Electricity Asset Management Plan Update

Information Disclosure 2015

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1 INTRODUCTION

This Asset Management Plan (AMP) Update has been prepared to inform Vector's customers and other stakeholders of material changes and updates to our asset management planning since 31 March 2014, when the last Electricity AMP Update (2014-2024) was published.[1] In particular it contains updated 10-year capital investment and maintenance programmes for the electricity distribution network. These have been revised to reflect new improvement programmes initiated over the course of the last year, ongoing analysis of the performance, condition and forecast future growth and reinforcement requirements of the network assets, as well as additional information received from third parties, such as re-confirmation of Auckland Council's projections on forecast housing growth across the network over the next 5-10 years.

Since the last AMP Update was published in March 2014, there have been two developments of material significance that have primarily driven the more significant changes in this AMP. Firstly, we are adopting a more aggressive stance to our forecast decline in network demand over the next 10 years, to incorporate a 25% reduction in demand per ICP over this period (described in more detail in section 2). Secondly, the Default Price Path (DPP) has been reset by the Commerce Commission (the Commission), taking effect from 1 April 2015, for the next 5 years. In finalising the expenditure forecasts, consideration has been given to the effect of this reset on the affordability of the capital and operational works programme, and the need to appropriately manage the potential associated risks to quality of service to customers.

2 UPDATE TO NETWORK DEVELOPMENT PLANNING

This section discusses factors that lead to material changes to the network development plan described in section 5 of Vector's 2013 AMP and the subsequent 2014 AMP Update.

2.1 The Auckland Plan and Vector's Network Development Plan

The Auckland Plan was released in March 2012, identifying a shortfall of 20,000-30,000 new dwellings in Auckland and a need for 13,000 new homes each year for the next 30 years.

The Housing Accords and Special Housing Areas Act was enacted in 2013 along with the Housing Accords and Special Housing Areas (Auckland) Order 2013 identifying areas to be included as accelerated housing areas. This was followed by an amendment to the 2013 Order in June 2014 to include a fourth tranche of green and brownfields sites suitable for redevelopment[2]. Overall, the four tranches identified 80 separate locations across the Auckland region as suitable for accelerated development.

Goals set by the Government and Auckland Council as part of the Auckland Housing Accord, include targets for new residential building consents over the next three years as shown in Table 1. The first year of the Housing Accord was completed at the end of September 2014 and Table 1 shows the number of consents issued compared to the new electricity connections achieved over the same period.

[1] A copy of this AMP is available on the Vector website, at http://vector.co.nz/disclosures/electricity/amp

[2] http://www.aucklandcouncil.govt.nz/EN/ratesbuildingproperty/housingsupply/Documents/overviewoftranches1234.pdf

	Prior year	Year 1[3]	Year 2	Year 3
Housing Accord consents target	-	9,000	13,000	17,000
New dwellings consented	5,648	7,366	-	-
New electricity connections (typically lags slightly behind consents)	5,530	6,519	-	-

Table 1 : Auckland Housing Accord targets for residential housing consents

At a more granular level Figure 1 shows monthly new-building consents, compared to gross[4] electricity connections. The growth trend in new electricity connections mimics the issuance of building consents.

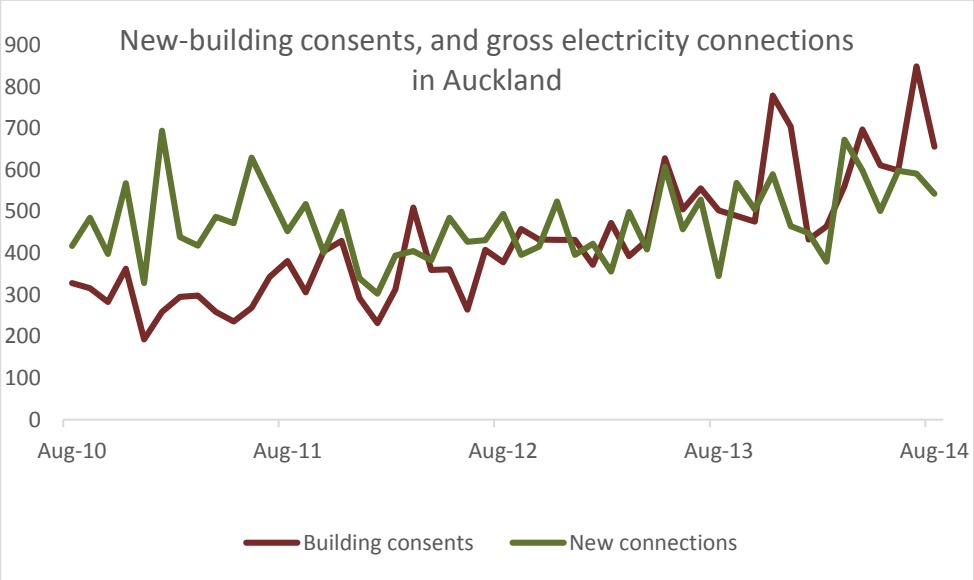

Figure 1 : New building consents, new electricity connections

2.1.1 Vector's Growth Forecast

Last year Vector commissioned Covec[5] to independently forecast connection rates on the Auckland electricity network. Their study considered population growth, household growth, national and Auckland economic projections, the property market, and building consents in the context of the Housing Accord and the draft Unitary Plan. Covec's study separately calculated the expected connection rate for residential, small-medium enterprise (SME) and industrial/large commercial (I&C) based on high, medium and low growth scenarios.

Figure 2 shows the gross connection forecasts provided by Covec and the associated year end forecast of Vector's new-connection numbers. Early forecasts indicate gross connection for Vector's June 2015 financial rate of about 7,200 which is very close to Covec's "medium" forecast last year.

[3] October 2013 – September 2014

[4] The net connection figure is 5,126 for the 12 months from Oct 2013 to September 2014 after disconnects/reconnects/decommissioned sites are factored in (cf. 3,530 for 2012/13 period)

[5] For a description of the analysis behind Covec's forecast refer to Vectors 2014 Electricity Asset Management Plan http://vector.co.nz/disclosures/electricity/amp

A further update from the Council in September 2014 based on projections completed in May did not materially change their previous forecasts, and with no additional contrasting forecast information, we believe the "medium" connection rate forecast by Covec in 2013 remains the best forecast to use, and is therefore retained as the basis for the growth forecasts in this AMP.

However, Vector is conscious that since demand growth on the network is driven largely by ICP growth, over-forecasting of connections numbers could lead to excess asset investment in growth and reinforcement projects – a situation which is difficult to rectify. On the other hand, should actual demand growth exceed forecast levels, this situation can be addressed relatively easily, by increasing network capacity to reflect actual growth rates. As such, Vector very deliberately adopts a 'just-in-time' approach to growth and reinforcement projects and will not invest unless demand requirements are clearly evident. This requires keeping a close watch on actual network growth, adjusting forecasts and network plans put forward in this AMP Update as necessary.

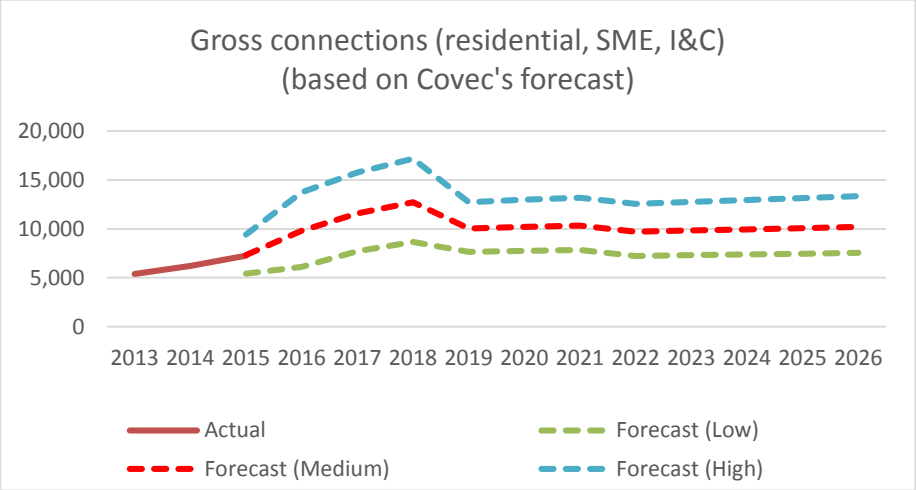

Figure 2 : Forecast gross electricity connections based on Covec's growth forecasts.

Although gross connection figures are important for forecasting the number of new service connections that will be required on the network, net connections forecasts (which also take into account disconnections) are used for predicting load demand and utilisation forecasts. Vector's net connections forecast is depicted in Figure 3 and is reflective of the Commerce Commission Information Disclosure numbers.

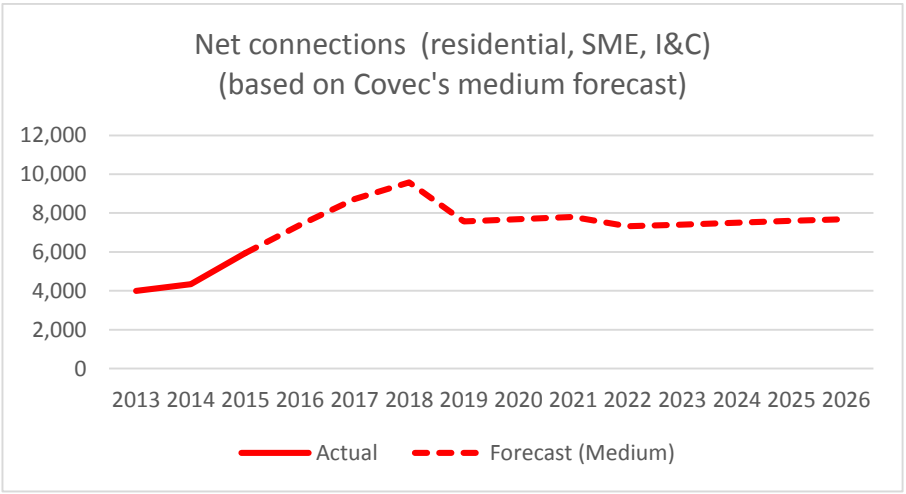

Figure 3 : Net connection numbers based on Covec's "medium" forecast

2.1.2 Location of Network Growth

A fourth tranche of Special Housing Areas (SHAs) is expected to add a further 11,000 new homes and sections in the Auckland area over the next three years[6]. The forecast to 2026 is 76,000 new dwellings and sections to be added to the housing stock, of which 36,000 are expected from the SHA's[7].

Vector's short term modelling has been based on the location of SHA's, known greenfield developments and zoning changes. Brownfield developments are included as organic growth in the forecast, using population growth as the proxy. Longer term demand forecasts default to population growth rates as a proxy for demand growth,[8] in line with guidance on specific growth areas provided in the Council's longer term development plans (our modelling has assumed that 95% of projected Auckland Region growth will occur within Vector' supply area).

2.1.3 Network Demand Trends

As can be seen from the historical figures represented in Figure 4 below, the average demand per ICP has decreased steadily over the last ten years. Over this time we have seen demand per ICP reduce by 7-8% (in the same order of magnitude as annual energy volumes per ICP which have reduced by 8-10% over the same period). In addition, with the advent of new technologies such as battery storage becoming more developed and economically viable, we believe this decline in network demand will accelerate even further over the next 10 years, with residential ICP demand potentially decreasing by as much as 25% over this time period.

It should be noted that Vector actively differentiates between 'demand' and 'energy use' when determining future network growth or reinforcement requirements. Peak 'demand' is measured by the one half-hour in the day where energy usage is at its highest, and when assessed on a substation by substation basis is what drives the need for additional reinforcement on the network if this increases. However, demand can decrease significantly without overall energy usage changing – it just means that energy use is being more evenly distributed throughout the day (the peak just becomes smaller and more spread). Apart from being used to understand asset utilisation (load factor) figures, overall energy use is not actively used or needed when considering the majority of network planning requirements (and is therefore not extensively referenced in this AMP Update). However it is needed for revenue calculation purposes and is therefore still an important measure for the business to understand and forecast accurately.

The impact of new technologies on energy use per ICP is less clear, and at this stage we are still forecasting network energy volumes declining at historical rates, with no additional acceleration, although we will update this view as more analysis work is completed.

[6] http://www.aucklandcouncil.govt.nz/EN/ratesbuildingproperty/housingsupply/Documents/aucklandhousingaccordmonitoringreportthree.pdf

[7] Ibid.

[8] See Electricity Asset Management Plan 2013 – 2023 Section 5, pg21

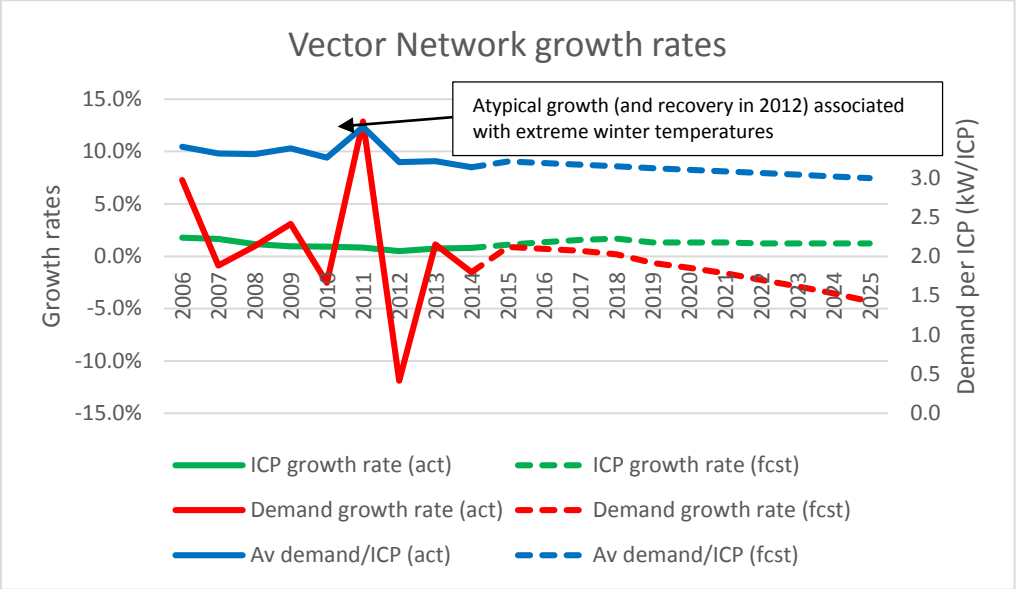

Figure 4 : Trend line showing average demand growth per ICP in comparison to Vector's coincident network peak demand growth

In contrast, as can be seen in Figure 5, Vector's coincident maximum demand has remained relatively flat over the last 10 years with the notable exception of a peak in 2011 (attributed to a polar blast on 14-17 August which delivered far colder temperatures (including snow) to the Auckland region). This flat trend is a result of the average demand per ICP decrease being balanced by the growth in Auckland's population over the same period – a steady increase from 495,300 connections in 2005 to 543,580 in 2014.

While the connection growth rates continue to increase up to a maximum of 1.7% per annum (boosted by the Council's accelerated housing construction programme) this is expected to reduce to a level of about 1.2% per annum towards the latter end of the 10 year period. Vector's coincident demand is therefore also expected to increase in the short-term, mimicking the connection profile albeit at a lower growth rate due to the continued decrease in average demand per ICP. However, in the latter half of this 10 year period, we anticipate that demand decreases per ICP will outstrip the growth in ICP numbers, and overall coincident demand will start to drop.[9]

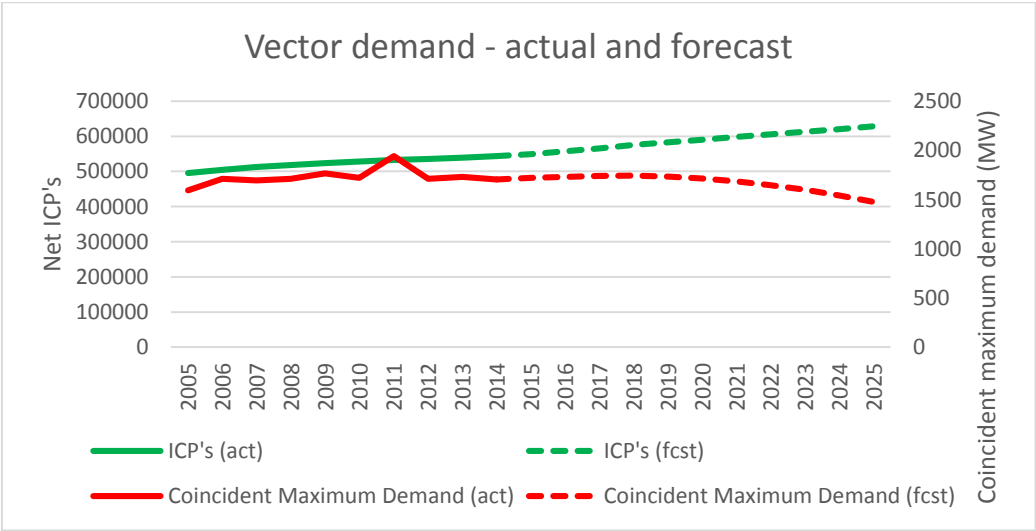

Figure 5 : Chart showing Vector's network demand compared to total connected ICP's

[9] Note this represents a long term trend and does not factor in short term adverse weather events.

2.1.4 Growth Impact on Network Reinforcement

While demand growth at the level of Vector's coincident maximum demand has remained low over the last few years, when disaggregated to a zone substation level this provides a clearer picture of some of the drivers behind the investment decisions captured in Vector's growth initiated capital works programme. Some geographical regions have experienced little or no population growth over the last few years and therefore overall demand at these substations has decreased due to continuing decline in demand per ICP (therefore requiring no additional investment). However, in other areas, population growth has been far more pronounced (more than offsetting the decline in demand per ICP) and so investment in reinforcement projects has been necessary, despite an overall flat demand increase at the network level. We expect this trend to continue, with a significant number of growth projects still required over the coming 10 years, despite a drop in overall network demand.

To help illustrate this issue, Figure 6 shows the average demand growth rate over the last five years at a zone substation level. This chart focuses on the maximum demand of the individual substations which shows a different picture from the overall network demand, as described above.

Greenfields developments are driving the expansion of HV reticulation and the construction of new zone substations into areas where currently there is no supply or, at best, a small capacity supply. In-filling or brownfields developments are the key drivers for the reinforcement of existing substations.

