needed*						
	All other quality of supply projects or programmes	-	-	-	-	-	-
	Quality of supply expenditure	17	122	96	104	104	104
less	Capital contributions funding quality of supply	-	-	-	-	-	-
	Quality of supply less capital contributions	17	122	96	104	104	104
	11a(vii): Legislative and Regulatory						
	*Project or programme**						
	[Description of material project or programme]						
	[Description of material project or programme]						
	[Description of material project or programme]						
	[Description of material project or programme]						
	[Description of material project or programme]						
	**Include additional rows if needed*						
	All other legislative and regulatory projects or programmes	-	-	-	-	-	-
	Legislative and regulatory expenditure	-	-	-	-	-	-
less	Capital contributions funding legislative and regulatory	-	-	-	-	-	-
	Legislative and regulatory less capital contributions	-	-	-	-	-	-

		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
	for year ended	31 Mar 14	31 Mar 15	31 Mar 16	31 Mar 17	31 Mar 18	31 Mar 19
	11a(viii): Other Reliability, Safety and Environmer	$000 (in constant prices)					
	*Project or programme**						
	Earth Upgrades - City	-	-	-	-	13	-
	Earth Upgrades - Bluff	-	-	-	-	-	-
	Substation Safety	-	13	58	-	-	-
	SF6 Installations	104	98	-	-	-	-
	[Description of material project or programme]						
	**Include additional rows if needed*						
	All other reliability, safety and environment projects or programmes	-	-	-	-	-	-
	Other reliability, safety and environment expenditure	104	156	58	-	13	-
less	Capital contributions funding other reliability, safety and environment	-	-	-	-	-	-
	Other reliability, safety and environment less capital contributions	104	156	58	-	13	-
	11a(ix): Non-Network Assets						
	Routine expenditure						
	*Project or programme**						
	ICT Hardware & Software, Plant & Office Equipment	198	198	198	198	198	198
	Meshmo	-	-	-	-	-	-
	[Description of material project or programme]						
	[Description of material project or programme]						
	[Description of material project or programme]						
	**Include additional rows if needed*						
	All other routine expenditure projects or programmes	-	-	-	-	-	-
	Routine expenditure	198	198	198	198	198	198
	Atypical expenditure						
	*Project or programme**						
	New Office Building Fit-out	-	-	429	-	-	-
	ICI Caravan Replacement	-	-	93	-	-	-
	System Control Upgrades	-	-	-	-	646	646
	[Description of material project or programme]						
	[Description of material project or programme]						
	**Include additional rows if needed*						
	All other atypical projects or programmes	-	-	-	-	-	-
	Atypical expenditure	-	-	478	-	646	646
	Non-network assets expenditure	198	677	198	844	844	198

Company Name	**Electricity Invercargill Limited**
AMP Planning Period	**1 April 2014 – 31 March 2024**

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												
7		*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 14**	**31 Mar 15**	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**
9	**Operational Expenditure Forecast**	**$000 (in nominal dollars)**										
10	Service interruptions and emergencies	700	716	741	767	796	827	858	891	923	956	977
11	Vegetation management	8	1	2	2	2	2	2	2	2	2	2
12	Routine and corrective maintenance and inspection	1,097	1,051	833	875	903	930	937	1,002	1,008	1,115	1,067
13	Asset replacement and renewal	77	150	110	114	118	123	127	132	137	142	145
14	**Network Opex**	1,882	1,918	1,685	1,757	1,819	1,881	1,925	2,026	2,070	2,215	2,191
15	System operations and network support	892	892	922	953	987	1,024	1,062	1,100	1,138	1,177	1,218
16	Business support	2,118	2,118	2,188	2,263	2,345	2,431	2,521	2,611	2,702	2,795	2,892
17	**Non-network opex**	3,010	3,010	3,110	3,215	3,332	3,455	3,583	3,711	3,839	3,972	4,109
18	**Operational expenditure**	4,892	4,928	4,795	4,973	5,151	5,336	5,508	5,737	5,909	6,187	6,300