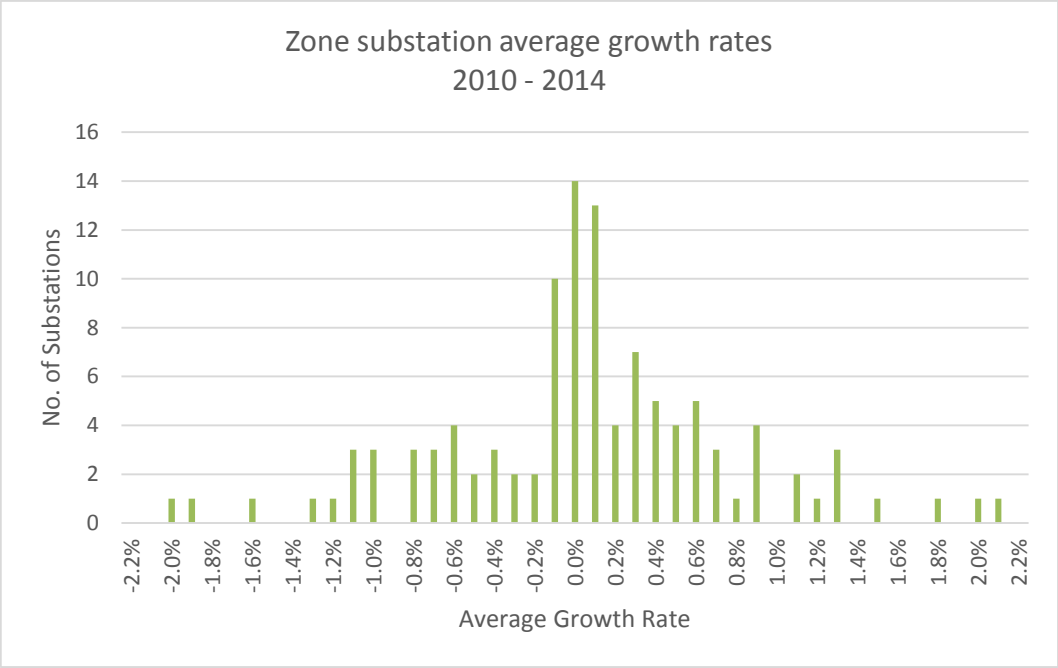

Figure 6 : Historic average demand growth rates of Vector zone substations

When determining the types of growth reinforcement projects that will need to be completed on the network, we have assumed the majority of demand decreases will impact the sub-transmission network (>11kV), whereas there is less certainty over the reduction in demand on the 11kV and 400V networks. Until some of the newer technologies emerge and become more mature (e.g. bulk storage and distributed generation options), it is less certain how the 400V and 11kV networks will be utilised – they may be additionally used for distribution of alternative lower voltage energy sources to give consumers more flexibility in where they source their power from - therefore such large drops in demand may not always be seen at distribution voltage levels. Reduction in distribution

reinforcement requirements will therefore be monitored closely by Vector, and at this stage expenditure on distribution reinforcement projects has not been reduced in our long term forecasts.

2.2 Future Disruptive Consumer Technology

Historically the rate of load growth on Vector's distribution network has been closely correlated to the rate of housing growth and economic activity. Although we expect this trend to continue in the short term, in the coming decades the rate of load growth is expected to diverge significantly from these established trends due to both energy efficiency measures on demand (as discussed in section 2.1.3 above) and the anticipated uptake of so called 'disruptive' technologies. Of particular note is the expected increase in electrification of heating as well as potential future transport technologies; sectors of energy use that are currently dominated by other fuels. The increasing proliferation of distributed generation technologies and increasingly stringent regulations on the net energy performance of buildings, will also impose significant new stresses on the network.

Vector has been monitoring the development trend of disruptive consumer technologies, and their potential effects on the network's ability to deliver quality service to its customers. Particularly challenging from a forecasting perspective is that the uptake of these disruptive technologies is consumer driven and down to individual customer choice. This makes it more difficult for us to predict with any certainty when the 'tipping point' will occur where we will see a material impact on the network. That said, all of our modelling to date implies that this will be sooner rather than later, especially if clustering of particular technologies occurs in localised parts of the network.

The main technologies that are currently expected to have the greatest impact on the low voltage network are heat pumps (particularly in summer), photovoltaic panels, and electric vehicles.

2.2.1 Heat Pumps

Although heat pump uptake in NZ has been relatively high compared to other western countries, their usage so far (specifically for domestic use) seems to be mainly for winter heating. As residential users get more comfortable with heat pumps and summer temperatures continue to rise over the long term, it is anticipated that they will also be used more for summer cooling. If this is the case, heat pumps used by residential customers for summer cooling will cause a substantial peak demand due to the higher ambient temperatures but only for a relatively short period of time in a year. This load profile results in a disproportionately low energy usage relative to the peak demand they cause. In addition, higher ambient temperatures also unfortunately temporarily de-rates network equipment capacity and this therefore increases the impact on network performance. Based on research by BRANZ[10], between 65% and 95% of domestic heat pumps will be used for cooling over the period 2009 to 2041. In our modelling[11] we have assumed that 70% of installed domestic heat pumps will be used for cooling between 2015 and 2060. Figure 7 shows the domestic heat pump uptake (as a percentage of the housing stock) forecast in the Vector supply area in Auckland under three scenarios (low, central and high). This has been extrapolated from BRANZ data.

[10] Nigel Isaacs et al., "Energy Use in New Zealand Households", BRANZ Study Report SR 221, Final Report on the Household Energy End-use Project (HEEP)," BRANZ, 2010.
[11] Refer to section 2.3 of this AMP Update.

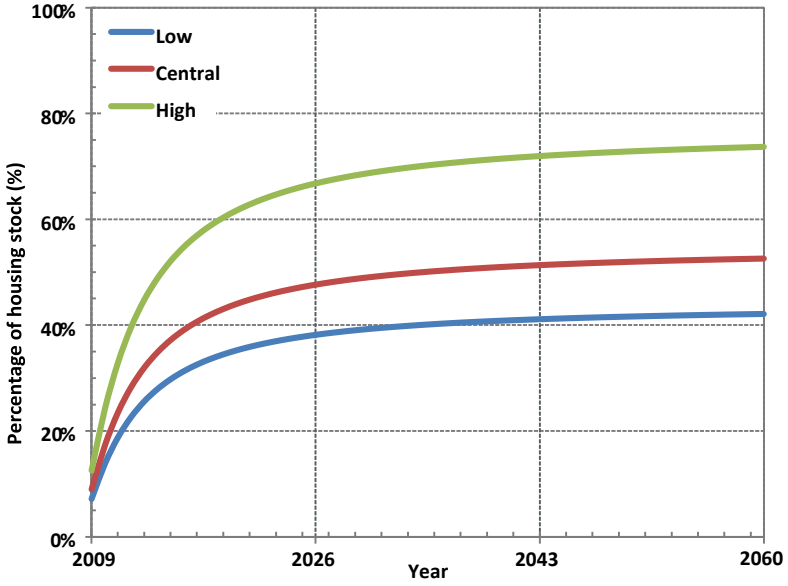

Figure 7 : Domestic heat pump uptake rate for Auckland region

2.2.2 Solar Photovoltaic Panels

Photovoltaic (PV) generation produces electricity when the sun is shining, which usually occurs in the afternoon. In winter, the PV generation subsides before the evening peaks. The PV panels do not help in reducing the peak demand but reduce the energy throughput in the distribution network and hence the associated revenue. In summer, residential PV installations will be most productive in low demand periods (particularly during the Christmas / New Year holidays) and in years to come as solar PV installations become larger in number (particularly when installed in clusters), may therefore cause high voltages in pockets within the distribution network, unless further network reinforcement is undertaken or batteries are also included as part of the PV installation.

Figure 8 and Figure 9 show Vector's forecast of PV uptake and PV generation capacity under three different uptake scenarios. Uptake rate of solar PV is very difficult to predict, with overseas uptake rates (and associated customer drivers) difficult to translate to the New Zealand market. We have therefore deliberately chosen a broad range between our low and high scenarios.

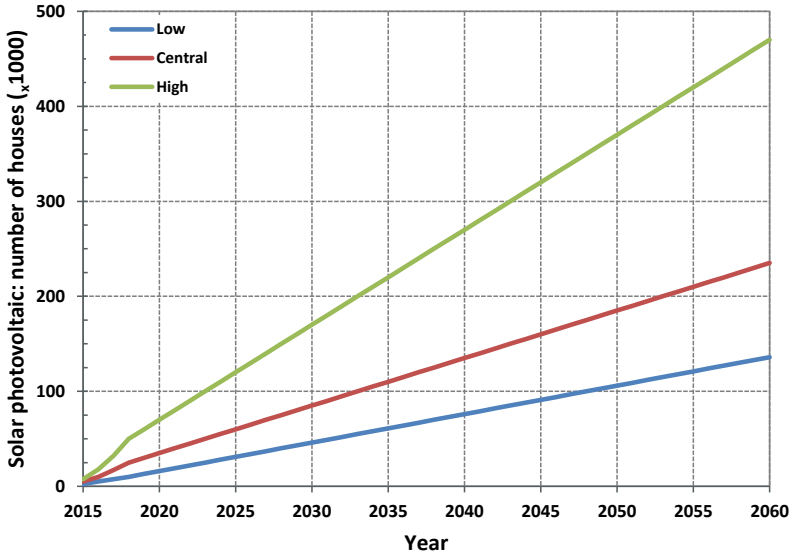

Figure 8 : Solar PV uptake scenarios against housing stock

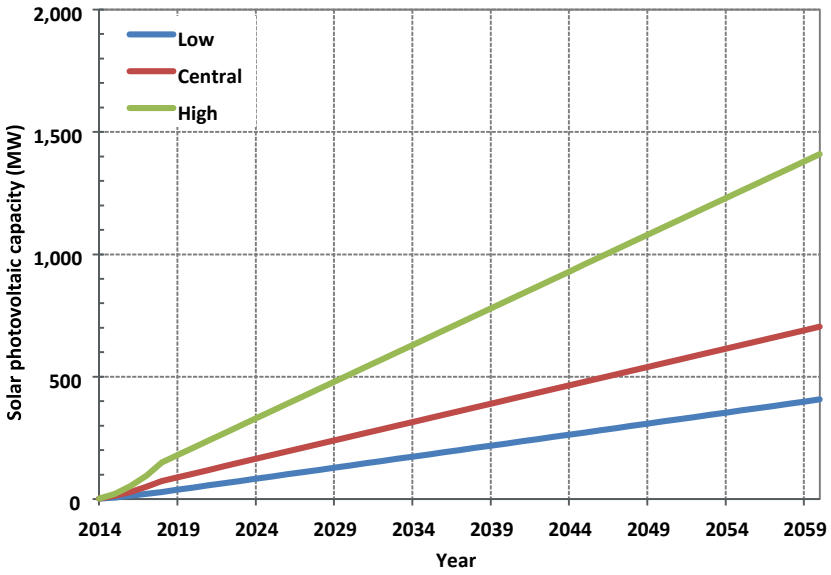

Figure 9 : Solar PV uptake scenarios against capacity

2.2.3 Electric Vehicles

Electric Vehicles (EV) can currently be recharged using a slow mode (~3kW) or a fast mode (~20kW). When a group of EVs are being charged over the same period of time (for example when residential users plug–in to recharge after returning home from work in the evening), the network will lose the usual benefit of diversity and the charging has to be managed carefully so that they will not coincide with the underlying network peak. Future incentives such as lower night time rates, etc. and new technology to manage the charging sequence and speed, may be needed to entice consumers to slow charge their EVs overnight or in interruptible mode so as to reduce excessive demand (and associated power quality issues) and network investments.

Based on research information by New Zealand Centre for Advanced Engineering (CAENZ),[12] Figure 10 shows Vector's forecast of EV uptake under the three different growth scenarios. Vector understands that mainly three kilowatt charging stations are being installed on our network, and so these have been used for modelling purposes. Based on these uptake scenarios, our initial modelling implies that electric vehicles will have a limited impact on Vector's network over the next 10 years.

[12] CAENZ, 2010. "Electric Vehicles Impacts on New Zealand's Electricity System", Technical Report, New Zealand Centre for Advanced Engineering, Dec 2010.

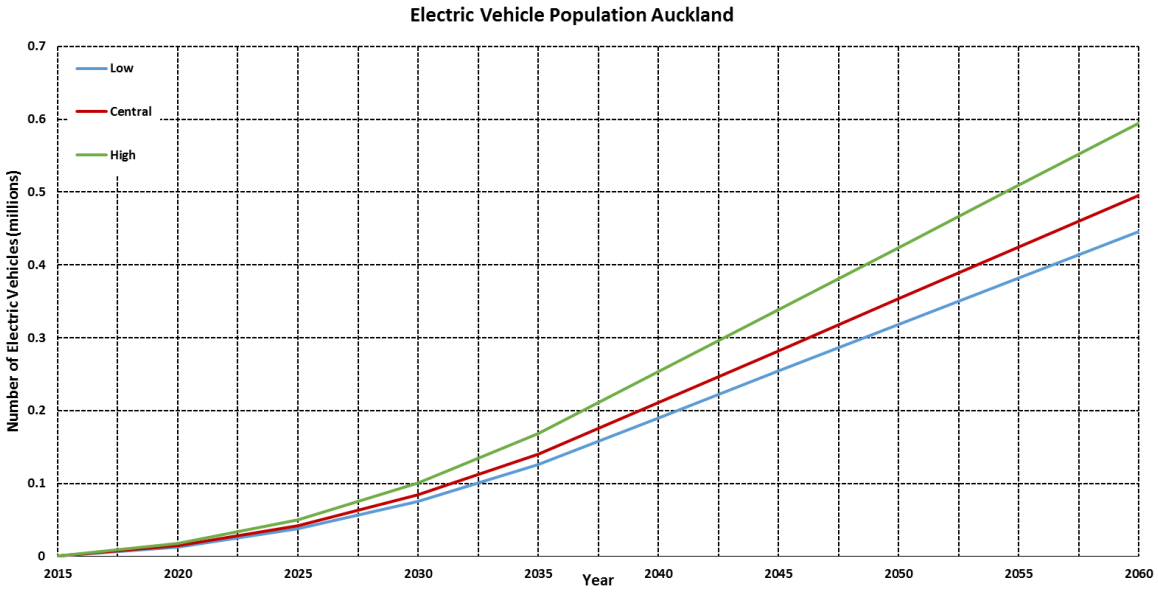

Figure 10 : Electric Vehicle uptake scenarios

2.3 Transform Model

As discussed in section 2.2 above, Vector's electricity system is facing a challenging period ahead as customers purchase new technologies and their demand habits change.

The spread of these new technologies on networks will not be uniform and will pose different challenges to different network areas, such as in rural and urban contexts. To address this in an effective and cost-efficient way, a range of solutions will be required comprising a mix of new and conventional technologies. Decisions will need to be taken regarding the optimal investment strategy to ensure that the needs of customers are met while not compromising the quality of supply and security of power distribution.

The key is understanding the resulting impact on the distribution network, in particular the ability to understand and plan the likely best investments that ensure the grid can sufficiently meet the demands of the network in 20-30 years' time, while minimising abortive costs and stranded assets.

Over the course of 2014, Vector worked with EA Technology (UK) to develop a parametric model of the distribution network (based on a similar model which has now been adopted by all UK electricity network utilities as well as the UK regulator) which can be used to explore the anticipated future demands on the network that come from disruptive technologies such as those described above. Using different investment scenarios ranging from the further investment in "conventional" network reinforcement practices, to that employing varying degrees of "smart" technology, the Transform model can determine the best investments for Vector's distribution network to ensure the network can sufficiently meet future demands.

Merit order ranking based on criteria such as expenditure (capex and opex), disruption (a factor applied to the installation and operation of the solution), cross-network benefits (the solution applied to one part of the network delivers solutions to other parts), flexibility (ability to relocate/reuse the solution elsewhere on the network) and life expectancy of the solution is then used to compare solutions (see Figure 11).

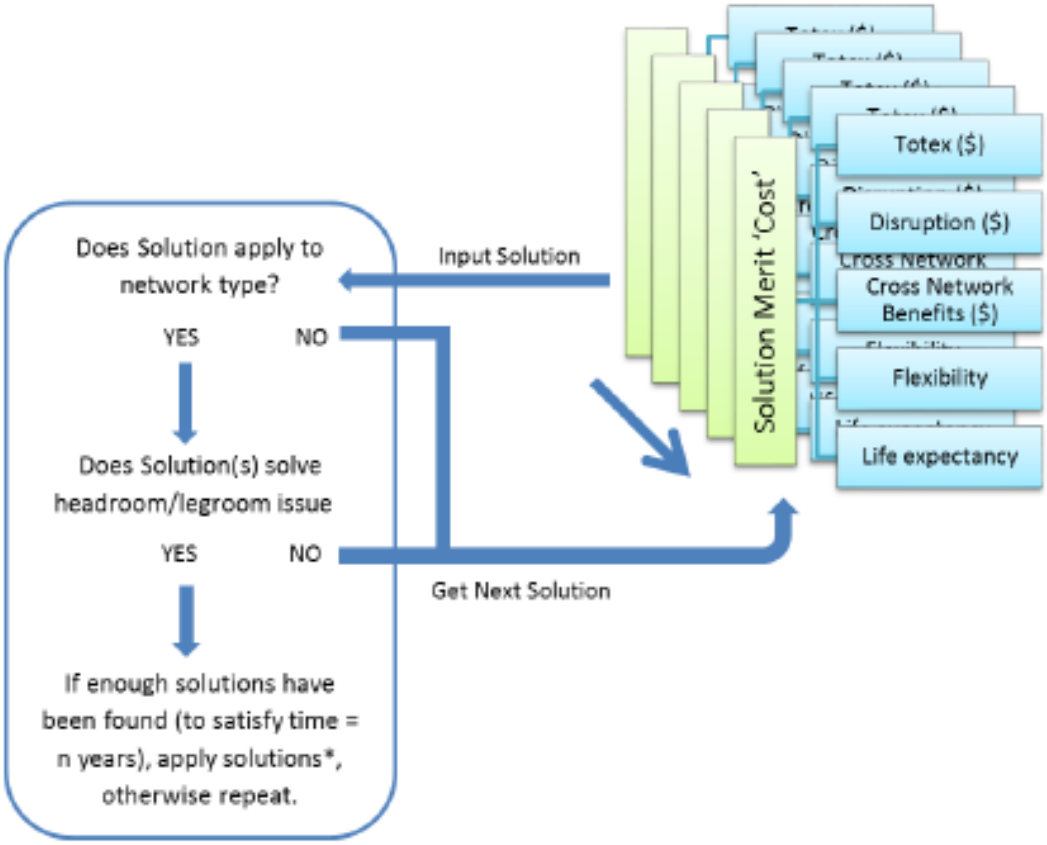

Figure 11 : Flow chart showing how solutions are applied in the Transform Model from the Merit Order Stack

The objective is to identify the optimal strategy for future network investments that improves network utilisation, avoids taking on further risk, whilst lowering costs.

Although initial results from the model are only preliminary and require significantly more analysis over the course of the next year or so (e.g. updating and re-running the model with recent pricing reductions seen in the battery storage market), the high level messaging is reasonably clear and provides some interesting results.

Firstly, the majority of investment to counter the potential effects of these disruptive technologies will occur at the LV (415V) and MV (11kV) voltage levels (see Figure 12). This is to be expected owing to the bottom up nature of the model and the fact that the majority of the change in terms of customer behaviours and connections of new technology that will be seen owing to disruptive technologies, occur at the lower voltages. We also anticipate that the indicated additional reinforcement requirements on the HV (33kV) and EHV (110kV) parts of the network to counter disruptive technology impacts, will be more than offset by the overall reduction in reliance on the sub-transmission network that we have highlighted in section 2.1.4.

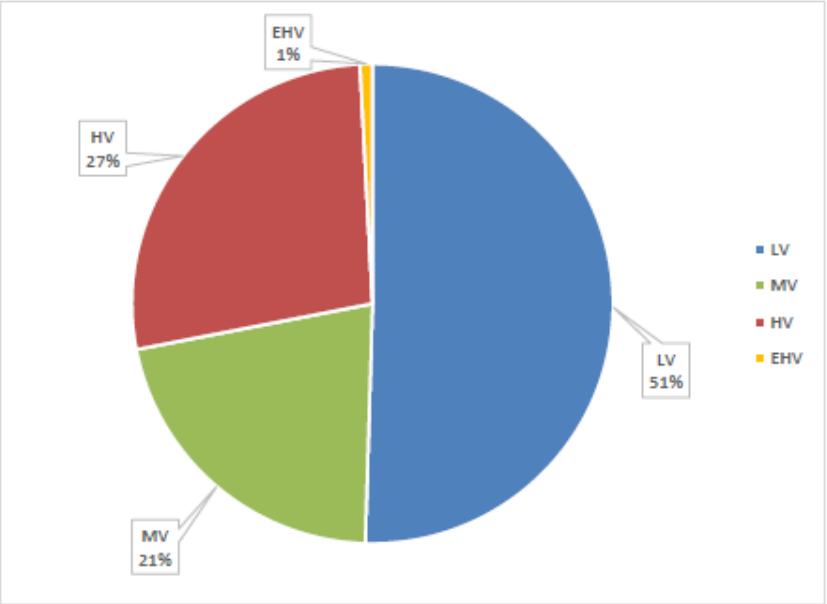

Figure 12 : Ratio of discounted investment figures per voltage level, 2015-2060

The results also clearly confirm that continued investment in conventional network technology cannot be avoided but there are opportunities for the extraction of further value from the existing network by investment in smart network tools. A breakdown of the top 10 solutions selected from the Model based on initial scenario modelling is shown in Table 2, along with the associated enabling technologies that would also need to be deployed shown in Table 3.