19		*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 14**	**31 Mar 15**	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**
21		**$000 (in constant prices)**										
22	Service interruptions and emergencies	700	716	716	716	716	716	716	716	716	716	716
23	Vegetation management	8	1	1	1	1	1	1	1	1	1	1
24	Routine and corrective maintenance and inspection	1,097	1,051	805	816	811	805	782	805	782	835	782
25	Asset replacement and renewal	77	150	106	106	106	106	106	106	106	106	106
26	**Network Opex**	1,882	1,918	1,628	1,639	1,635	1,628	1,605	1,628	1,605	1,658	1,605
27	System operations and network support	892	892	892	892	892	892	892	892	892	892	892
28	Business support	2,118	2,118	2,118	2,118	2,118	2,118	2,118	2,118	2,118	2,118	2,118
29	**Non-network opex**	3,010	3,010	3,010	3,010	3,010	3,010	3,010	3,010	3,010	3,010	3,010
30	**Operational expenditure**	4,892	4,928	4,638	4,649	4,645	4,638	4,615	4,638	4,615	4,668	4,615
31	**Subcomponents of operational expenditure (where known)**											
32	Energy efficiency and demand side management, reduction of energy losses	125	125	125	125	125	125	125	125	125	125	125
33	Direct billing*	-	-	-	-	-	-	-	-	-	-	-
34	Research and Development	-	-	-	-	-	-	-	-	-	-	-
35	Insurance	133	133	133	133	133	133	133	133	133	133	133
37	** Direct billing expenditure by suppliers that direct bill the majority of their consumers*											

39		*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 14**	**31 Mar 15**	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**
41	**Difference between nominal and real forecasts**	**$000**										
42	Service interruptions and emergencies	-	-	25	52	81	111	143	175	207	241	261
43	Vegetation management	-	-	0	0	0	0	0	0	0	0	1
44	Routine and corrective maintenance and inspection	-	-	28	59	92	125	156	197	227	281	286
45	Asset replacement and renewal	-	-	4	8	12	16	21	26	31	36	39
46	**Network Opex**	-	-	57	118	185	253	320	398	465	558	586
47	System operations and network support	-	-	30	61	95	132	170	208	246	285	326
48	Business support	-	-	70	145	227	313	403	493	584	677	774
49	**Non-network opex**	-	-	100	205	322	445	573	701	829	962	1,099
50	**Operational expenditure**	-	-	157	324	507	698	893	1,100	1,294	1,520	1,686

C. Appendix – Schedule 12a

Company Name	Electricity Invercargill Limited
AMP Planning Period	1 April 2014 – 31 March 2024

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	Voltage	Asset category	Asset class	Units	Asset condition at start of planning period (percentage of units by grade)						
					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%	-	1	5.00%
11	All	Overhead Line	Wood poles	No.	10.00%	70.00%	20.00%	-	-	1	10.00%
12	All	Overhead Line	Other pole types	No.	-	-	100.00%	-	-	1	-
13	HV	Subtransmission Line	Subtransmission OH up to 66kV conductor	km	-	-	100.00%	-	-	1	-
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	-	-	100.00%	-	-	1	-
16	HV	Subtransmission Cable	Subtransmission UG up to 66kV (Oil pressurised)	km	-	-	100.00%	-	-	1	-
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.	-	25.00%	75.00%	-	-	1	25.00%
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%	-	-	1	50.00%
27	HV	Zone substation switchgear	22/33kV CB (Outdoor)	No.	-	25.00%	75.00%	-	-	1	25.00%
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.	-	20.00%	80.00%	-	-	1	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.	-	50.00%	50.00%	-	-	1	50.00%
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