Top solutions picked by the Transform Model
LV Ground mounted MV/LV Transformer
LV Pole mounted MV/LV Transformer
Generator Providing Network Support e.g. Operating in PV Mode - LV
Real Time Thermal Rating for MV/LV transformers
Real Time Thermal Rating for MV Overhead Lines
Permanent Meshing of Networks - LV Urban
Active Network Management - HV
Temporary Meshing (soft open point) - MV
LV overhead Minor works
Permanent Meshing of Networks - LV Sub-Urban

Table 2 : Top 10 solution selection from the Transform Model

Top enablers picked by the Transform Model
Communications to and from devices – last mile only
MV/LV Transformer Monitoring
LV Circuit Monitoring (along feeder)
MV Circuit Monitoring (along feeder)
Weather monitoring
Advanced control systems - MV
Advanced control systems - HV
HV Circuit Monitoring (along feeder)
RMUs Fitted with Actuators
Dynamic Network Protection 11kV

Table 3 : Top 10 enablers' selection from the Transform Model

Finally, the model forecasts additional network reinforcement expenditure to counter the impact of disruptive technologies (on the basis of total discounted cost (TDC)) to be about $280m using only conventional (BAU) investment between now and 2060. Conversely, the least costly investment scenario forecasts a TDC of about $135m over 45 years using an incremental investment approach utilising smart solutions where appropriate. This latter approach translates into a cost investment of $3-4m a year over the next 10 years, which has been incorporated into our budget forecasts moving forward.

2.4 Future Network Technology

Fortunately, Vector is not the first utility to embark on the journey described above, and can take advantage of industry standards and methodologies that will help to ensure that some of the complex systems required are engineered effectively and efficiently. For example the system engineering approach described in IEC 62559's Intelligrid methodology and the unified US and Europe Smart Grid Architecture Model (SGAM) framework provide an industry-recognised blueprint for development of smart grids.

Some of the specific future technology initiatives that Vector is trialling and/or implementing using a standards-based, systems engineering approach are:

- Various distribution system automation projects are being implemented including automatic sectionalisers on long feeders, and more advanced communication systems.
- Improvement in visibility of low voltage system power flows and power quality, allowing better utilisation of equipment capacity, power quality improvements and reliability enhancement, involving:
    - Voltage, frequency and power factor measurements using Smart Meters to inform LV network operational decisions.
    - Electricity distribution network state estimation, which allows us to infer what power flows are occurring on any part of the low voltage network, which doesn't traditionally provide much visibility to the Operator.
    - Electricity distribution network demand side participation and management including direct load control of hot water and air conditioning systems. Suitable technology solutions to take us into the future are currently being investigated.

- Electricity distribution network real-time thermal rating, e.g. operating cables to measured maximum insulation withstand-temperature, rather than calculating what the temperature might be.

Progress on each of these initiatives will continue to be reported in subsequent Asset Management Plans.

2.5 Review of Security of Supply Standards

Over the last few months, Vector has started to review its Security of Supply Standards, including a full comparison to the updated EEA Guide for Security of Supply published in August 2013. Given the additional work we are also undertaking on defining the potential future shape of the network (based on changing consumer demands), work will continue next year on updating these standards, exploring potential leverage of security from growing distributed generation on the network, as well as exploring the changing security needs at different voltage levels as a result of how the network may be utilised by consumers moving forward.

We are anticipating that in the future consumers will have less reliance on the 33kV sub-transmission network, instead taking a significant amount of their primary supply from distributed generation at 11kV and below. 33kV will therefore be utilised more for security and bulk transfer purposes rather than as a primary supply source. If used more as a secondary source of supply, this implies that n-1 security could potentially be provided to customers by different mechanisms (n-1 being provided by the MV and LV networks instead), negating the need for n-1 security at the HV voltage level. Our security of supply standards will need to be updated to reflect this. The overall findings and conclusions from this review will form part of our 2016 Asset Management Plan.

3 LIFE-CYCLE ASSET MANAGEMENT CHANGES

This section discusses aspects that have led to material changes to Vector's asset life-cycle management practices compared to those previously described in Section 3 of the 2014 AMP Update and Section 6 of the 2013 AMP.

3.1 Safety in Design

Vector takes health and safety very seriously and is committed to ensuring that its operations do not put our employees, contractors or the public at risk. This extends to ensuring that safety is a key focus of the design phase of the work we do, because it is the design stage of creating assets that offers the greatest opportunity to incorporate safety for the whole life cycle of the asset.

Safety in design is about eliminating or controlling risks to health and safety as early as possible in the planning and design stage so that whatever is designed will be safe to construct, operate, repair and maintain and ultimately, safe to decommission and dispose of at the end of its life cycle. This concept is implicit in our work practice (such as adopting international engineering standards and practices).

Although we have implicitly always incorporated safety features into our asset designs, up until recently this has not been considered a specific, measurable part of the design process and as such was potentially not fully optimised. Vector have now developed a clear policy on safety in design which is embedded in our Health Safety and Environmental management system. Our policy is to ensure, as far as is reasonably practicable, that all

measures are taken during engineering design to avoid injury and ill health to those who construct, operate, maintain, decommission or demolish a Vector asset.

Broadly speaking, safety in design at Vector is implemented via three work streams and will continue to be developed over the course of the 2016 regulatory year:

- Review all internal design standards and guidelines on a regular basis to specifically highlight safety in design considerations, as well as identify any areas where improvement is required in the area of safety in design.
- Roll-out of a comprehensive suite of safety in design reviews that can be conducted at the appropriate stages of the design process, ensuring all aspects of safety throughout an asset's lifecycle can be considered and optimised at the design stage.
- Review incidents in field operations and proactively seek feedback from our service providers on an ongoing basis, incorporating relevant lessons learned into our engineering design standards and guidelines.

The aim is to have the first two work streams completed in early 2015. The third work stream will be an ongoing work process.

3.2 Critical Spares

Maintaining appropriate levels of spare parts is vital to effective remedial maintenance actions and fault response, avoiding potentially prolonged outages. It is therefore important that Vector maintains appropriate levels of spares for critical assets, stores them in the correct fashion to maintain serviceability, and has them readily accessible for maintenance service providers.

By early 2015 Vector will have completed a review of our existing critical spares holdings, confirming those spare components that it must hold or have readily available via its suppliers. An output of this review will also include a statistical calculation methodology for ongoing use, to better inform the timing of purchases and the quantity of spares that need to be held for each asset class.

Changes in current spares holdings will be reflected in future capital investment programmes.

3.3 Condition Based Risk Management (CBRM)

CBRM is a registered Trademark of EA Technologies, which developed a maintenance prioritisation tool for UK utilities some years ago that is now in widespread use in many utilities across the world, in various forms. The tool uses asset condition data and a criticality assessment to derive a dollar value for the avoided risk associated with maintaining a particular asset. This can then be used to prioritise maintenance activities.

Vector has begun implementing a risk-based maintenance prioritisation system for its electricity assets that will either utilise the EA Technology tool or software developed in-house that will deliver similar outcomes. We expect to have this in full use by the end of 2016.

3.4 Load Management Systems

Vector is currently investigating load management technologies that will best serve our customers and the needs of the electricity network over the next few decades.

Changes in consumer technology (as discussed in section 2.2) are expected to significantly change the demand profile on the electricity network. For example if there is large uptake

of electrical vehicles, most of the battery charging will take place in the early evening or overnight, more household solar PV will reduce demand during daylight hours, and any embedded battery systems (including those in electric vehicles) could conceivably be utilised to service peak network demand.

It follows that demand management (load control) is expected to be an important part of our future network development strategy, notwithstanding any business opportunities that it might create.

In conjunction with the above review, and in light of outages on the Northern network Pilot Wire Hot Water Control System during storms in 2014, the pilot wire system for hot water load control is being progressively decommissioned. This decision was made after determining that it is not cost effective to upgrade or re-design it to meet any existing load control needs of the network, yet it is clear from customer feedback that the recent performance of this system is not satisfactory to meet ongoing consumer needs.

3.5 Asset Information Management Strategy

Vector has been revising its asset information strategy, aspects of which will address issues identified by a recent benchmarking audit completed against ISO55000 (see Section 4).

In particular Vector is implementing a five-year plan to achieve:

- **Legacy data improvement**. Much of the asset data inherited from United Networks upon its purchase was incomplete and inaccurate, as is much of the data inherited from Mercury for assets more than 20 years old. Systematic efforts are being made to verify data accuracy and map existing systems to complete our data.
- **Better reporting tools**. Vector's Asset Information Team is routinely called upon to produce asset performance reports to inform operational decisions as well as Commerce Commission information disclosure requirements. To this end the team is developing data warehousing facilities that will allow one-touch retrieval of data using an SQL (Structured Query Language) based reporting solution. The ultimate objective is to provide a comprehensive suite of tools to allow stakeholders in the organisation to manage their own reporting requirements.
- **Mobile data capture and audit**. The Asset Information Team is working with our Service Delivery team and Vector's field service providers to develop mobile data gathering and quality verification tools to allow easy capture of accurate asset characteristic and condition data, including 3-dimensional GPS coordinates for buried assets such as cables and pipes.
- **System integration.** Vector runs a plethora of data management systems, each originally purchased to meet a specific need but not necessarily within the context of an overall roadmap. Our objective is to integrate useful systems either by providing a common portal, synchronising databases, and retiring systems that have been superseded. System integration will allow us to develop a B2B (Business to Business) gateway approach for all interfaces with our service providers' own applications, which will provide considerably more flexibility and efficiency.
- **Condition Based Risk Management.** Vector's initiative to develop a condition based risk management system (Section 3.3) will require adaptation of our existing systems to record and process asset condition measurements, and to convert them to useful information for the purposes of maintenance planning.

3.6 Vegetation Management

In the short to medium term Vector is undergoing an end-to-end review of its vegetation management strategy and how this is delivered. This process is due for completion mid-2015. Once complete, any changes to approach and / or budget will be incorporated into the asset management plan and future forecasts. In the meantime the 10-year cost forecast for vegetation management has been aligned to recent historical spend levels, pending completion of the strategic review.

4 ASSET MANAGEMENT MATURITY REVIEW

On January 10 2014, the International Organisation for Standardisation (ISO) published the ISO5500X suite of standards for Asset Management, consisting of:

- ISO 55000:2014 - Asset management - Overview, principles and terminology
- ISO 55001:2014 - Asset management - Management systems - Requirements
- ISO 55002:2014 - Asset management - Management systems - Guidelines for the application of ISO 55001

This suite of standards is expected to be adopted widely in the utility industry, superseding PAS55. The phrase "management system for asset management" is significant. The standards specify what documents, systems, procedures and other requirements need to be in place in order to determine how well an organisation is managing its assets, rather than instructing readers how to manage their assets.

The Commerce Commission does not presently require certification to ISO55000 but nevertheless Vector is seeking to at least align its asset management practices with this standard. It will provide credibility for our investment decisions and allow us to operate more efficiently, which will ultimately benefit our customers.

In August 2014, Vector commissioned an independent benchmarking review of its asset management systems against ISO55000. While the review showed most areas as 'competent' or 'near competent' (terms defined in the standard), some areas such as information management were scored as 'developing' (i.e. needing some improvement).

Vector has taken all recommendations of the review on board and will conduct regular benchmarking reviews to track improvement. With respect to the information management area, Section 3.5 describes some of the improvement initiatives currently underway.

5 DEMAND FORECAST UPDATE (FY16 – FY25)

This section presents updates on the peak demand forecast expected on various parts of the Vector network. Winter peak demand (which is greater than summer demand for the majority of the network) normally drives the need for network reinforcement and these forecasts are therefore fundamental to the network development planning and the growth expenditure forecasts highlighted in the subsequent sections of this Update.

Based on the latest population and economic growth information, the demand forecast of the Vector electricity distribution network at zone substation level for the 10 year planning period to 2025 is summarised in Table 4. A number of growth scenarios have been investigated, and the forecasts below represent the 'medium' growth forecast based on the review discussed in section 2.1.

Substation	Actual	Forecast Demand (MVA) - Winter									
	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Atkinson Road	17.9	17.8	17.5	17.3	17.0	16.7	16.4	16.2	16.0	15.7	15.6
Auckland Airport	15.4	15.5	16.5	18.7	20.9	21.7	22.6	23.5	27.9	27.9	27.9
Avondale	26.0	25.6	25.2	24.9	24.5	24.1	23.6	23.3	23.0	22.7	22.5
Bairds	22.9	23.0	23.0	23.0	23.0	23.0	22.9	22.9	22.9	22.9	23.0
Balmain	8.4	8.3	8.2	8.2	8.1	8.0	7.9	7.8	7.7	7.6	7.6
Balmoral	14.7	14.8	17.4	17.3	17.2	17.1	17.0	16.9	16.9	16.8	16.8
Belmont	12.3	11.9	11.7	11.6	11.4	11.2	11.0	10.9	10.8	10.7	10.6
Birkdale	22.9	24.3	24.0	23.7	23.4	23.0	22.6	22.4	22.1	21.9	21.7
Brickworks	10.3	10.1	10.2	10.3	10.4	10.4	10.5	10.6	10.7	10.7	10.9
Browns Bay	17.4	17.4	17.3	17.3	17.2	17.1	16.9	16.9	16.8	16.7	16.7
Bush Road	24.1	22.3	22.6	22.9	23.2	23.4	23.7	23.9	24.2	24.4	24.6
Carbine	14.1	15.4	15.9	16.0	16.1	16.1	16.2	16.3	16.4	16.4	16.5
Chevalier	19.9	20.5	20.3	20.1	18.9	18.6	18.4	18.2	18.0	17.8	17.7
Clendon	20.1	22.5	22.4	22.2	21.9	21.7	21.4	21.2	21.1	20.9	20.8
Clevedon	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.4	2.4	2.3
Coatesville	9.8	9.7	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.6	9.6
Drive	24.9	26.7	27.4	28.0	28.5	28.7	29.0	29.3	29.6	30.0	30.3
East Coast Road	18.4	15.2	15.1	15.0	14.8	14.6	14.4	14.3	14.2	14.1	14.0
East Tamaki	18.0	17.5	17.7	17.8	18.0	18.1	18.2	18.4	18.5	18.7	18.8
Forrest Hill	16.6	16.6	16.4	16.1	15.9	15.6	15.3	15.1	14.9	14.7	14.5
Freemans Bay	20.1	20.9	21.1	21.2	21.3	21.3	21.4	21.5	21.5	21.6	21.7
Glen Innes	10.8	10.9	10.8	10.8	10.7	10.6	10.5	10.4	10.4	10.3	10.3
Greenhithe	11.5	11.6	11.7	12.0	12.2	12.4	12.6	12.8	12.9	17.1	17.4
Greenmount	41.6	41.4	41.7	41.9	42.0	42.2	42.3	42.6	42.8	43.0	43.3
Gulf Harbour	7.5	7.4	7.4	7.4	7.5	7.5	7.4	7.5	7.5	7.5	7.6
Hans	25.0	26.9	27.1	27.3	27.4	27.5	27.6	27.8	27.9	28.0	28.2
Hauraki	8.7	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
Helensville	13.9	13.4	13.4	13.5	13.6	13.7	13.7	13.8	13.8	13.9	14.0
Henderson Valley	16.3	16.1	16.2	16.2	16.2	16.2	16.2	16.3	16.3	16.3	16.4
Highbrook	5.6	5.6	5.7	5.8	5.8	5.9	6.0	6.1	6.1	6.2	6.3
Highbury	13.8	14.7	14.7	14.7	14.7	14.6	14.6	14.6	14.6	14.6	14.6
Hillcrest	23.5	23.8	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.7
Hillsborough	16.6	16.7	16.6	16.5	16.4	16.2	16.1	16.0	15.9	15.8	15.7
Hobson 110/11kV	18.0	18.4	18.6	18.8	19.0	19.1	19.3	19.4	19.6	19.8	19.9
Hobson 22/11kV	16.6	17.2	17.4	17.6	17.7	17.9	18.0	18.2	18.3	18.4	18.6
Hobson 22kV	43.2	46.6	49.2	51.7	52.6	53.4	54.2	55.1	58.3	59.2	60.2

Substation	Actual	Forecast Demand (MVA) - Winter									
	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Hobson 22kV distribution	9.9	12.2	14.6	17.0	17.7	18.4	19.1	19.9	23.0	23.8	24.6
Hobsonville	21.0	26.3	32.4	38.5	44.9	49.4	50.8	52.3	53.8	55.3	57.0
Auckland Hospital	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Howick	39.2	37.9	37.3	36.6	35.9	35.1	34.3	33.7	33.2	32.6	32.2
James Street	20.0	19.3	19.2	19.1	19.0	18.9	18.7	18.7	18.6	18.5	18.4
Keeling Road	14.3	14.0	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	15.1
Kingsland	23.6	24.6	29.1	29.1	29.0	28.9	28.8	28.8	26.6	26.5	26.5
Kingsland 22kV	58.7	59.3	63.4	63.0	61.6	61.1	60.4	60.1	57.5	57.2	56.9
Laingholm	8.8	8.3	8.2	8.0	7.8	7.6	7.5	7.3	7.2	7.1	7.0
Liverpool	36.5	38.0	38.6	39.0	39.4	39.9	40.2	40.7	41.1	41.5	41.9
Liverpool 22kV	91.8	92.4	94.1	99.1	104.8	105.9	107.1	108.4	109.7	111.0	112.3
Liverpool 22kV distribution	13.5	14.1	14.9	19.3	24.5	24.9	25.5	26.2	26.8	27.4	28.1
Mangere Central	25.2	26.1	27.0	27.6	27.5	27.4	27.3	27.3	27.3	27.2	27.3
Mangere East	23.5	23.6	23.4	23.4	23.3	23.1	22.8	22.7	22.6	22.4	22.4
Mangere West	17.5	22.3	23.8	30.4	31.4	32.4	35.6	42.9	44.0	45.0	46.0
Manly	18.9	19.7	19.7	19.6	19.6	19.5	19.4	19.3	19.3	19.3	19.3
Manukau	41.0	43.2	43.4	43.6	43.8	43.9	44.0	44.2	44.4	44.6	44.9
Manurewa	47.5	49.4	49.1	48.7	48.3	47.8	47.2	46.9	46.5	46.2	46.0
Maraetai	8.2	7.2	7.2	7.1	7.0	6.9	6.8	6.7	6.7	6.6	6.5
McKinnon	22.1	17.1	17.5	17.9	18.3	18.6	18.9	19.2	19.5	19.8	20.1
Mcleod Road	12.4	12.1	12.0	12.0	11.9	11.9	11.8	11.8	11.7	11.7	11.7
McNab	40.3	41.1	41.8	42.4	43.0	43.1	43.2	43.4	43.6	43.8	44.0
Milford	7.3	8.1	8.0	8.0	8.0	7.9	7.9	7.8	7.8	7.7	7.7
Mt Albert	6.9	7.1	7.0	7.0	6.9	6.9	6.8	6.7	6.7	6.6	6.6
Mt Wellington	19.2	18.4	18.4	18.4	18.3	18.3	18.2	18.2	18.1	18.1	18.1
New Lynn	13.8	15.6	16.1	16.1	16.2	16.3	16.3	16.3	16.4	16.4	16.6
Newmarket	37.2	43.4	45.8	46.8	47.8	48.7	49.6	50.7	51.7	52.7	53.7
Newton	17.2	15.1	15.3	15.4	15.5	15.6	15.7	15.8	15.9	16.0	16.1
Ngataringa Bay	8.8	8.7	8.6	8.5	8.4	8.4	8.3	8.2	8.1	8.0	8.0
Northcote	6.2	6.5	6.5	6.4	6.4	6.4	6.3	6.3	6.3	6.3	6.2
Onehunga	14.2	14.0	14.1	14.1	14.1	14.1	14.1	14.2	14.2	14.2	14.3
Orakei	21.5	22.1	22.1	21.8	21.5	21.1	20.7	20.4	20.2	19.9	19.7
Oratia	5.3	5.3	5.2	5.1	5.1	5.0	4.9	4.9	4.8	4.7	4.7
Orewa	15.9	16.6	17.9	19.3	20.8	21.6	21.8	22.1	22.4	22.6	22.9
Otara	33.5	33.6	33.9	34.1	34.2	34.2	34.2	34.3	34.4	34.4	34.6
Pacific Steel	54.9	53.5	53.5	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0

Substation	Actual	Forecast Demand (MVA) - Winter									
	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Pakuranga	22.8	22.9	22.7	22.7	22.6	22.4	22.2	22.1	22.0	21.9	21.9
Papakura	26.1	26.3	26.2	26.1	26.0	25.8	25.7	25.6	25.5	25.4	25.4
Parnell	10.4	10.4	10.5	11.0	11.4	11.9	12.3	12.3	12.3	12.3	12.4
Ponsonby	15.8	14.8	14.6	14.5	14.3	14.1	13.8	13.7	13.5	13.4	13.3
Quay	22.0	23.2	25.0	25.2	26.0	26.7	27.4	28.2	28.9	29.6	30.4
Quay 22kV	39.3	40.8	42.8	43.5	44.8	46.1	47.3	48.1	49.0	49.8	50.7
Quay 22kV distribution	7.2	7.5	7.6	7.7	7.8	7.9	8.0	8.1	8.1	8.2	8.3
Ranui	12.2	11.8	11.8	12.4	13.0	13.5	14.0	14.6	15.2	15.7	15.8
Red Beach	14.2	15.5	16.8	18.7	20.7	23.3	25.8	28.4	31.0	31.4	31.8
Remuera	34.6	28.4	29.1	29.7	30.3	30.8	30.8	31.0	30.7	30.4	30.2
Riverhead	9.1	9.0	9.5	10.4	11.6	12.7	14.4	16.1	16.9	17.7	18.0
Rockfield	21.2	22.1	22.2	22.1	22.1	22.1	22.0	22.0	22.1	22.1	22.1
Rosebank	22.2	21.5	21.7	21.8	21.8	21.9	22.0	22.1	22.2	22.3	22.5
Rosedale	0.0	9.7	13.2	13.3	13.5	13.6	13.7	13.8	13.9	14.0	14.1
Sabulite Road	19.9	18.9	18.9	18.9	18.9	18.8	18.7	18.7	18.7	18.7	18.8
Sandringham	22.4	22.6	22.4	22.2	22.0	21.7	21.5	21.3	21.1	20.9	20.8
Sandringham 22kV	36.4	36.7	39.1	38.9	38.5	38.2	37.8	37.6	37.3	37.1	36.9
Simpson Road	4.8	4.5	4.5	4.5	4.4	4.4	4.4	4.3	4.3	4.3	4.3
Snells Beach	6.4	6.3	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.2	6.2
South Howick	31.0	28.6	28.1	27.6	27.1	26.5	25.9	25.4	25.0	24.6	24.3
Spur Road	10.7	11.4	11.7	12.0	12.3	12.6	12.9	13.1	13.4	13.6	13.9
St Heliers	22.5	22.1	21.8	21.5	21.1	20.7	20.2	19.9	19.6	19.4	19.2
St Johns	19.2	19.8	20.8	21.8	22.7	23.6	24.2	24.4	24.6	24.8	24.9
St Johns 33kV	59.7	60.5	61.1	61.4	61.7	61.7	61.5	61.2	60.9	60.6	60.3
Sunset Road	17.7	13.9	13.9	13.8	13.8	13.7	13.7	13.6	13.6	13.6	13.5
Swanson	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.3	9.4
Sylvia Park	17.0	17.9	18.8	19.8	20.7	21.2	21.7	21.8	21.8	21.9	22.0
Takanini	14.4	14.5	14.5	14.5	14.5	14.4	14.3	14.3	14.2	14.2	14.2
Takapuna	8.7	8.1	8.3	8.4	8.6	8.8	8.9	9.1	9.2	9.2	9.3
Te Atatu	20.3	22.6	22.5	22.4	22.3	22.1	22.0	21.9	21.8	21.7	21.7
Te Papapa	22.8	23.9	24.1	24.3	24.4	24.6	24.7	24.9	25.0	25.1	25.3
Torbay	7.0	6.4	7.3	8.5	10.0	11.4	12.6	13.6	14.7	15.7	16.8
Triangle Road	17.3	17.2	17.2	17.8	18.8	19.7	20.6	21.6	22.4	23.2	23.4
Victoria	22.9	23.7	24.0	24.2	24.4	24.6	24.8	25.0	25.2	25.5	25.7
Waiake	8.9	8.5	8.4	8.3	8.2	8.1	7.9	7.9	7.8	7.7	7.7
Waiheke	10.6	9.9	9.8	9.7	9.6	9.5	9.3	9.2	9.1	8.9	8.9
Waikaukau	7.4	6.9	6.8	6.8	6.7	6.7	6.6	6.6	6.5	6.5	6.5
Waimauku	8.9	8.7	9.2	10.0	10.8	11.5	12.2	12.8	13.4	14.0	14.1

Substation	Actual	Forecast Demand (MVA) - Winter									
	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Wairau Road	16.6	17.9	18.1	18.2	18.3	18.4	18.5	18.7	18.8	18.9	19.0
Warkworth	18.5	20.7	21.1	21.2	21.4	21.4	21.5	21.6	21.7	21.8	22.0
Wellsford	8.2	8.1	8.1	8.2	8.2	8.3	8.3	8.3	8.4	8.4	8.5
Westfield	25.8	31.0	31.5	31.9	32.3	32.6	33.0	33.4	33.8	34.2	34.6
White Swan	29.8	29.4	29.0	28.6	28.1	27.6	27.0	26.7	26.3	25.9	25.7
Wiri	41.4	41.7	42.2	42.6	43.0	43.4	43.8	44.2	44.7	45.1	45.5
Woodford	10.2	10.3	10.4	10.4	10.5	10.5	10.6	10.6	10.7	10.8	10.9

Table 4 : Forecast winter peak demand at Vector zone substations

6 PROJECT PROGRAMME UPDATE

This section presents the list of projects on the Vector electricity distribution network capital works programme that have changed since the last AMP Update. These changes reflect the updated planning as influenced by the updated demand forecasts (see section 5) and asset life-cycle management improvements (see section 3). The following table shows the target completion dates of these projects, the previous target completion dates and the reasons for any changes proposed.

A full list of proposed projects from 2015 to 2025 (excluding ongoing works programmes) with the respective commission dates is provided in Appendix 7 of this AMP.

6.1 System Growth

2015 AMP Forecast	Substation	Project and Programme Description	2014 AMP Forecast	Reason for Change
-	Brickworks	First 33/11kV transformer	FY14	Complete
-	Hillsborough	Install 2nd 22kV Power Transformer & 2nd 22kV cable	FY14	Complete
-	Hobson	Install 3rd 110kV Power Transformer (T5)	FY14	Complete
-	Kingsland	Install NER	FY14	Complete
-	Liverpool	Fire suppression in Penrose tunnel	FY14	Complete
-	Mangere East	Middlemore Hospital	FY14	Complete
-	Maraetai	11kV Reinforcement	FY14	Complete
-	Quay	Reinstate 22kV oil filled cable for ripple signal	FY14	Complete
-	Quay	Upgrade CTs in 22kV interconnectors 1 and 2	FY14	Complete
-	Te Papapa	CHH 11kV reinforcement	FY14	Complete
-	Hobson	CBD Fish Market 11kV to 22kV conversion	FY14	Complete
-	Takanini	11kV Reinforcement	FY14	Cancelled
-	Tunnel	Tunnel LV power supply reinforcement	FY14	Project cancelled pending further investigation
-	Balmoral	11kV Reinforcement St Lukes	FY15	Cancelled due to customer plan change
-	Clevedon	Install Energy meter at Matingarahi	FY15	Replaced by new PAC project
-	McNab	two new 11kV feeders to offload Westfield	FY15	Cancelled due to customer plan change
-	Papakura	Install Energy meter at Opaheke	FY15	Cancelled

2015 AMP Forecast	Substation	Project and Programme Description	2014 AMP Forecast	Reason for Change
-	Various	11kV switchboard for planned works	FY15	Moved to Asset Replacement area
-	Warkworth	Matakana 11kV Feeder New	FY15	Cancelled after further analysis
-	Westfield	New 11kV feeders to supply Bell Av Development	FY15	Cancelled due to customer plan change
-	Greenhithe	33kV Supply New	FY16	Cancelled
-	Mangere West	11kV Feeder Upgrade	FY16	Cancelled due to revised load forecast
-	Ngataringa Bay	substation reconstruction	FY16	Cancelled due to Unitary Plan revision
-	Quay	Ports of Auckland 22kV Feeders New	FY17	Postponed to beyond planning period
-	Te Atatu	New 33/11kV transformers	FY17	Cancelled after receiving test results
-	Brickworks	Second 33/11kV TX New	FY18	Cancelled until development proceeds
-	Oratia	Piha 11kV Feeder New	FY19	Cancelled in favour of new technology project
-	Waitakere	Zone SUB New	FY19	Cancelled until development proceeds
-	Manly	Transformer Upgrade	FY20	Cancelled in favour of protection upgrade
-	Orewa	11kV reinforcement - Savoy Fdr	FY20	Cancelled - no growth experienced
-	Lincoln	Land purchase	FY21	Cancelled - minor growth experienced can be supplied from existing substations
-	Oratia	Transformer upgrade	FY22	Cancelled - Load adjustment between substations
-	Warkworth	11kV reinforcement - Whangateau Fdr	FY22	Cancelled - Costing more than allowed for
-	Atkinson	Rd New 11kV Fdr, Kaurilands	FY23	Cancelled - no growth experienced
-	Manurewa	11kV Reinforcement	FY23	Cancelled - no growth experienced
-	Takapuna	Second 33/11kV TX New	FY23	Cancelled until development proceeds
-	Glen Innes	11kV Feeders New	FY24	Deferred due to updated load forecast
-	Te Papapa	11kV new feeders to off load heavily loaded feeders	FY24	Postponed to beyond planning period
-	Westfield	Carbine 11kV Feeders New	FY24	Postponed to beyond planning period
-	Various	Management Arising from Electric Vehicles	On-going	Cancelled
FY15	Flatbush	Zone SUB Land New	FY14	Land purchase delays
FY15	Hobsonville Point	Land New	FY14	Negotiation delays
FY15	Keeling Rd	Second 33/11kV TX New	FY14	Construction delays
FY15	Northern relocations	Wainui Rd Relocate	-	New project - developer
FY15	Rosebank	11kV Ducts New	FY17	Brought forward to align with NZTA project program
FY15	Rosedale	Zone SUB New	FY14	Construction delays
FY15	Southern relocations	AMETI 4 Panmure - Pakuranga**	-	New project - Auckland Transport
FY15	Takanini	Brookby supply upgrade	-	New Project
FY16	Hans	11kV Cable New	-	New Project
FY16	Hobson	22kV Ducts Madden St Waterfront Dev New	FY19	Brought forward to align with Waterfront program
FY16	Hobson	City Rail Link (Aotea Station) 22kV Cables New	-	New project, customer driven
FY16	Hobson	Wynyard South Waterfront Development 22kV Ducts New	-	New project, customer driven

2015 AMP Forecast	Substation	Project and Programme Description	2014 AMP Forecast	Reason for Change
FY16	Hospital	11kV Feeders New	-	New project due to request of capacity increase
FY16	Mangere West	11kV Cable New	FY15	Customer driven
FY16	Newmarket	309 Broadway 11kV Feeders New	FY15	Deferred due to change of customer plan
FY16	Newmarket South	Zone SUB Land New	FY14	Land purchase delays
FY16	Quay	Feasibility study	FY19	Brought forward to FY16 to commence with a master plan study of Quay St at an earlier date
FY16	Rosedale	Watercare 11kV Feeder New	-	New project - Customer driven
FY16	Southern relocations	Reeves Rd Flyover**	-	New project - Auckland Transport
FY16	Various	Electricity distribution network power flow and state estimation	-	New Project
FY16	Various	Electricity distribution network voltage cyber security - Vulnerability management	-	New Project
FY16	Various	Electricity distribution network voltage cyber security - Independent Health Monitor	-	New Project
FY16	Various	LV Network - Operation	-	New Project
FY16	Wairau	110kV Mast Relocate	-	New project - Transpower
FY16	Wainui	Zone SUB Land New	FY15	Negotiation delays
FY17	Chevalier	Cycleway Ducts New	-	New project due to AT project initiation
FY17	Hepburn	33kV SWBD Replace	-	New project - Transpower
FY17	Hobson	22kV Cable Madden St Waterfront Dev New	FY20	Brought forward to align with Waterfront program
FY17	Hobson	Wynyard South Waterfront Development 22kV Cables New	-	New project, customer driven
FY17	Mt Albert	Future Ducts New	-	New project to leverage off subtran replacement project
FY17	Northern relocations	Albany Highway Relocate	-	New project - Auckland Transport
FY17	Northern relocations	Lincoln Rd Stage 2 Relocate	-	New project - Auckland Transport
FY17	Northern relocations	Te Atatu Rd Relocate	-	New project - Auckland Transport
FY17	Penrose	33kV SWBD Replace		New project - Transpower
FY17	Red Hills	Zone SUB Land New	FY21	Brought forward to ensure land is secured prior to substation construction
FY17	Southern relocations	AMETI Relocate	-	New project - Auckland Transport
FY17	Southern relocations	Dominion Rd Relocate	-	New project - Auckland Transport
FY17	St Johns	33kV Feeder New	FY23	New project
FY17	Takanini	33kV SWBD Replace	-	New project - Transpower
FY17	Te Atatu	Henderson - Westgate Duct New	FY16	Customer driven
FY17	Various	Electricity network information modelling	-	New Project
FY17	Various	Electricity distribution network voltage cyber security - Security event logging and management	-	New Project
FY17	Various	Electricity distribution network voltage cyber security - intrusion detection	-	New Project
FY17	Wairau	Hospital 11kV Feeder New	-	New project, more cost effective than fixing a cable fault on an existing cable

2015 AMP Forecast	Substation	Project and Programme Description	2014 AMP Forecast	Reason for Change
FY18	Ellerslie	Land New	FY14	Land purchase delays
FY18	Henderson	33kV SWBD Replace	-	New project - Transpower
FY18	Hobson	22kV Cable Halsey St Waterfront Dev New	FY14	Deferred to align with Waterfront program
FY18	Mangere Central	11kV Feeder New	FY15	Deferred due to revised load forecast
FY18	Southern relocations	Mill Rd - Redoubt Rd Relocate	-	New project - Auckland Transport
FY18	Various	Distributed generation integration and management	-	New Project
FY18	Various	Electrical Vehicle Integration and management	-	New Project
FY18	Various	Electricity distribution network dynamic network reconfiguration - load transferring schemes	-	New Project
FY18	Whenuapai	Zone SUB Land New	-	New project - to allow for area re-zoning
FY19	Albany	33kV SWBD Replace	-	New project - Transpower
FY19	Drive	Alexandra Park 11kV Feeder New	-	New project, customer driven
FY19	Glenvar	Zone SUB New	FY17	Postponed to ensure just-in-time expenditure
FY19	Kumeu	Zone SUB New	FY21	Brought forward due to developments
FY19	Liverpool	110/22kV TX Replace	FY24	Brought forward to create fault level headroom for distributed generation
FY19	Newmarket South	Zone SUB New	FY17	Deferred due to updated load forecast
FY19	Quay	22kV SWBD Upgrade	FY14	Project has been pushed out to allow sufficient time for detailed investigation and scoping
FY19	Roskill	33kV SWBD Replace	-	New project - Transpower
FY19	Southdown	Zone SUB Land New	FY19	New project
FY19	Various	Electricity distribution network voltage / VAr / Watt control	-	New Project
FY19	Various	Distributed electrical energy storage integration and management	-	New Project
FY19	Westgate	33kV Supply 1 Henderson New	-	New project - to allow for expected load increase
FY20	Brighams Creek	Land New	-	New project - to allow for area re-zoning
FY20	Kingsland	City Rail Link 22kV Feeders New	FY16	Customer driven
FY20	Liverpool	22kV Subtrans Cables New	FY17	Postponed to define the actual requirements
FY20	Southern relocations	SH20A Kirkbride	-	New project
FY20	Various	Integration of Microgrids	-	New Project
FY20	Various	Electricity distribution network optimisation (operation, maintenance and loss reduction)	-	New Project
FY20	Waiwera	Zone SUB Land New	FY17	Postponed due to the revised load forecast
FY21	Greenhithe	Watercare 11kV Feeder New	-	New project - Customer driven
FY21	Ihumatao	Land New	FY16	Customer driven
FY21	Mangere Central	33/11kV TX New	FY16	Deferred due to revised load forecast
FY21	Quay	110kV Feeder New	FY18	Postponed to define the actual requirements
FY21	Southdown	33kV Feeders New	FY21	New project
FY21	Southern relocations	East west link Relocate	-	New project - Auckland Transport

2015 AMP Forecast	Substation	Project and Programme Description	2014 AMP Forecast	Reason for Change
FY22	Southern relocations	Second harbour crossing	-	New project
FY23	Greenhithe	Second 33/11kV TX New	FY20	Postponed until further development occurs
FY23	Hobson	Queens Wharf 22kV Cable New	FY22	Provisional budget for customer driven project
FY23	Liverpool	Telecom Mayoral Dr 22kV Cables New	FY18	Provisional budget for customer driven project
FY23	Onehunga	11kV Feeders New	FY24	Brought forward due to updated load forecast
FY23	Southdown	Zone SUB New	FY23	New project
FY23	Takanini	Mill Road 11kV Cable New	FY20	Deferred due to revised load forecast
FY23	Takanini South	Land New	FY17	Deferred due to revised load forecast
FY23	Wiri West	Zone SUB New	FY20	Deferred due to revised load forecast
FY24	Liverpool	University Medical School 11kV Feeders New	FY20	Provisional budget for customer driven project
FY24	Victoria	22kV SWBD New	FY22	Provisional project
FY24	Waiwera	Zone SUB New	-	Project brought forward to relieve Orewa feeders
FY25	Balmoral	11kV Feeder New	-	New project due to increased capacity at Balmoral after completion of subtran and transformer replacement projects
FY25	Ellerslie	Zone SUB New	FY18	Deferred due to updated load forecast
FY25	Ihumatao	Zone SUB Stage 1 New	-	New Project
FY25	Kaukapakapa	Zone SUB New	FY19	Postponed to ensure just-in-time expenditure
FY25	Liverpool	110kV SWBD New	FY22	Provisional
FY25	Matakana	Land New	FY14	Plan change
FY25	Newmarket South	SWBD New	FY21	Project can be deferred by additional backstopping
FY25	Parnell	11kV Feeders New	FY24	Deferred due to updated load forecast
FY25	Riverhead	33/11kV TX Upgrade	FY23	Project postponed to allow for just-in-time expenditure
FY25	Sandspit	Zone SUB New	FY17	Postponed expenditure by increasing Warkworth South scope
FY25	Various	Liverpool 22kV Distribution Cables New	FY24	Deferred due to updated load forecast
FY25	Various	Electricity distribution network dynamic network reconfiguration - fault location, isolation and system restoration systems	-	New Project
FY25	Warkworth South	33kV Second SWBD New	-	New project - staging of the previous projects
FY25	Westgate	33kV Supply 2 Henderson New	-	New project - to allow for expected load increase
FY25	Whenuapai	Zone SUB New	-	New project - to allow for area re-zoning
FY25	Woodford	Second 33/11kV TX New	-	Project brought forward to allow for expected load increase
On-going	Various	Electricity distribution network real-time thermal rating	-	New Project
On-going	Various	Network automation - primary substation next generation	-	New Project
On-going	Various	Network automation - secondary MV/LV distribution substation	-	New Project
On-going	Various	Network automation - LV network	-	New Project