sch ref	Voltage	Asset category	Asset class	Units	Asset condition at start of planning period (percentage of units by grade)						
					Grade 1	Grade 2	Grade 3	Grade 4	Grade unknown	Data accuracy (1–4)	% of asset forecast to be replaced in next 5 years
45	HV	Zone Substation Transformer	Zone Substation Transformers	No.	-	-	83.00%	17.00%	-	1	-
46	HV	Distribution Line	Distribution OH Open Wire Conductor	km	2.00%	23.00%	70.00%	5.00%	-	1	5.00%
47	HV	Distribution Line	Distribution OH Aerial Cable Conductor	km	N/A	N/A	N/A	N/A	N/A	N/A	N/A
48	HV	Distribution Line	SWER conductor	km	N/A	N/A	N/A	N/A	N/A	N/A	N/A
49	HV	Distribution Cable	Distribution UG XLPE or PVC	km	-	2.00%	90.00%	8.00%	-	1	10.00%
50	HV	Distribution Cable	Distribution UG PILC	km	2.00%	5.00%	93.00%	-	-	1	15.00%
51	HV	Distribution Cable	Distribution Submarine Cable	km	N/A	N/A	N/A	N/A	N/A	N/A	N/A
52	HV	Distribution switchgear	3.3/6.6/11/22kV CB (pole mounted) - reclosers and sectionalisers	No.	-	-	100.00%	-	-	1	-
53	HV	Distribution switchgear	3.3/6.6/11/22kV CB (Indoor)	No.	5.00%	25.00%	70.00%	-	-	1	25.00%
54	HV	Distribution switchgear	3.3/6.6/11/22kV Switches and fuses (pole mounted)	No.	5.00%	15.00%	70.00%	10.00%	-	1	10.00%
55	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
56	HV	Distribution switchgear	3.3/6.6/11/22kV RMU	No.	4.00%	6.00%	80.00%	10.00%	-	1	10.00%
57	HV	Distribution Transformer	Pole Mounted Transformer	No.	3.00%	7.00%	75.00%	15.00%	-	1	10.00%
58	HV	Distribution Transformer	Ground Mounted Transformer	No.	1.00%	9.00%	75.00%	15.00%	-	1	5.00%
59	HV	Distribution Transformer	Voltage regulators	No.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
60	HV	Distribution Substations	Ground Mounted Substation Housing	No.	-	10.00%	90.00%	-	-	1	20.00%
61	LV	LV Line	LV OH Conductor	km	5.00%	10.00%	80.00%	5.00%	-	1	5.00%
62	LV	LV Cable	LV UG Cable	km	2.00%	3.00%	90.00%	5.00%	-	1	5.00%
63	LV	LV Streetlighting	LV OH/UG Streetlight circuit	km	1.00%	4.00%	85.00%	10.00%	-	1	5.00%
64	LV	Connections	OH/UG consumer service connections	No.	1.00%	4.00%	85.00%	10.00%	-	1	5.00%
65	All	Protection	Protection relays (electromechanical, solid state and numeric)	No.	-	50.00%	50.00%	-	-	1	50.00%
66	All	SCADA and communications	SCADA and communications equipment operating as a single system	Lot	-	20.00%	80.00%	-	-	1	20.00%
67	All	Capacitor Banks	Capacitors including controls	No.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
68	All	Load Control	Centralised plant	Lot	-	100.00%	-		-	1	100.00%
69	All	Load Control	Relays	No.	-	5.00%	10.00%	5.00%	80.00%	1	100.00%
70	All	Civils	Cable Tunnels	km	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Company Name	**Electricity Invercargill Limited**
AMP Planning Period	**1 April 2014 – 31 March 2024**

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

12b(i): System Growth - Zone Substations

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
Doon Street	21	23	N-1	12	91%	-	N/A	No constraint within +5 years	Decommissioned - replaced by new substation at Spey Street
Leven Street	21	23	N-1	12	90%	23	97%	No constraint within +5 years	
Southern	16	-	N	23	-	23	84%	No constraint within +5 years	Substation upgrade to N-1 following growth trigger
Racecourse Road	14	-	N	23	-	-	N/A	No constraint within +5 years	
Spey Street	-	-	N-1	-	-	36	92%	No constraint within +5 years	New substation as relocation of Doon Street substation
[Zone Substation_06]					-			[Select one]	
[Zone Substation_07]					-			[Select one]	
[Zone Substation_08]					-			[Select one]	
[Zone Substation_09]					-			[Select one]	
[Zone Substation_10]					-			[Select one]	
[Zone Substation_11]					-			[Select one]	
[Zone Substation_12]					-			[Select one]	
[Zone Substation_13]					-			[Select one]	
[Zone Substation_14]					-			[Select one]	
[Zone Substation_15]					-			[Select one]	
[Zone Substation_16]					-			[Select one]	
[Zone Substation_17]					-			[Select one]	
[Zone Substation_18]					-			[Select one]	
[Zone Substation_19]					-			[Select one]	
[Zone Substation_20]					-			[Select one]	