2015 AMP Forecast	Substation	Project and Programme Description	2014 AMP Forecast	Reason for Change
On-going	Various	Network automation - MV network	-	New Project
On-going	Various	Fault level management	-	New Project
On-going	Various	Fault level monitoring	-	New Project

Table 5 : List of projects based on medium growth scenario

6.2 Renewal and Replacement Projects

2015 AMP Forecast	Substation	Project and Programme Description	2014 AMP Forecast	Reason for Change
FY15	Avondale	11kV switchboard retrofit	FY16	Carry over from FY15
FY15	Balmoral	11kV switchboard replace	FY16	Carry over from FY15
FY15	Browns Bay	11kV switchboard replace	FY16	Carry over from FY15
FY18	Browns Bay	33kV switchyard outdoor to indoor conversion	FY17	Brought forward one year
FY19	Pt Chevalier	22kV subtrans cable replace	FY18	Brought forward one year
FY18	Drive	11kV switchboard replace	FY17	Brought forward one year
FY15	Hans	11kV switchboard replace / retrofit	FY16	Re-scoped and re-estimated
FY16	Henderson	11kV switchboard replace and switchroom build	FY17	Priority and phasing reviewed
FY17	Hobson	New 22kV switchboard	FY19	Priority and phasing reviewed
FY17	James St	11kV switchboard replace	FY18	Priority and phasing reviewed
FY17	Laingholm	11kV switchboard replace	FY21	Priority and phasing reviewed
FY18	Liverpool	22kV subtrans cable replace	FY22	Priority and phasing reviewed
N/A	Manly	11kV and 33kV switchboards replace	FY25	New project
N/A	McLeod	11kV switchboard replace	FY25	New project
FY16	Mt Albert	11kV switchboard replace	FY17	Priority and phasing reviewed
FY16	Mt Albert	22kV transformer replace	FY17	Priority and phasing reviewed
FY18	Mt Albert	22kV subtrans cable replacement	FY20	Priority and phasing reviewed
FY16	New Lynn	11kV switchboard replace and switchroom build	FY19	Priority and phasing reviewed
N/A	Newton	11kV switchboard replace	FY22	New project
N/A	Ngataringa	11kV switchboard replace	FY20	New project
FY19	Northcote	11kV switchboard replace	FY20	Priority and phasing reviewed
FY15	Onehunga	22kV power transformer replace	FY16	Carry over
N/A	Orewa	33kV switchgear replace	FY23	New project
FY20	Otara	22kV power transformer replace	FY21	Priority and phasing reviewed
FY15	Riverhead	11kV switchboard replace	FY16	Carry over
N/A	Riverhead	33kV switchgear replace	FY22	New project
N/A	Rosebank	11kV switchgear replace	FY25	New project
FY22	Sabulite	33kV switchgear replace	FY23	Priority and phasing reviewed
N/A	Sunset	11kV switchboard replace	FY25	New project
N/A	Sunset	33kV switchboard replace	FY24	New project
FY20	Swanson	11kV switchboard replace	FY21	Priority and phasing reviewed
FY21	Te Papapa	11kV switchboard retrofit	FY20	Brought forward one year

2015 AMP Forecast	Substation	Project and Programme Description	2014 AMP Forecast	Reason for Change
FY18	Waikaukau Rd	33kV switchboard replace	FY22	Priority and phasing reviewed
FY19	Waimauku	33kV power transformer replace	FY19	Priority and phasing reviewed
FY15	Wellsford	33kV outdoor CB replace	FY22	Re-scoped and re-prioritised
N/A	Westfield	33kV subtrans cable replace	FY25	New project
N/A	White Swan	11kV switchboard replace	FY25	New project
FY19	Woodford Ave	11kV switchboard retrofit	FY25	Re-scoped and re-prioritised

Table 6 : List of Renewal and Replacement Projects

6.3 Relocation Projects

2015 AMP Forecast	Substation	Project and Programme Description	2014 AMP Forecast	Comments
FY15	Various	AMETI 4 Panmure – Pakuranga Network Relocation	-	Auckland Transport Project
FY15	Various	Wainui Rd Line Relocation	-	Developer Project
FY15	Various	Albany Highway Network Relocation	-	Auckland Transport Project
FY15	Various	Wynyard Quarter Network Relocation	-	Auckland Transport, Waterfront Auckland Project
FY15	Various	SH20A/Kirkbride Cable Relocation	-	NZTA Project
FY16	Various	Te Atatu Rd Cable Relocation	-	Auckland Transport Project
FY16	Various	Northern Corridor Interchange Network Relocation	-	NZTA Project
FY16	Various	Reeves Rd Flyover Network Relocation	-	Auckland Transport Project
FY17	Hepburn Rd	Cable Relocation- Transpower Hepburn Rd	-	Transpower Project
FY17	Various	Lincoln Rd Stage 2 Network Relocation	-	Auckland Transport Project
FY17	Penrose	Cable Relocation- Transpower Penrose	-	Transpower Project
FY17	Takanini	Cable Relocation- Transpower Takanini	-	Transpower Project
FY18	Henderson	Cable Relocation- Transpower Henderson	-	Transpower Project
FY18	Various	Mill Rd - Redoubt Rd Network Relocation	-	Auckland Transport Project
FY18	Various	East-West Link Cable Relocation	-	NZTA Project
FY19	Albany	Cable Relocation- Transpower Albany	-	Transpower Project
FY19	Roskill	Cable Relocation- Transpower Roskill	-	Transpower Project

Table 7 : List of Relocation Projects

7 CAPITAL AND OPERATIONAL EXPENDITURE FORECAST UPDATE

This section describes the capital and direct operational expenditure forecasts for the electricity distribution network assets for the next 10 year planning period (2015-2025), and provides a comparison with the 10 year forecast prepared and disclosed in the 2014 AMP Update (disclosed in March 2014). These forecasts are applicable to the development, maintenance, replacement and management of network assets.

In setting Vector's prices as part of the Default Price Path (DPP) which becomes effective 1 April 2015, the Commerce Commission has assumed Vector's capital and operating

expenditure over the next 5 years will be around 11% and 5% lower than the figures submitted in the 2014 AMP respectively. In finalising the expenditure forecasts, consideration has been given to the effect of this reset on the affordability of the capital and operational works programmes. Although we are optimistic about the future benefits that may arise from new technologies as well as changes in customer behaviour, as previously advised we are still concerned about the impact of aspects of the current regulatory environment on our decision making processes. As an example, the indexation methodology used by the Commerce Commission skews revenue cash flows towards the end of an asset's assumed useful life. We are very conscious of the long depreciation life of some network assets in comparison to the potentially reduced useful life requirements for these same assets (associated with aforementioned changing customer needs). The current regulatory regime therefore exacerbates recovery risk in light of this societal change and potential regulatory change risk. This, combined with an unattractively low regulated WACC means that Vector is looking at its alternatives, whilst considering the potential associated risks and impacts on quality of service to its customers.

7.1 Capital Expenditure

In this section, we present the proposed capital expenditure forecast (Table 8). The figures are presented in 2016 prices to reflect the expenditure level of this works programme to be implemented in 2016. For reference purposes we have also included the corresponding operational expenditure forecast disclosed in the 2014 AMP Update escalated to 2016 prices using a PPI of 3.0% (Table 9).

2015 AMP Update	Financial Year ($000)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Consumer connection	58,168	50,048	43,651	38,760	37,637	37,455	36,706	36,755	37,021	37,323
System growth	35,533	37,337	37,939	30,305	22,345	18,914	20,287	27,905	32,872	33,285
Asset replacement and renewal	64,802	69,912	67,938	60,441	57,201	54,846	59,147	58,040	65,183	63,089
Asset relocations	18,032	17,809	14,871	15,713	13,810	13,810	13,479	13,810	13,810	13,810
Reliability, safety and environment:										
Quality of supply	19	280	467	467	-	-	-	-	-	-
Legislative and regulatory	189	-	-	-	-	-	-	-	-	-
Other reliability, safety and environment	9,981	12,494	11,214	11,165	9,513	8,098	8,119	8,038	8,249	8,133
Non-network assets	13,444	10,624	12,763	7,350	9,636	12,209	11,189	11,134	12,402	11,823
Total Capital Expenditure	**200,169**	**198,504**	**188,842**	**164,201**	**150,141**	**145,332**	**148,927**	**155,683**	**169,537**	**167,463**

Table 8 : Proposed capital expenditure forecast

2014 AMP Update	Financial Year ($000)								
	2016	2017	2018	2019	2020	2021	2022	2023	2024
Consumer connection	41,279	45,896	41,751	37,794	38,047	38,227	37,372	37,698	37,884
System growth	42,797	45,520	41,811	51,972	43,578	48,386	56,074	51,313	47,714
Asset replacement and renewal	63,214	69,321	69,197	68,006	60,709	55,834	52,314	56,530	51,790
Asset relocations	22,829	22,292	19,050	19,050	19,050	19,050	19,050	19,050	19,050
Reliability, safety and environment:									
Quality of supply	3,539	3,226	3,789	7,249	8,617	9,027	9,376	10,425	10,425
Legislative and regulatory	1,894	947	-	-	-	-	-	-	-
Other reliability, safety and environment	10,606	10,606	11,553	11,553	12,500	12,500	13,447	13,447	13,447
Non-network assets	14,324	9,438	14,679	6,734	9,962	7,673	7,485	6,732	6,007
Total Capital Expenditure	**200,482**	**207,244**	**201,830**	**202,358**	**192,463**	**190,697**	**195,119**	**195,195**	**186,317**

Table 9 : Capital expenditure forecast disclosed in the 2014 AMP Update

Figure 13 below shows the difference between the 2014 and 2015 expenditure forecasts by expenditure categories. The associated Table 10 shows the major variances by expenditure categories and years.

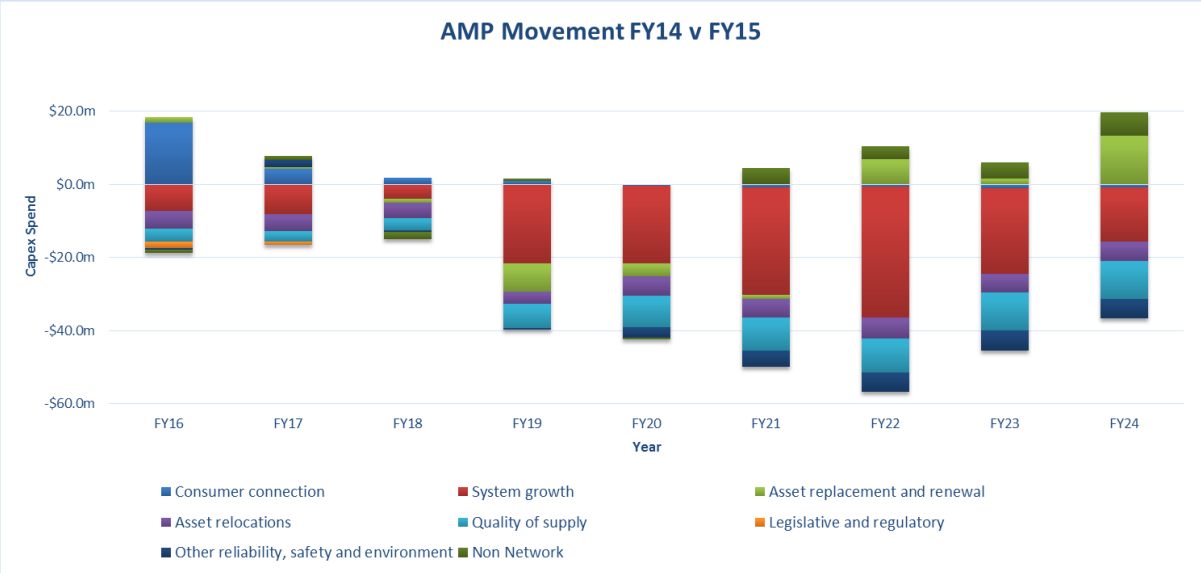

Figure 13 : Variance between 2014 and 2015 capital expenditure forecast

2014/2015 AMP Variances	Financial Year ($000)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Consumer connection	16,888	4,152	1,901	966	-411	-773	-666	-943	-863	**20,252**
System growth	-7,264	-8,183	-3,872	-21,667	-21,233	-29,471	-35,787	-23,408	-14,842	**-165,728**
Asset replacement and renewal	1,588	591	-1,259	-7,565	-3,509	-987	6,832	1,510	13,393	**10,594**
Asset relocations	-4,796	-4,482	-4,180	-3,337	-5,240	-5,240	-5,572	-5,240	-5,240	**-43,329**
Reliability, safety and environment:										
Quality of supply	-3,520	-2,946	-3,322	-6,782	-8,617	-9,027	-9,376	-10,425	-10,425	**-64,440**
Legislative and regulatory	-1,705	-947	-	-	-	-	-	-	-	**-2,651**
Other reliability, safety and environment	-625	1,888	-339	-388	-2,987	-4,402	-5,327	-5,409	-5,198	**-22,787**
Non-network assets	-880	1,186	-1,916	616	-326	4,536	3,704	4,402	6,395	**17,718**
Total Capital Expenditure	**-313**	**-8,740**	**-12,988**	**-38,157**	**-42,323**	**-45,365**	**-46,192**	**-39,513**	**-16,780**	**-250,370**

Table 10 : Major variances between 2014 and 2015 capital expenditure forecast

7.1.1 Explanation of Major Capex Variances

This section highlights the significant changes to the 2014 disclosed expenditure forecasts[13]. The major changes in capital expenditure over the 9-year period for which the 2014 AMP Update and the 2015 AMP Update overlap, reflect the following changes:

- Discussions with property developers have indicated an increase in greenfield sites requiring electricity reticulation over the short to medium term. Although it is unclear how quickly these newly reticulated sites will lead to additional ICP connections, we have increased the short term budget to accommodate this forecast increase in reticulation. However, as with last year's forecasts, we still harbour concerns over how building activity in Auckland can ramp up to this implied new level of greenfields housing over such a short period of time, and whether there are enough resources in the building trade to keep pace with the greenfields developments as well as maintain the forecast level of brownfields developments. In the absence of additional information, we have therefore left the number and rate of overall consumer connections the same as disclosed in the 2014 AMP update.
- Our revised view of network demand over the next 10 years, reflects a 25% decline in demand per ICP (as discussed in section 2.1). A number of sub-transmission projects

[13] The figures are inflation adjusted.

have therefore been deferred to beyond the 10-year forecast period, contributing to a significant part of the $165M decrease in forecast over the next 9 years.

- A significant reduction in forecast asset relocations, partly associated with changing requirements of the Auckland Unitary Plan, but mainly associated with a number of significant Auckland Transport projects being put on hold or changed in scope.
- Over the past two years, Vector has investigated and trialled a number of consumer/network technologies to mitigate the adverse effects of disruptive technologies such as solar PV. An expenditure provision was made in the previous capital expenditure forecast based on the deployment of battery/PV sets for this purpose. To develop the optimal approach for mitigating these negative effects Vector has subsequently developed a Transform Model to identify alternative options to addressing the impacts of solar PV (refer to Section 2.5 of this AMP). This AMP Update's expenditure forecast has therefore been prepared based on the outcome of the Transform Model and replaces the forecast for the battery/PV programme included in previous expenditure forecasts.
- Some asset replacement and renewal programmes have also been reduced, or deferred beyond the next 5 year regulatory period in order to maintain expenditure limits within the cost profiles used by the Commerce Commission in their 2015 price reset. We are still assessing the potential impact of these deferrals on overall quality of service to our customers, as well as the commercial rationale for replacing these long life assets on a like-for-like basis given the risks discussed in the introduction to section 7.

7.2 Operational Expenditure

In this section, we present the proposed operational expenditure forecast (Table 11). The figures are presented in 2016 prices to reflect the expenditure level of this works programme to be implemented in 2016. For reference purposes we have also included the corresponding operational expenditure forecast disclosed in the 2014 AMP Update escalated to 2016 prices using a PPI of 3.0% (Table 12) and a comparison of the two (Table 13).

2015 AMP Update	Financial Year ($000)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Service interruptions and emergencies	8,604	8,709	8,814	8,920	8,769	8,617	8,465	8,312	8,416	8,520
Vegetation management	3,565	3,565	3,565	3,565	3,565	3,565	3,565	3,565	3,565	3,565
Routine and corrective maintenance and inspection	13,170	14,681	14,750	14,819	14,889	14,959	15,030	15,101	15,173	15,245
Asset replacement and renewal	10,395	11,940	15,030	15,030	15,030	15,030	12,970	12,970	12,970	12,970
System operations and network support	42,941	42,999	43,057	43,057	43,057	43,057	43,057	43,057	43,057	43,057
Business support	27,636	27,636	27,636	27,636	27,636	27,636	27,636	27,636	27,636	27,636
Total Operational Expenditure	**106,310**	**109,528**	**112,851**	**113,027**	**112,946**	**112,864**	**110,723**	**110,641**	**110,816**	**110,992**

Table 11 : Proposed operational expenditure forecast

2014 AMP Update	Financial Year ($000)								
	2016	2017	2018	2019	2020	2021	2022	2023	2024
Service interruptions and emergencies	7,730	7,730	7,730	7,730	7,730	7,730	7,730	7,730	7,730
Vegetation management	4,893	4,790	4,687	4,584	4,481	4,378	4,275	4,172	4,069
Routine and corrective maintenance and inspection	15,293	14,820	14,454	14,553	14,594	14,683	14,736	14,831	14,879
Asset replacement and renewal	12,704	10,644	10,644	10,644	10,644	10,644	10,644	10,644	10,644
System operations and network support	45,844	45,844	45,844	45,844	45,844	45,844	45,844	45,844	45,844
Business support	32,722	32,722	32,722	32,722	32,722	32,722	32,722	32,722	32,722
Total Operational Expenditure	**119,186**	**116,550**	**116,081**	**116,077**	**116,015**	**116,001**	**115,951**	**115,943**	**115,888**

Table 12 : Operational expenditure forecast disclosed in the 2014 AMP Update

2014/2015 AMP Variances	Financial Year ($000)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Service interruptions and emergencies	874	978	1,084	1,190	1,039	887	735	582	685	8,053
Vegetation management	-1,328	-1,225	-1,122	-1,019	-916	-813	-710	-607	-504	-8,244
Routine and corrective maintenance and inspection	-2,124	-139	296	266	295	277	294	270	293	-271
Asset replacement and renewal	-2,309	1,296	4,386	4,386	4,386	4,386	2,326	2,326	2,326	23,508
System operations and network support	-2,903	-2,845	-2,787	-2,787	-2,787	-2,787	-2,787	-2,787	-2,787	-25,257
Business support	-5,086	-5,086	-5,086	-5,086	-5,086	-5,086	-5,086	-5,086	-5,086	-45,778
Total Operational Expenditure	**-12,877**	**-7,021**	**-3,230**	**-3,050**	**-3,069**	**-3,136**	**-5,229**	**-5,302**	**-5,073**	**-47,987**

Table 13 : Major variances between 2014 and 2015 operational expenditure forecast

7.2.1 Explanation of Major Opex Variances

This section highlights the significant changes to the 2014 disclosed expenditure forecasts[14]. The major changes in operational expenditure over the 9-year period for which the 2014 AMP Update and the 2015 AMP Update overlap, reflect:

- An $8 million increase in service interruptions and emergencies to reflect the growing size of the network each year which has been partially offset by a reduction from FY20 onwards as a result of the higher spend on asset replacement and renewal described below.
- An $8 million reduction in vegetation management forecast, pending the results of a review of our overall vegetation management strategy. In the short to medium term Vector is undergoing an end-to-end review of its vegetation management programme and how this is delivered. This process is due for completion mid-2015. Once complete, any changes to approach and / or budget will be incorporated into the asset management plan and future forecasts. In the meantime the 10-year cost forecast for vegetation management has been aligned to recent historical spend levels, pending completion of the strategic review.
- This AMP update includes an additional $4.5 million per year from FY18 for 4 years in asset replacement and renewal due to increased spend to address the anticipated higher level of defects due to the aging network. This is expected to improve the reliability of the network and result in a reduction in service interruptions and emergencies as noted above.
- A forecast reduction in system operations, network support and business support costs to reduce operational costs in line with the Commerce Commission DPP reset. These

[14] The figures are inflation adjusted.

reductions may have network reliability and other quality of service implications that have yet to be fully assessed.