[1] *Extend forecast capacity table as necessary to disclose all capacity by each zone substation*

12b(ii): Transformer Capacity

	(MVA)
Distribution transformer capacity (EDB owned)	N/A
Distribution transformer capacity (Non-EDB owned)	-
Total distribution transformer capacity	#VALUE!
Zone substation transformer capacity	N/A

Company Name	**Electricity Invercargill Limited**
AMP Planning Period	**1 April 2014 – 31 March 2024**

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

12c(i): Consumer Connections

Number of ICPs connected in year by consumer type

		Number of connections					
		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	for year ended	**31 Mar 14**	**31 Mar 15**	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**
	*Consumer types defined by EDB**						
	Customer Connections (≤ 20kVA)	16	16	16	16	16	16
	Medium Connections (21 to 99kVA)	1	1	1	1	1	1
	≥ 100kVA Customer Connections	1	1	1	1	1	1
	Connections total	18	18	18	18	18	18

**include additional rows if needed*

Distributed generation

	Number of connections	10	20	25	30	30	30
	Installed connection capacity of distributed generation (MVA)	0	0	0	0	0	0

12c(ii) System Demand

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	Maximum coincident system demand (MW) for year ended	**31 Mar 14**	**31 Mar 15**	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**
	GXP demand	61	62	62	63	64	65
plus	Distributed generation output at HV and above	-	-	-	-	-	-
	Maximum coincident system demand	61	62	62	63	64	65
less	Net transfers to (from) other EDBs at HV and above	(3)	(3)	(3)	(3)	(3)	(3)
	Demand on system for supply to consumers' connection points	64	65	66	67	68	69

Electricity volumes carried (GWh)

	Electricity supplied from GXPs	254	255	256	258	259	260
less	Electricity exports to GXPs	-	-	-	-	-	-
plus	Electricity supplied from distributed generation	-	-	-	-	-	-
less	Net electricity supplied to (from) other EDBs	(19)	(19)	(19)	(19)	(19)	(19)
	Electricity entering system for supply to ICPs	272	274	275	276	278	279
less	Total energy delivered to ICPs	258	259	260	262	263	264
	Losses	14	15	15	15	15	15
	Load factor	49%	48%	48%	47%	47%	46%
	Loss ratio	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%

Company Name	**Electricity Invercargill Limited**
AMP Planning Period	**1 April 2014 – 31 March 2024**
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							
8		*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
9	for year ended	**31 Mar 14**	**31 Mar 15**	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**
10	**SAIDI**						
11	Class B (planned interruptions on the network)	4.8	4.0	4.0	4.0	4.0	4.0
12	Class C (unplanned interruptions on the network)	19.8	22.7	19.3	18.9	18.5	18.1
13	**SAIFI**						
14	Class B (planned interruptions on the network)	0.02	0.02	0.02	0.02	0.02	0.02
15	Class C (unplanned interruptions on the network)	0.46	0.50	0.49	0.49	0.48	0.48

G. Appendix – Schedule 13

Summary of Asset Management Maturity Assessment Tool (no change from previous AMP);

Company Name	Electricity Invercargill Limited
AMP Planning Period	1 April 2014 – 31 March 2024
Asset Management Standard Applied	PAS 55: 2008

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY

This schedule requires information on the EDB'S self-assessment of the maturity of its asset management practices .