8 RISK MANAGEMENT

As part of Vector's periodic review and assessment of its enterprise risk management and risk appetite, Vector recently updated its risk assessment matrix from a 5x5 to a 4x4 matrix. The new matrix is the result of the Vector Group's review of the board's appetite for risks with impacts across a number of consequence categories.

The level of a risk is determined by considering the combination of the "likelihood" (i.e. rare, unlikely, likely or almost certain) and "consequences" (i.e. minor, moderate, major or catastrophic) of the risk occurring, given its existing controls, and applying the risk matrix assessment (a 4x4 heat map) below.

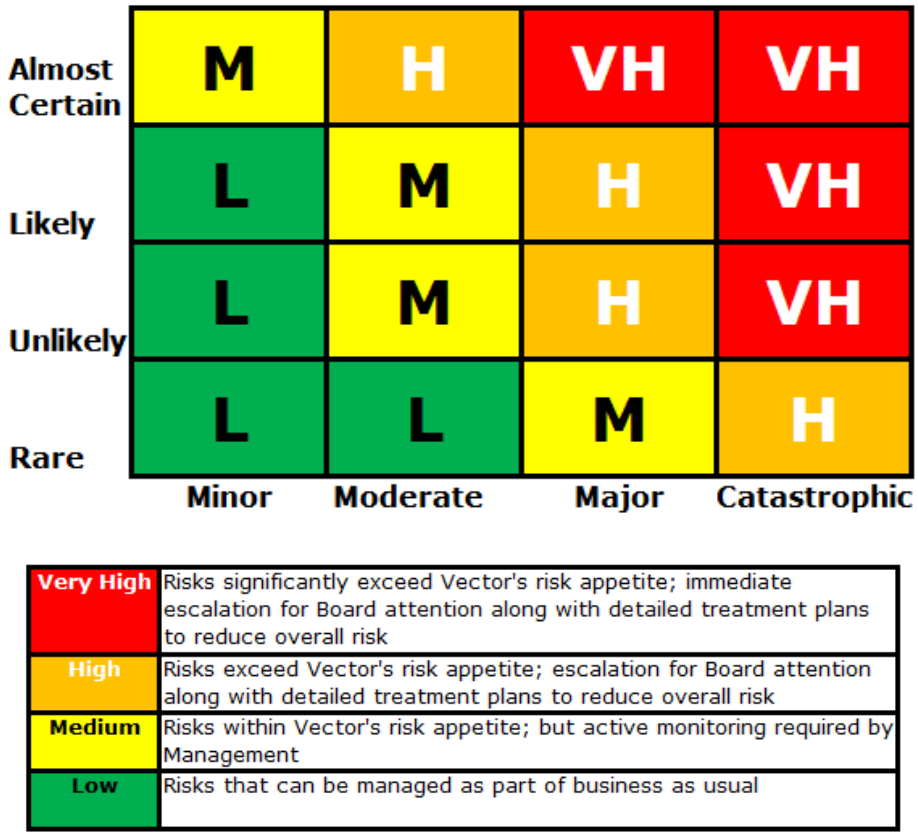

Figure 14 : Vector's risk assessment matrix

Electricity Asset Management Plan Update

Information Disclosure 2015

Appendix 1
Report on Forecast Capital Expenditure

Company Name	**Vector Limited**
AMP Planning Period	**1 April 2015 – 31 March 2025**

SCHEDULE 11a: REPORT ON FORECAST CAPITAL EXPENDITURE

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

sch ref

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
	for year ended	**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**	**31 Mar 25**
	11a(i): Expenditure on Assets Forecast	**$000 (in nominal dollars)**										
	Consumer connection	39,193	64,585	52,766	47,116	42,822	41,625	42,196	42,551	43,437	44,779	46,263
	System growth	32,312	39,753	38,114	37,620	33,581	26,310	21,595	22,497	30,043	37,215	40,583
	Asset replacement and renewal	70,033	68,929	73,564	70,918	66,627	64,244	60,503	69,361	68,231	78,637	80,814
	Asset relocations	14,472	20,803	18,082	16,232	16,586	15,666	15,523	15,625	16,211	16,717	17,135
	Reliability, safety and environment:											
	Quality of supply	1,403	159	264	445	508	-	-	-	-	-	-
	Legislative and regulatory	1,660	686	48	-	-	-	-	-	-	-	-
	Other reliability, safety and environment	246	7,598	11,452	11,528	11,446	10,419	9,093	8,948	9,109	9,492	9,699
	Total reliability, safety and environment	3,309	8,443	11,764	11,973	11,954	10,419	9,093	8,948	9,109	9,492	9,699
	Expenditure on network assets	159,319	202,512	194,290	183,859	171,571	158,266	148,910	158,982	167,033	186,840	194,493
	Non-network assets	8,469	12,099	11,661	12,935	9,470	10,109	13,222	13,409	13,389	14,878	15,102
	Expenditure on assets	167,788	214,612	205,952	196,794	181,040	168,375	162,132	172,391	180,421	201,718	209,595
plus	Cost of financing	447	3,037	2,855	3,813	1,887	2,691	4,945	4,927	4,584	5,068	4,999
less	Value of capital contributions	33,010	50,216	38,473	36,360	35,093	35,455	35,612	36,421	37,549	38,742	66,330
plus	Value of vested assets											
	Capital expenditure forecast	135,225	167,433	170,333	164,246	147,835	135,611	131,465	140,897	147,456	168,043	148,263
	Value of commissioned assets	145,344	174,067	159,600	170,280	142,875	149,206	129,203	128,037	117,524	144,888	98,171

		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 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**	**31 Mar 25**
		$000 (in constant prices)										
	Consumer connection	39,193	62,746	49,801	43,273	38,235	36,260	35,861	35,281	35,137	35,339	35,619
	System growth	32,312	38,622	35,973	34,551	29,984	22,919	18,353	18,653	24,302	29,369	31,247
	Asset replacement and renewal	70,033	66,966	69,431	65,132	59,490	55,964	51,419	57,509	55,193	62,059	62,221
	Asset relocations	14,472	20,211	17,067	14,908	14,810	13,647	13,193	12,955	13,113	13,193	13,193
	Reliability, safety and environment:											
	Quality of supply	1,403	154	250	408	454	-	-	-	-	-	-
	Legislative and regulatory	1,660	667	45	-	-	-	-	-	-	-	-
	Other reliability, safety and environment	246	7,381	10,808	10,588	10,220	9,076	7,728	7,419	7,369	7,491	7,467
	Total reliability, safety and environment	3,309	8,202	11,103	10,996	10,674	9,076	7,728	7,419	7,369	7,491	7,467
	Expenditure on network assets	159,319	196,747	183,375	168,859	153,193	137,867	126,553	131,817	135,114	147,451	149,747
	Non-network assets	8,469	11,755	11,006	11,880	8,455	8,806	11,237	11,118	10,830	11,741	11,627
	Expenditure on assets	167,788	208,502	194,381	180,739	161,649	146,673	137,790	142,936	145,945	159,192	161,374
	Subcomponents of expenditure on assets (where known)											
	Energy efficiency and demand side management, reduction of energy losses											
	Overhead to underground conversion	6,539	2,483	6,465	7,866	7,866	7,866	7,866	7,866	7,866	7,866	7,866
	Research and development											

Company Name	**Vector Limited**
AMP Planning Period	**1 April 2015 – 31 March 2025**

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)
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sch ref												
57			*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
58		for year ended	**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**	**31 Mar 25**
59	**Difference between nominal and constant price forecasts**		**$000**										
60	Consumer connection		-	1,839	2,964	3,844	4,587	5,365	6,335	7,271	8,300	9,440	10,644
61	System growth		-	1,132	2,141	3,069	3,597	3,391	3,242	3,844	5,741	7,846	9,337
62	Asset replacement and renewal		-	1,962	4,133	5,786	7,137	8,281	9,084	11,851	13,038	16,578	18,593
63	Asset relocations		-	592	1,016	1,324	1,777	2,019	2,331	2,670	3,098	3,524	3,942
64	Reliability, safety and environment:												
65	Quality of supply		-	5	15	36	54	-	-	-	-	-	-
66	Legislative and regulatory		-	20	3	-	-	-	-	-	-	-	-
67	Other reliability, safety and environment		-	216	643	940	1,226	1,343	1,365	1,529	1,741	2,001	2,231
68	**Total reliability, safety and environment**		-	240	661	977	1,280	1,343	1,365	1,529	1,741	2,001	2,231
69	**Expenditure on network assets**		-	5,765	10,915	14,999	18,378	20,399	22,357	27,165	31,918	39,389	44,746
70	Non-network assets		-	344	655	1,055	1,014	1,303	1,985	2,291	2,558	3,136	3,474
71	**Expenditure on assets**		-	6,110	11,570	16,055	19,392	21,702	24,342	29,456	34,477	42,526	48,221
72													

73			*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
		for year ended	**31 Mar 15**	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**
74	**11a(ii): Consumer Connection**							
75	*Consumer types defined by EDB**		**$000 (in constant prices)**					
76	Service Connection		13,739	16,011	13,830	15,062	14,418	13,788
77	Customer Substations		6,849	10,757	7,325	6,834	6,834	6,834
78	Business subdivisions		1,904	3,513	2,347	2,419	1,885	1,696
	Residential Subdivisions		16,668	28,030	22,835	15,492	11,633	10,476
	Capacity Changes		-	3,596	2,780	2,780	2,780	2,780
79	Street Lighting		-	839	686	686	686	686
80	Easements		32	-	-	-	-	-
81	*include additional rows if needed							
82	**Consumer connection expenditure**		39,193	62,746	49,801	43,273	38,235	36,260
83	*less* Capital contributions funding consumer connection		27,913	43,264	31,657	28,804	27,513	27,365
84	**Consumer connection less capital contributions**		11,280	19,482	18,144	14,469	10,723	8,896
85	**11a(iii): System Growth**							
86	Subtransmission		7,876	8,150	7,539	4,226	5,110	4,760
87	Zone substations		13,962	14,208	14,222	18,795	15,643	10,054
88	Distribution and LV lines		653	982	128	6	-	-
89	Distribution and LV cables		6,727	10,198	8,185	8,164	5,914	4,957
90	Distribution substations and transformers		1,162	1,559	3,293	662	729	1,092
91	Distribution switchgear		295	2,111	1,853	1,990	1,846	1,744
92	Other network assets		1,637	1,415	753	706	743	312
93	**System growth expenditure**		32,312	38,622	35,973	34,551	29,984	22,919
94	*less* Capital contributions funding system growth							
95	**System growth less capital contributions**		32,312	38,622	35,973	34,551	29,984	22,919

Company Name	**Vector Limited**
AMP Planning Period	**1 April 2015 – 31 March 2025**

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)
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sch ref			*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
104		for year ended	**31 Mar 15**	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**
105	**11a(iv): Asset Replacement and Renewal**		**$000 (in constant prices)**					
106	Subtransmission		9,155	2,342	8,331	5,912	6,466	3,495
107	Zone substations		19,547	22,790	14,803	13,914	11,557	8,396
108	Distribution and LV lines		15,918	19,058	20,247	20,247	20,247	20,247
109	Distribution and LV cables		8,089	5,479	5,053	4,928	4,311	5,351
110	Distribution substations and transformers		5,067	4,544	6,918	6,994	4,762	7,867
111	Distribution switchgear		5,267	4,817	4,840	4,792	4,769	4,728
112	Other network assets		6,990	7,936	9,240	8,344	7,378	5,878
113	**Asset replacement and renewal expenditure**		70,033	66,966	69,431	65,132	59,490	55,964
114	*less* Capital contributions funding asset replacement and renewal							
115	**Asset replacement and renewal less capital contributions**		70,033	66,966	69,431	65,132	59,490	55,964
116	**11a(v):Asset Relocations**							
117	*Project or programme**							
118	Overground to underground conversions		6,539	2,483	6,465	7,866	7,866	7,866
119	Takanini 33kV SWBD Relocation - TP				1,922			
120	Penrose 33kV SWBD Relocation - TP			1,199				
121	Henderson 33kV SWBD Relocation - TP					1,312		
122	Albany 33kV SWBD Relocation - TP						1,266	
123	*include additional rows if needed							
124	All other asset relocations projects or programmes		7,933	16,529	8,679	5,730	5,677	5,781
125	**Asset relocations expenditure**		14,472	20,211	17,067	14,908	14,810	13,647
126	*less* Capital contributions funding asset relocations		5,097	5,522	4,655	4,590	3,821	3,521
127	**Asset relocations less capital contributions**		9,375	14,689	12,412	10,318	10,988	10,126
128								
129	**11a(vi):Quality of Supply**							
130	*Project or programme**							
131	Solar		1,006					
132								
133								
134								
135								
136	*include additional rows if needed							
137	All other quality of supply projects or programmes		397	154	250	408	454	-
138	**Quality of supply expenditure**		1,403	154	250	408	454	-
139	*less* Capital contributions funding quality of supply							
140	**Quality of supply less capital contributions**		1,403	154	250	408	454	-
141								

Company Name	**Vector Limited**
AMP Planning Period	**1 April 2015 – 31 March 2025**

SCHEDULE 11a: REPORT ON FORECAST CAPITAL EXPENDITURE

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sch ref

11a(vii): Legislative and Regulatory

143		*Project or programme**						
144								
145								
146								
147								
148								
149		**include additional rows if needed*						
150		All other legislative and regulatory projects or programmes	1,660	667	45	-	-	-
151		**Legislative and regulatory expenditure**	1,660	667	45	-	-	-
152	*less*	Capital contributions funding legislative and regulatory						
153		**Legislative and regulatory less capital contributions**	1,660	667	45	-	-	-

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
162	for year ended	**31 Mar 15**	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**

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

164		*Project or programme**	**$000 (in constant prices)**					
165		Electricity network losses optimisation						1,005
166								
167								
168								
169								
170		**include additional rows if needed*						
171		All other reliability, safety and environment projects or programmes	246	7,381	10,808	10,588	10,220	8,072
172		**Other reliability, safety and environment expenditure**	246	7,381	10,808	10,588	10,220	9,076
173	*less*	Capital contributions funding other reliability, safety and environment						
174		**Other reliability, safety and environment less capital contributions**	246	7,381	10,808	10,588	10,220	9,076

Company Name	**Vector Limited**
AMP Planning Period	**1 April 2015 – 31 March 2025**

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)
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sch ref

11a(ix): Non-Network Assets

Routine expenditure

180	*Project or programme**						
181							
182							
183							
184							
185							
186	**include additional rows if needed*						
187	All other routine expenditure projects or programmes	5,101	4,766	4,410	4,733	3,468	3,598
188	**Routine expenditure**	5,101	4,766	4,410	4,733	3,468	3,598

Atypical expenditure

190	*Project or programme**						
191							
192							
193							
194							
195							
196	**include additional rows if needed*						
197	All other atypical projects or programmes	3,369	6,989	6,596	7,147	4,987	5,208
198	**Atypical expenditure**	3,369	6,989	6,596	7,147	4,987	5,208
199							
200	**Non-network assets expenditure**	8,469	11,755	11,006	11,880	8,455	8,806

Schedule 11a Explanatory Notes

The box below provides commentary specific to the difference between nominal and constant price capital expenditure forecasts. It is provided in the same format as required for Box 1, Schedule 14a of the Electricity Distribution Information Disclosures, which will be fully disclosed within 6 months of the end of the disclosure year.

Commentary on difference between nominal and constant price capital expenditure forecasts

Vector has used the NZIER (New Zealand Institute of Economic Research) September 2014 PPI (Producer Price Index-outputs) forecast from 2015 to 2019. Thereafter we have assumed a long term inflation rate of 2.5%. The constant price capital expenditure forecast is then inflated by the above mentioned PPI forecast to nominal price capital expenditure forecasts.

Additional explanatory notes pertaining to Schedule 11a are provided in the box below, in the format required for Schedule 15 of the Electricity Distribution Information Disclosures:

Additional explanatory comment on disclosed information

When forecasting System Growth (11a(iii)), we do not differentiate between LV lines and cables projects when completing forecasts for projects where preliminary engineering has not been completed. All LV lines and cables cost forecasts are therefore consolidated into the LV cables category for projects beyond the current regulatory year.

Electricity Asset Management Plan Update

Information Disclosure 2015

Appendix 2
Report on Forecast Operational Expenditure

Company Name	**Vector Limited**
AMP Planning Period	**1 April 2015 – 31 March 2025**

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 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**	**31 Mar 25**
9	**Operational Expenditure Forecast**	**$000 (in nominal dollars)**										
10	Service interruptions and emergencies	12,568	8,454	8,931	9,289	9,670	9,815	9,888	9,957	10,022	10,321	10,710
11	Vegetation management	3,497	3,611	3,667	3,768	3,876	3,973	4,072	4,174	4,278	4,385	4,495
12	Routine and corrective maintenance and inspection	13,621	13,150	14,713	15,574	16,095	16,575	17,069	17,579	18,104	18,644	19,201
13	Asset replacement and renewal	11,951	10,501	11,885	15,072	16,343	16,751	17,170	15,790	15,567	15,956	16,355
14	**Network Opex**	41,637	35,715	39,196	43,703	45,984	47,114	48,199	47,500	47,971	49,306	50,761
15	System operations and network support	41,734	43,287	44,217	45,501	46,818	47,989	49,188	50,418	51,678	52,970	54,295
16	Business support	27,477	27,664	28,428	29,214	30,049	30,801	31,571	32,360	33,169	33,998	34,848
17	**Non-network opex**	69,211	70,951	72,644	74,715	76,868	78,789	80,759	82,778	84,847	86,969	89,143
18	**Operational expenditure**	110,847	106,666	111,840	118,418	122,851	125,904	128,958	130,278	132,818	136,275	139,904

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 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**	**31 Mar 25**
21		**$000 (in constant prices)**										
22	Service interruptions and emergencies	12,568	8,213	8,429	8,532	8,634	8,550	8,403	8,255	8,107	8,145	8,246
23	Vegetation management	3,497	3,508	3,461	3,461	3,461	3,461	3,461	3,461	3,461	3,461	3,461
24	Routine and corrective maintenance and inspection	13,621	12,775	13,886	14,303	14,371	14,439	14,507	14,575	14,644	14,714	14,783
25	Asset replacement and renewal	11,951	10,202	11,217	13,842	14,592	14,592	14,592	13,092	12,592	12,592	12,592
26	**Network Opex**	41,637	34,698	36,994	40,138	41,058	41,042	40,963	39,384	38,804	38,912	39,083
27	System operations and network support	41,734	42,055	41,732	41,789	41,803	41,803	41,803	41,803	41,803	41,803	41,803
28	Business support	27,477	26,876	26,831	26,831	26,831	26,831	26,831	26,831	26,831	26,831	26,831
29	**Non-network opex**	69,211	68,931	68,563	68,620	68,634	68,634	68,634	68,634	68,634	68,634	68,634
30	**Operational expenditure**	110,847	103,630	105,557	108,758	109,692	109,676	109,597	108,018	107,438	107,546	107,717
31	**Subcomponents of operational expenditure (where known)**											
32	Energy efficiency and demand side management, reduction of											
33	energy losses											
34	Direct billing*											
35	Research and Development											
36	Insurance	2,603	2,532	2,532	2,532	2,532	2,532	2,532	2,532	2,532	2,532	2,532
37	** Direct billing expenditure by suppliers that direct bill the majority of their consumers*											
38												

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 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**	**31 Mar 25**
41	**Difference between nominal and real forecasts**	**$000**										
42	Service interruptions and emergencies	-	241	502	758	1,036	1,265	1,485	1,701	1,915	2,176	2,464
43	Vegetation management	-	103	206	307	415	512	611	713	818	924	1,034
44	Routine and corrective maintenance and inspection	-	374	827	1,271	1,724	2,136	2,563	3,004	3,459	3,931	4,417
45	Asset replacement and renewal	-	299	668	1,230	1,751	2,159	2,578	2,698	2,975	3,364	3,763
46	**Network Opex**	-	1,017	2,202	3,565	4,925	6,073	7,237	8,116	9,167	10,395	11,678
47	System operations and network support	-	1,232	2,484	3,712	5,015	6,185	7,385	8,615	9,875	11,167	12,491
48	Business support	-	788	1,597	2,383	3,219	3,970	4,740	5,529	6,338	7,167	8,017
49	**Non-network opex**	-	2,020	4,081	6,095	8,234	10,155	12,125	14,144	16,213	18,335	20,509
50	**Operational expenditure**	-	3,037	6,283	9,661	13,159	16,228	19,362	22,260	25,380	28,729	32,187

Schedule 11b Explanatory Notes

The box below provides commentary specific to the difference between nominal and constant price operational expenditure forecasts. It is provided in the same format as required for Box 2, Schedule 14a of the Electricity Distribution Information Disclosures, which will be fully disclosed within 6 months of the end of the disclosure year.

Commentary on difference between nominal and constant price operational expenditure forecasts

Vector has used the NZIER (New Zealand Institute of Economic Research) September 2014 PPI (Producer Price Index-outputs) forecast from 2015 to 2019. Thereafter we have assumed a long term inflation rate of 2.5%. The constant price operating expenditure forecast is then inflated by the above mentioned PPI forecast to nominal price operating expenditure forecasts.

Electricity Asset Management Plan Update

Information Disclosure 2015

Appendix 3
Report on Asset Condition

Company Name	**Vector Limited**
AMP Planning Period	**1 April 2015 – 31 March 2025**

SCHEDULE 12a: REPORT ON ASSET CONDITION

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

sch ref

						Asset condition at start of planning period (percentage of units by grade)						
	Voltage	**Asset category**	**Asset class**	**Units**	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**	**Grade unknown**	**Data accuracy (1–4)**	**% of asset forecast to be replaced in next 5 years**
10	All	Overhead Line	Concrete poles / steel structure	No.	-	0.30%	62.20%	37.50%	-	4	6.10%
11	All	Overhead Line	Wood poles	No.	0.10%	3.20%	73.30%	23.40%	-	4	9.70%
12	All	Overhead Line	Other pole types	No.	-	-	-	100.00%	-	4	-
13	HV	Subtransmission Line	Subtransmission OH up to 66kV conductor	km	-	-	84.50%	15.50%	-	3	-
14	HV	Subtransmission Line	Subtransmission OH 110kV+ conductor	km	-	-	98.30%	1.70%	-	3	-
15	HV	Subtransmission Cable	Subtransmission UG up to 66kV (XLPE)	km	-	0.10%	12.30%	87.60%	-	2	0.10%
16	HV	Subtransmission Cable	Subtransmission UG up to 66kV (Oil pressurised)	km	-	5.60%	77.70%	16.70%	-	2	5.60%
17	HV	Subtransmission Cable	Subtransmission UG up to 66kV (Gas pressurised)	km	-	43.80%	56.20%	-	-	2	100.00%
18	HV	Subtransmission Cable	Subtransmission UG up to 66kV (PILC)	km	-	6.20%	85.20%	8.60%	-	2	36.60%
19	HV	Subtransmission Cable	Subtransmission UG 110kV+ (XLPE)	km	-	-	-	100.00%	-	2	-
20	HV	Subtransmission Cable	Subtransmission UG 110kV+ (Oil pressurised)	km	-	-	73.00%	27.00%	-	2	-
21	HV	Subtransmission Cable	Subtransmission UG 110kV+ (Gas Pressurised)	km	-	-	-	-	-	N/A	-
22	HV	Subtransmission Cable	Subtransmission UG 110kV+ (PILC)	km	-	-	-	-	-	N/A	-
23	HV	Subtransmission Cable	Subtransmission submarine cable	km	-	11.80%	42.70%	45.50%	-	2	11.80%
24	HV	Zone substation Buildings	Zone substations up to 66kV	No.	-	4.10%	22.50%	73.40%	-	3	5.10%
25	HV	Zone substation Buildings	Zone substations 110kV+	No.	-	-	28.60%	71.40%	-	3	-
26	HV	Zone substation switchgear	22/33kV CB (Indoor)	No.	-	7.90%	17.20%	74.90%	-	4	8.50%
27	HV	Zone substation switchgear	22/33kV CB (Outdoor)	No.	-	14.90%	53.70%	31.40%	-	4	15.30%
28	HV	Zone substation switchgear	33kV Switch (Ground Mounted)	No.	-	-	-	-	-	N/A	-
29	HV	Zone substation switchgear	33kV Switch (Pole Mounted)	No.	-	23.30%	72.50%	4.20%	-	4	23.30%
30	HV	Zone substation switchgear	33kV RMU	No.	-	-	-	100.00%	-	4	-
31	HV	Zone substation switchgear	50/66/110kV CB (Indoor)	No.	-	-	-	100.00%	-	4	-
32	HV	Zone substation switchgear	50/66/110kV CB (Outdoor)	No.	-	-	-	100.00%	-	4	-
33	HV	Zone substation switchgear	3.3/6.6/11/22kV CB (ground mounted)	No.	-	13.70%	43.40%	42.90%	-	4	25.00%
34	HV	Zone substation switchgear	3.3/6.6/11/22kV CB (pole mounted)	No.	-	-	-	-	-	N/A	

Company Name	**Vector Limited**
AMP Planning Period	**1 April 2015 – 31 March 2025**

SCHEDULE 12a: REPORT ON ASSET CONDITION

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

sch ref						Asset condition at start of planning period (percentage of units by grade)						
	Voltage	Asset category	Asset class	Units	Grade 1	Grade 2	Grade 3	Grade 4	Grade unknown	Data accuracy (1–4)	% of asset forecast to be replaced in next 5 years
45	HV	Zone Substation Transformer	Zone Substation Transformers	No.	-	3.40%	52.40%	44.20%	-	4	5.80%
46	HV	Distribution Line	Distribution OH Open Wire Conductor	km	-	-	64.50%	35.50%	-	3	0.30%
47	HV	Distribution Line	Distribution OH Aerial Cable Conductor	km	-	-	-	-	-	N/A	-
48	HV	Distribution Line	SWER conductor	km	-	-	-	-	-	N/A	-
49	HV	Distribution Cable	Distribution UG XLPE or PVC	km	0.10%	0.30%	5.90%	93.70%	-	2	1.10%
50	HV	Distribution Cable	Distribution UG PILC	km	0.20%	0.80%	40.20%	58.80%	-	2	1.00%
51	HV	Distribution Cable	Distribution Submarine Cable	km	-	-	86.10%	13.90%	-	2	-
52	HV	Distribution switchgear	3.3/6.6/11/22kV CB (pole mounted) - reclosers and sectionalisers	No.	0.60%	0.60%	3.20%	95.60%	-	4	11.40%
53	HV	Distribution switchgear	3.3/6.6/11/22kV CB (Indoor)	No.	-	-	43.20%	56.80%	-	4	-
54	HV	Distribution switchgear	3.3/6.6/11/22kV Switches and fuses (pole mounted)	No.	4.00%	1.80%	53.50%	40.70%	-	4	9.10%
55	HV	Distribution switchgear	3.3/6.6/11/22kV Switch (ground mounted) - except RMU	No.	0.30%	0.10%	68.30%	31.30%	-	3	8.00%
56	HV	Distribution switchgear	3.3/6.6/11/22kV RMU	No.	0.30%	0.10%	55.60%	44.00%	-	3	3.90%
57	HV	Distribution Transformer	Pole Mounted Transformer	No.	3.50%	0.70%	32.00%	63.80%	-	3	8.10%
58	HV	Distribution Transformer	Ground Mounted Transformer	No.	1.00%	0.70%	39.60%	58.70%	-	3	4.20%
59	HV	Distribution Transformer	Voltage regulators	No.	-	-	-	100.00%	-	4	-
60	HV	Distribution Substations	Ground Mounted Substation Housing	No.	1.50%	1.30%	76.50%	20.70%	-	4	2.80%
61	LV	LV Line	LV OH Conductor	km	-	-	73.80%	26.20%	-	3	0.20%
62	LV	LV Cable	LV UG Cable	km	-	0.30%	36.40%	63.30%	-	2	0.30%
63	LV	LV Streetlighting	LV OH/UG Streetlight circuit	km	-	-	-	-	100.00%	1	0.10%
64	LV	Connections	OH/UG consumer service connections	No.	-	-	-	-	100.00%	1	-
65	All	Protection	Protection relays (electromechanical, solid state and numeric)	No.	-	10.80%	40.30%	48.90%	-	3	17.20%
66	All	SCADA and communications	SCADA and communications equipment operating as a single system	Lot	2.20%	6.90%	-	90.90%	-	4	15.20%
67	All	Capacitor Banks	Capacitors including controls	No.	-	-	89.30%	10.70%	-	3	-
68	All	Load Control	Centralised plant	Lot	-	-	100.00%	-	-	4	-
69	All	Load Control	Relays	No.	-	-	-	-	-	N/A	-
70	All	Civils	Cable Tunnels	km	-	-	8.60%	91.40%	-	4	-

Electricity Asset Management Plan Update

Information Disclosure 2015

Appendix 4
Report on Forecast Capacity

Company Name	**Vector Limited**
AMP Planning Period	**1 April 2015 – 31 March 2025**

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
Atkinson Road	18	24	N-1	20	75%	24	68%	No constraint within +5 years	Meets Vector security criteria
Auckland Airport	16	25	N-1	-	64%	25	93%	Other	Meets customers security requirements
Avondale	26	24	N-1 switched	18	108%	24	99%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Bairds	23	24	N-1	23	95%	24	96%	No constraint within +5 years	Meets Vector security criteria
Balmain	8	-	N	13	-	-	-	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Balmoral	15	23	N-1	12	64%	24	71%	No constraint within +5 years	Meets Vector security criteria - Subtransmission cable replacement
Belmont	12	14	N-1	10	88%	14	79%	No constraint within +5 years	Meets Vector security criteria
Birkdale	23	24	N-1	18	95%	24	94%	No constraint within +5 years	Meets Vector security criteria
Brickworks	10	-	N	12	-	18	58%	No constraint within +5 years	Meets Vector security criteria - Second transformer planned
Browns Bay	17	12	N-1 switched	19	145%	12	141%	No constraint within +5 years	Meets Vector security criteria - Glenvar substation planned
Bush Road	24	24	N-1 switched	12	101%	24	100%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Carbine	16	22	N-1	8	74%	22	84%	No constraint within +5 years	Meets Vector security criteria
Chevalier	20	19	N-1 switched	15	105%	19	97%	No constraint within +5 years	Meets Vector security criteria
Clendon	20	24	N-1	19	84%	24	89%	No constraint within +5 years	Meets Vector security criteria
Clevedon	3	-	N	3	-	-	-	No constraint within +5 years	Meets Vector security criteria
Coatesville	10	-	N	10	-	13	77%	No constraint within +5 years	Meets Vector security criteria - Second transformer installation planned within 5 years
Drive	25	24	N-1 switched	26	104%	24	121%	No constraint within +5 years	Meets Vector security criteria, - New 11kV feeders from Balmoral substation will reduce load on Drive
East Coast Road	18	-	N	17	-	-	-	No constraint within +5 years	Meets Vector security criteria - New Rosedale substation has reduced the load at East Coast Road substation however Rosedale was commissioned after 2014 peak load.
East Tamaki	18	24	N-1	9	75%	24	76%	No constraint within +5 years	Meets Vector security criteria
Forrest Hill	17	20	N-1	17	83%	20	77%	No constraint within +5 years	Meets Vector security criteria
Freemans Bay	20	22	N-1	17	93%	22	99%	No constraint within +5 years	Meets Vector security criteria
Glen Innes	11	13	N-1	11	81%	24	44%	No constraint within +5 years	Meets Vector security criteria - Subtransmission cables and transformer upgrade planned
Greenhithe	12	-	N	12	-	-	-	No constraint within +5 years	Meets Vector security criteria - Second transformer installation planned
Greenmount	42	48	N-1	30	87%	48	88%	No constraint within +5 years	Meets Vector security criteria
Gulf Harbour	8	-	N-1 switched	13	-	-	-	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Hans	25	24	N-1 switched	10	104%	24	115%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Hauraki	9	-	N	13	-	-	-	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Helensville	14	9	N-1 switched	12	154%	9	152%	No constraint within +5 years	Meets Vector security criteria - Kaukapakapa substation planned
Henderson Valley	16	16	N-1 switched	18	107%	16	101%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Highbrook	6	23	N-1	-	24%	23	26%	No constraint within +5 years	Switching Station
Highbury	14	-	N	16	-	16	91%	No constraint within +5 years	Meets Vector security criteria - Second transformer installation planned
Hillcrest	24	24	N-1	22	99%	24	102%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Hillsborough	17	24	N-1	17	69%	24	67%	No constraint within +5 years	Meets Vector security criteria
Hobson 110/11kV	21	30	N-1	11	68%	30	72%	No constraint within +5 years	Meets Vector security criteria
Hobson 22/11kV	18	18	N-1	8	99%	18	111%	No constraint within +5 years	Meets Vector security criteria - CBD 11kV to 22kV load transfer will progressively reduce the load on the Hobson 11kV bus
Hobson 22kV	45	80	N-1 switched	26	57%	80	72%	No constraint within +5 years	Meets Vector security criteria
Hobsonville	21	16	N-1 switched	14	131%	16	317%	No constraint within +5 years	Westgate substation under construction, Hobsonville Point substation planned
Howick	39	46	N-1	14	85%	46	75%	No constraint within +5 years	Meets Vector security criteria
James Street	20	16	N-1 switched	18	125%	16	117%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Keeling Road	14	-	N	20	-	24	67%	No constraint within +5 years	Meets Vector security criteria - Second transformer planned

Company Name	**Vector Limited**
AMP Planning Period	**1 April 2015 – 31 March 2025**

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
Kingsland	24	24	N-1	22	98%	24	120%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Laingholm	9	9	N-1	11	98%	9	83%	No constraint within +5 years	Meets Vector security criteria
Liverpool	38	48	N-1	19	78%	48	88%	No constraint within +5 years	Meets Vector security criteria
Liverpool 22kV	95	135	N-1	49	70%	135	86%	No constraint within +5 years	Meets Vector security criteria
Mangere Central	25	24	N-1 switched	11	105%	48	57%	No constraint within +5 years	Meets Vector security criteria - Third transformer planned
Mangere East	24	24	N-1	20	98%	24	95%	No constraint within +5 years	Meets Vector security criteria
Mangere West	19	33	N-1	4	57%	33	112%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Manly	19	14	N-1 switched	16	135%	14	138%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Manukau	41	48	N-1	25	85%	48	92%	No constraint within +5 years	Meets Vector security criteria
Manurewa	48	47	N-1 switched	27	101%	47	101%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Maraetai	8	18	N-1	2	46%	18	38%	No constraint within +5 years	Meets Vector security criteria
McKinnon	22	24	N-1	15	93%	24	79%	No constraint within +5 years	Meets Vector security criteria
Mcleod Road	12	-	N	15	-	-	-	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
McNab	40	48	N-1	22	84%	48	90%	No constraint within +5 years	Meets Vector security criteria
Milford	9	-	N	8	-	-	-	No constraint within +5 years	Meets Vector security criteria
Mt Albert	7	-	N	7	-	-	-	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Mt Wellington	19	24	N-1	18	80%	24	76%	No constraint within +5 years	Meets Vector security criteria
New Lynn	14	14	N-1	16	99%	14	116%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Newmarket	37	48	N-1	33	78%	48	103%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Newton	17	19	N-1	14	91%	19	83%	No constraint within +5 years	Meets Vector security criteria
Ngataringa Bay	9	-	N	10	-	-	-	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Northcote	6	-	N	8	-	-	-	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Onehunga	14	15	N-1	12	97%	24	59%	No constraint within +5 years	Meets Vector security criteria - Subtransmission cables and transformer upgrade planned
Orakei	22	22	N-1	15	100%	22	96%	No constraint within +5 years	Meets Vector security criteria
Oratia	5	-	N-1 switched	6	-	-	-	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Orewa	16	15	N-1 switched	19	105%	24	91%	No constraint within +5 years	Meets Vector security criteria - Replace 11kV switchboard
Otara	34	31	N-1 switched	22	109%	31	111%	No constraint within +5 years	Meets Vector security criteria - Flat Bush substation under construction
Pacific Steel	55	44	N	-	-	44	122%	Other	Meets customers security requirements
Pakuranga	23	24	N-1	7	95%	24	93%	No constraint within +5 years	Meets Vector security criteria
Papakura	26	24	N-1 switched	10	109%	24	107%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Parnell	10	13	N-1	12	78%	24	51%	No constraint within +5 years	Meets Vector security criteria - Subtransmission cable replacement
Ponsonby	16	14	N-1 switched	10	110%	18	77%	No constraint within +5 years	Meets Vector security criteria
Quay	24	24	N-1	19	100%	24	131%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Quay 22kV	39	120	N-1	27	33%	120	41%	No constraint within +5 years	Meets Vector security criteria
Ranui	12	-	N	18	-	-	-	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Red Beach	14	24	N-1	15	59%	24	108%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Remuera	35	24	N-1 switched	20	144%	24	129%	No constraint within +5 years	Meets Vector security criteria - New 11kV feeders at Newmarket substation will reduce load on Remuera
Riverhead	9	9	N-1 switched	16	101%	9	160%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Rockfield	21	24	N-1	25	88%	24	92%	No constraint within +5 years	Meets Vector security criteria
Rosedale	10	-	N	15	-	-	-	No constraint within +5 years	Meets Vector security criteria
Rosebank	22	26	N-1	17	86%	26	85%	No constraint within +5 years	Meets Vector security criteria
Sabulite Road	20	14	N-1 switched	20	142%	14	134%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
Sandringham	22	24	N-1	21	93%	24	89%	No constraint within +5 years	Meets Vector security criteria
Simpson Road	5	-	N	6	-	-	-	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability

Company Name	**Vector Limited**
AMP Planning Period	**1 April 2015 – 31 March 2025**