Question No.	Function	Question	Score	Maturity Level Description
3	Asset management policy	To what extent has an asset management policy been documented, authorised and communicated?	3	The asset management policy is authorised by top management, is widely and effectively communicated to all relevant employees and stakeholders, and used to make these persons aware of their asset related obligations.
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?	3	All linkages are in place and evidence is available to demonstrate that, where appropriate, the organisation's asset management strategy is consistent with its other organisational policies and strategies. The organisation has also identified and considered the requirements of relevant stakeholders.
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?	3	The asset management strategy takes account of the lifecycle of 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?	3	Asset management plan(s) are established, documented, implemented and maintained for asset systems and critical assets to achieve the asset management strategy and asset management objectives across all life cycle phases.
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?	3	The plan(s) are communicated to all relevant employees, stakeholders and contracted service providers to a level of detail appropriate to their participation or business interests in the delivery of the plan(s) and there is confirmation that they are being used effectively.
29	Asset management plan(s)	How are designated responsibilities for delivery of asset plan actions documented?	4	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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)	3	The organisation's arrangements fully cover all the requirements for the efficient and cost effective implementation of asset management plan(s) and realistically address the resources and timescales required, and any changes needed to functional policies, standards, processes and the asset management information system.
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?	3	An effective process exists for determining the resources needed for asset management and sufficient resources are available. It can be demonstrated that resources are matched to asset management requirements.
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?	3	Evidence exists to demonstrate that outsourced activities are appropriately controlled to provide for the compliant delivery of the organisational strategic plan, asset management policy and strategy, and that these controls are integrated into the asset management system
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)?	3	The organisation can demonstrate that plan(s) are in place and effective in matching competencies and capabilities to the asset management system including the plan for both internal and contracted activities. Plans are reviewed integral to asset management system process(es).
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?	3	Competency requirements are in place and aligned with asset management plan(s). Plans are in place and effective in providing the training necessary to achieve the competencies. A structured means of recording the competencies achieved is in place.
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?	3	Competency requirements are identified and assessed for all persons carrying out asset management related activities - internal and contracted. Requirements are reviewed and staff reassessed at appropriate intervals aligned to asset management requirements.
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?	3	The organisation has established documentation that comprehensively describes all the main elements of its asset management system and the interactions between them. The documentation is kept up to date.
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?	3	The organisation has determined what its asset information system should contain in order to support its asset management system. The requirements relate to the whole life cycle and cover information originating from both internal and external sources.
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?	3	The organisation has effective controls in place that ensure the data held is of the requisite quality and accuracy and is consistent. The controls are regularly reviewed and improved where necessary.
64	Information management	How has the organisation's 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?	3	Identification and assessment of asset related risk across the asset lifecycle is fully documented. The organisation can demonstrate that appropriate documented mechanisms are integrated across life cycle phases and are being consistently applied.
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?	3	Outputs from risk assessments are consistently and systematically used as inputs to develop resources, training and competency requirements. Examples and evidence is available.
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?	3	Evidence exists to demonstrate that the organisation's legal, regulatory, statutory and other asset management requirements are identified and kept up to date. Systematic mechanisms for identifying relevant legal and statutory requirements.
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?	4	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	3	The organisation have defined the appropriate responsibilities and authorities and evidence is available to show that these are applied across the business and kept up to date.
105	Audit	What has the organisation done to establish procedure(s) for the audit of its asset management system (process(es))?	3	The organisation can demonstrate that its audit procedure(s) cover all the appropriate asset-related activities and the associated reporting of audit results. Audits are to an appropriate level of detail and consistently managed.
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?	3	Mechanisms are consistently in place and effective for the systematic instigation of preventive and corrective actions to address root causes of non compliance or incidents identified by investigations, compliance evaluation or audit.
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?	2	Continuous improvement process(es) are set out and include consideration of cost risk, performance and condition for assets managed across the whole life cycle but it is not yet being systematically applied.
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.

6. Approval by Board of Directors

Certification for Year-beginning Disclosures

We, Neil Douglas Boniface 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 2.6.1 and subclauses 2.6.3(4) and 2.6.5(3) 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's corporate vision and strategy and are documented in retained records.

N D Boniface

R L Smith

Date: 27.3.14