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
	Snells Beach	6	-	N	6	-	-	-	No constraint within +5 years	Warkworth South and Sandspit substations are planned. This will reduce the load at Snells Beach and increase the transfer capacity at this substation
	South Howick	31	24	N-1 switched	20	129%	24	108%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
	Spur Road	11	-	N	19	-	14	92%	No constraint within +5 years	Meets Vector security criteria - Second transformer planned
	St Heliers	23	21	N-1 switched	17	107%	21	96%	No constraint within +5 years	Meets Vector security criteria
	St Johns	19	24	N-1	18	80%	24	101%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
	Sunset Road	18	14	N-1 switched	15	126%	14	98%	No constraint within +5 years	Meets Vector security criteria
	Swanson	9	-	N	13	-	-	-	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
	Sylvia Park	18	24	N-1	13	75%	24	103%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
	Takanini	14	18	N-1	11	80%	18	80%	No constraint within +5 years	Meets Vector security criteria
	Takapuna	9	-	NN	12	-	-	-	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
	Te Atatu	20	14	N-1 switched	11	145%	14	157%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
	Te Papapa	23	24	N-1	12	95%	24	103%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
	Torbay	7	-	N	8	-	-	-	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
14	Triangle Road	17	12	N-1 switched	21	144%	18	115%	No constraint within +5 years	Meets Vector security criteria - Transformer upgrade planned
15	Victoria	24	22	N-1 switched	21	108%	22	119%	No constraint within +5 years	Meets Vector security criteria - CBD 11kV to 22kV conversion will progressively reduce load Victoria substation
16	Waiake	9	-	N	10	-	-	-	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
17	Waiheke	11	15	N-1	3	71%	15	62%	No constraint within +5 years	Meets Vector security criteria
18	Waikaukau	7	-	N	9	-	-	-	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
19	Waimauku	9	-	N	10	-	12	102%	No constraint within +5 years	Meets Vector security criteria - Second 33kV circuit
20	Wairau Road	17	16	N-1 switched	20	104%	16	116%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
21	Warkworth	19	18	N-1 switched	15	103%	18	120%	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
22	Wellsford	8	9	N-1	7	91%	9	92%	No constraint within +5 years	Meets Vector security criteria
23	Westfield	29	24	N-1 switched	13	122%	24	157%	No constraint within +5 years	Meets Vector security criteria - New feeders from McNab will off load Westfield substation
24	White Swan	30	32	N-1	19	93%	32	84%	No constraint within +5 years	Meets Vector security criteria
25	Wiri	41	48	N-1	20	86%	48	91%	No constraint within +5 years	Meets Vector security criteria
26	Woodford	10	-	N	12	-	-	-	No constraint within +5 years	Meets Vector security criteria - Substantial load transfer capability
27						-				
28						-				

29 [1] *Extend forecast capacity table as necessary to disclose all capacity by each zone substation*

12b(ii): Transformer Capacity

		(MVA)
32	Distribution transformer capacity (EDB owned)	
33	Distribution transformer capacity (Non-EDB owned)	
34	**Total distribution transformer capacity**	-
35		
36	**Zone substation transformer capacity**	

Schedule 12b Explanatory Notes

Explanatory notes pertaining to Schedule 12b are provided in the box below, in the format required for Schedule 15 of the Electricity Distribution Information Disclosures:

Additional explanatory comment on disclosed information

Vector's security standards are also not strictly based on an N-1 security definition, but based on supplying the required electricity load x% of the time following a fault (the value of x depends on the type of consumer being supplied). This standard permits higher loading limits on our substations, and as a result the % utilisation figures calculated in the form required for Schedule 12b could misconstrue the network's true utilisation.

Electricity Asset Management Plan Update

Information Disclosure 2015

Appendix 5
Report on Forecast Network Demand

Company Name	**Vector Limited**
AMP Planning Period	**1 April 2015 – 31 March 2025**

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					
	for year ended	*Current Year CY* **31 Mar 15**	*CY+1* **31 Mar 16**	*CY+2* **31 Mar 17**	*CY+3* **31 Mar 18**	*CY+4* **31 Mar 19**	*CY+5* **31 Mar 20**
	*Consumer types defined by EDB**						
	Residential & Small Medium Enterprise (SME)	6,939	9,143	11,140	12,433	10,694	10,126
	Industrial & Commercial (I & C)	136	159	159	159	159	159
	Connections total	7,075	9,302	11,299	12,592	10,853	10,285
	**Distributed generation*						
	Number of connections	1,010	1,507	2,508	2,509	2,510	3,013
	Installed connection capacity of distributed generation (MVA)	7	5	7	7	7	9

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 15**	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**
	GXP demand		1,709	1,721	1,730	1,734	1,723	1,703
plus	Distributed generation output at HV and above		10	10	10	10	10	10
	Maximum coincident system demand		1,719	1,732	1,740	1,744	1,733	1,713
less	Net transfers to (from) other EDBs at HV and above		-	-	-	-	-	-
	Demand on system for supply to consumers' connection points		1,719	1,732	1,740	1,744	1,733	1,713
	Electricity volumes carried (GWh)							
	Electricity supplied from GXPs		8,600	8,578	8,601	8,630	8,665	8,688
less	Electricity exports to GXPs							
plus	Electricity supplied from distributed generation		101	106	113	124	124	124
less	Net electricity supplied to (from) other EDBs							
	Electricity entering system for supply to ICPs		8,701	8,684	8,715	8,754	8,789	8,812
less	Total energy delivered to ICPs		8,348	8,333	8,361	8,399	8,432	8,454
	Losses		352	352	353	355	357	358
	Load factor		58%	57%	57%	57%	58%	59%
	Loss ratio		4.0%	4.1%	4.1%	4.1%	4.1%	4.1%

Schedule 12c Explanatory Notes

Explanatory notes pertaining to Schedule 12c are provided in the box below, in the format required for Schedule 15 of the Electricity Distribution Information Disclosures:

Additional explanatory comment on disclosed information

It should be noted that this forecast contains a high level of uncertainty; there is no clear indication of what future network growth will look like, and when the decreasing energy consumption trend will plateau. We will keep a close eye on this and update future AMPs accordingly.

Electricity Asset Management Plan Update

Information Disclosure 2015

Appendix 6
Report on Forecast Interruptions and Duration (reported by sub-network)

Company Name	**Vector Limited**
AMP Planning Period	**1 April 2015 – 31 March 2025**
Network / Sub-network Name	**Vector**

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 15**	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**
10	**SAIDI**						
11	Class B (planned interruptions on the network)	21.0	20.6	20.6	20.6	20.6	20.6
12	Class C (unplanned interruptions on the network)	482.4	137.8	137.8	137.8	137.8	137.8
13	**SAIFI**						
14	Class B (planned interruptions on the network)	0.11	0.12	0.12	0.12	0.12	0.12
15	Class C (unplanned interruptions on the network)	1.80	1.38	1.38	1.38	1.38	1.38

Electricity Asset Management Plan Update

Information Disclosure 2015

Appendix 7
List of proposed capital projects from 2015 to 2025

Project Name	Expenditure Category	Commissioning Date
Hobson 22kV Ducts Madden St Waterfront Dev New	System Growth	FY16
St Johns 33kV Feeder New	System Growth	FY17
Hobson Wynyard South Waterfront Development 22kV Ducts New	System Growth	FY16
Highbury Second 33kV TX New	System Growth	FY17
Hobson City Rail Link (Aotea Station) 22kV Cables New	System Growth	FY16
Kingsland City Rail Link 22kV Feeders New	System Growth	FY17
Newmarket 309 Broadway 11kV Feeders New	System Growth	FY16
Chevalier Cycleway Ducts New	System Growth	FY17
Mt Albert Future Ducts New	System Growth	FY17
Hobsonville Point Zone SUB New	System Growth	FY18
Warkworth South Zone SUB New	System Growth	FY17
Wainui Zone SUB Land New	System Growth	FY16
Newmarket South Zone SUB Land New	System Growth	FY16
Wairau Hospital 11kV Feeder New	System Growth	FY16
Flatbush 11kV Feeder Cables New	System Growth	FY17
Tunnel - Newmarket Plant Room LV Reinforce	System Growth	FY16
Waterview North Portal Permanent Supply New	System Growth	FY16
Quay 22kV SWBD Upgrade	System Growth	FY17
Rosebank 11kV Ducts New	System Growth	FY16
Rosedale to Watercare 11kV Feeder New	System Growth	FY16
Te Atatu - Henderson - Westgate Duct New	System Growth	FY17
Kumeu Land New	System Growth	FY16
Mangere West 11kV Cable New	System Growth	FY16
Takanini Brookby Supply	System Growth	FY17
Takanini Brookby Supply	System Growth	FY17
Takanini Brookby Supply	System Growth	FY17
Hobson 110kV GXP New	System Growth	FY15
Waterview South Portal Permanent Supply New	System Growth	FY15
Birkdale SUB Upgrade	System Growth	FY15
Keeling Rd Second 33/11kV TX New	System Growth	FY15
Rosedale Zone SUB New	System Growth	FY15
Spur Rd Weiti Development 11kV Feeder New	System Growth	FY15
Flatbush Zone SUB Land New	System Growth	FY15
Hobsonville Point Land New	System Growth	FY15
Flatbush Zone SUB New	System Growth	FY15
Quay Feasibility Study	System Growth	FY17
Newmarket South Zone SUB New	System Growth	FY19
Hobson Wynyard South Waterfront Development 22kV Cables New	System Growth	FY17
Coatesville Second 33/11kV TX New	System Growth	FY18
Hillcrest Tonar 11kV Feeder New	System Growth	FY17
Keeling Rd Second 33kV Supply New	System Growth	FY18
Kumeu Zone SUB New	System Growth	FY19
Waimauku Second 33kV Supply New	System Growth	FY19
Red Hills Zone SUB Land New	System Growth	FY17
Ihumatao Land New	System Growth	FY17
Glenvar Zone SUB New	System Growth	FY19
Hobson 22kV Cable Madden St Waterfront Dev New	System Growth	FY17
Liverpool 110/22kV TX Replace	System Growth	FY19
Wainui Zone SUB New	System Growth	FY20
Westgate 33kV Supply 1 Henderson New	System Growth	FY19
Ellerslie Land New	System Growth	FY18

Project Name	Expenditure Category	Commissioning Date
Whenuapai Zone SUB Land New	System Growth	FY18
Mangere Central 11kV Feeder New	System Growth	FY18
Hobson 22kV Cable Halsey St Waterfront Dev New	System Growth	FY18
Quay 110kV Feeder New	System Growth	FY21
Drive Alexandra Park 11kV Feeder New	System Growth	FY19
Orewa 33kV Third Supply New	System Growth	FY20
Spur Rd Second 33/11kV TX New	System Growth	FY20
Southdown Zone SUB Land New	System Growth	FY19
Mangere Central 33/11kV TX New	System Growth	FY21
Red Hills Zone SUB New	System Growth	FY21
Kingsland City Rail Link Supply in Tunnel	System Growth	FY20
Brighams Creek Land New	System Growth	FY20
Waiwera Zone SUB Land New	System Growth	FY20
Hobson Waterfront Development Third 22kV Feeder New	System Growth	FY22
Southdown Zone SUB New	System Growth	FY23
Greenhithe to Watercare 11kV Feeder New	System Growth	FY21
Takanini South Land New	System Growth	FY21
Liverpool 22kV Subtrans Cables New	System Growth	FY24
Onehunga 11kV Feeders New	System Growth	FY23
Greenhithe Second 33/11kV TX New	System Growth	FY23
Waiwera Zone SUB New	System Growth	FY24
Takanini Mill Road 11kV Cable New	System Growth	FY23
Wiri West Zone SUB New	System Growth	FY23
Hobson Queens Wharf 22kV Cable New	System Growth	FY23
Liverpool Telecom Mayoral Dr 22kV Cables New	System Growth	FY23
Kaukapakapa Zone SUB New	System Growth	FY25
Sandspit Zone SUB New	System Growth	FY25
Whenuapai Zone SUB New	System Growth	FY25
Ihumatao Zone SUB Stage 1 New	System Growth	FY25
Liverpool University Medical School 11kV Feeders New	System Growth	FY24
Balmoral 11kV Feeder New	System Growth	FY25
Riverhead 33/11kV TX Upgrade	System Growth	FY25
Warkworth South 33kV Second SWBD New	System Growth	FY25
Westgate 33kV Supply 2 Henderson New	System Growth	FY25
Albany Zone SUB New	System Growth	FY25
Liverpool 110kV SWBD New	System Growth	FY25
Newmarket 110kV SWBD New	System Growth	FY25
Parnell 11kV Feeders New	System Growth	FY25
Liverpool 22kV Distribution Cables New	System Growth	FY25
Woodford Second 33/11kV TX New	System Growth	FY25
Matakana Land New	System Growth	FY25
LV Network - Operation	Other Reliability, Safety and Environment	FY16
Electricity network voltage cyber security - Independent Health Monitor	Other Reliability, Safety and Environment	FY16
Tunnel - Site Communications Redundancy New	Other Reliability, Safety and Environment	FY16
Tunnel - Airlock Security New	Other Reliability, Safety and Environment	FY18
Tunnel - Emergency Lighting/Sirens New	Other Reliability, Safety and Environment	FY16
Electricity network voltage cyber security -Vulnerability management	Other Reliability, Safety and Environment	FY16
Network automation - primary substation next generation	Other Reliability, Safety and Environment	FY16

Project Name	Expenditure Category	Commissioning Date
Electrical Vehicle Integration and management	Other Reliability, Safety and Environment	FY16
Electricity network modelling	Other Reliability, Safety and Environment	FY17
Condition Based Risk Management (CBRM) - Deployment	Other Reliability, Safety and Environment	FY16
Tunnel - Safety Equipment New	Other Reliability, Safety and Environment	FY15
Tunnel - Fire Main Jockey Pumps New	Other Reliability, Safety and Environment	FY15
Tunnel - Sensors (Gas/Temp/Humidity) Replace	Other Reliability, Safety and Environment	FY15
Tunnel - Fire System Compliance New	Other Reliability, Safety and Environment	FY15
Drive Seismic Reinforce	Other Reliability, Safety and Environment	FY17
Tunnel - Newmarket Egress Ladder Compliance New	Other Reliability, Safety and Environment	FY17
Tunnel - Catalytic Convertor Fume Extraction New	Other Reliability, Safety and Environment	FY17
Distributed generation integration and management	Other Reliability, Safety and Environment	FY18
Electricity network voltage cyber security - Security event logging and management	Other Reliability, Safety and Environment	FY17
Electricity network voltage cyber security - intrusion detection	Other Reliability, Safety and Environment	FY17
Electricity network voltage / VAr / Watt control	Other Reliability, Safety and Environment	FY18
Integration of Microgrids	Other Reliability, Safety and Environment	FY20
Electricity network dynamic network reconfiguration - load transferring schemes	Other Reliability, Safety and Environment	FY18
Electricity network demand side management	Other Reliability, Safety and Environment	FY19
Distributed electrical energy storage integration and management	Other Reliability, Safety and Environment	FY19
Advanced metering infrastructure integration	Other Reliability, Safety and Environment	FY20
Electricity network losses optimisation	Other Reliability, Safety and Environment	FY20
Tunnel - Fire Main Valve Replace	Other Reliability, Safety and Environment	FY24
Tunnel - Safety Integrity Level Compliance New	Legislative and Regulatory	FY16
Tunnel - Analogue Radio System Replace	Asset Replacement and Renewal	FY16
Wairau Valley SWBD Replace	Asset Replacement and Renewal	FY17
Howick SBWD Replace	Asset Replacement and Renewal	FY17
Mt Albert 11kV SWBD Replace	Asset Replacement and Renewal	FY17
Manurewa 11kV SWBD Replace	Asset Replacement and Renewal	FY17
Takanini SWBD Replace	Asset Replacement and Renewal	FY16
Orakei 11kV SWBD Replace	Asset Replacement and Renewal	FY17
Helensville 33kV CB Replace	Asset Replacement and Renewal	FY16
Tunnel - Portal Shaft Fire Detection Replace	Asset Replacement and Renewal	FY16
Tunnel - Ventilation Filters, Fire Dampers Replace	Asset Replacement and Renewal	FY17
Mt Albert TX Replace	Asset Replacement and Renewal	FY17
Parnell 22kV TX Replace	Asset Replacement and Renewal	FY17
Southern Bay Controls & RTU Replace	Asset Replacement and Renewal	FY16

Project Name	Expenditure Category	Commissioning Date
Lichfield PAC System Renewal	Asset Replacement and Renewal	FY17
East Tamaki PAC System Renewal	Asset Replacement and Renewal	FY16
Hobson 22kV PAC System Renewal	Asset Replacement and Renewal	FY16
Northern Load Control Replace	Asset Replacement and Renewal	FY19
Takapuna PAC System Upgrade	Asset Replacement and Renewal	FY17
Tunnel - Cooling Capacity New	Asset Replacement and Renewal	FY16
Tunnel - Newmarket Plant Room Exterior Replace	Asset Replacement and Renewal	FY16
Glen Innes SUBT Cable Replace	Asset Replacement and Renewal	FY17
Northern Control Centre Application	Asset Replacement and Renewal	FY18
Southern Control Centre Application	Asset Replacement and Renewal	FY18
Southern Load Control PC85 Replace	Asset Replacement and Renewal	FY17
Southern DMR Voice System	Asset Replacement and Renewal	FY17
Drive 11kV SWBD Replace	Asset Replacement and Renewal	FY17
Bairds PAC System upgrade	Asset Replacement and Renewal	FY15
Tunnel - Geda Lift Replace	Asset Replacement and Renewal	FY15
Tunnel - Drainage Pump and Controls Replace	Asset Replacement and Renewal	FY15
Tunnel - Ventilation VSD Replace	Asset Replacement and Renewal	FY15
Tunnel - Control Room New	Asset Replacement and Renewal	FY15
Tunnel - PLC Replace	Asset Replacement and Renewal	FY15
Tunnel - UPS Replace	Asset Replacement and Renewal	FY15
Glen Innes TX Replace	Asset Replacement and Renewal	FY18
Triangle 33kV TX Replace	Asset Replacement and Renewal	FY18
Chevalier SUBT Replace	Asset Replacement and Renewal	FY18
Orewa 11kV SWBD Replace	Asset Replacement and Renewal	FY18
Southern Load Control Replace	Asset Replacement and Renewal	FY22
Northern DMR Voice System	Asset Replacement and Renewal	FY18
Waiheke 11kV SWBD Retrofit	Asset Replacement and Renewal	FY18
Browns Bay 33kV SWBD Replace	Asset Replacement and Renewal	FY18
Tunnel - Ventilation Motor Replace	Asset Replacement and Renewal	FY18
Mt Wellington 33kV TX Replace	Asset Replacement and Renewal	FY19
Northern DMR Radio System Replace	Asset Replacement and Renewal	FY19
Mangere Central 11kV SWBD Replace	Asset Replacement and Renewal	FY19
Freemans Bay 11kV SWBD Replace	Asset Replacement and Renewal	FY19
Pakuranga 11kV SWBD Replace	Asset Replacement and Renewal	FY19

Project Name	Expenditure Category	Commissioning Date
Henderson Valley SWBD Replace	Asset Replacement and Renewal	FY18
New Lynn SWBD Replace	Asset Replacement and Renewal	FY19
Onehunga SUBT Cable Replace	Asset Replacement and Renewal	FY20
Torbay 11kV SWBD Replace	Asset Replacement and Renewal	FY20
Sandringham 11kV SWBD Replace	Asset Replacement and Renewal	FY20
Te Papapa 11kV SWBD Replace	Asset Replacement and Renewal	FY19
Ngataringa 11kV SWBD Replace	Asset Replacement and Renewal	FY20
Browns Bay TX Replace	Asset Replacement and Renewal	FY21
Swanson 11kV SWBD Replace	Asset Replacement and Renewal	FY21
Takanini TX Replace	Asset Replacement and Renewal	FY22
Liverpool-Quay 22kV SUBT Cable Replace	Asset Replacement and Renewal	FY22
East Coast Rd 11kV SWBD Retrofit	Asset Replacement and Renewal	FY22
Belmont 33kV SWBD Replace	Asset Replacement and Renewal	FY21
Wellsford 33kV SWGR Replace	Asset Replacement and Renewal	FY22
Riverhead 33kV SWGR Replace	Asset Replacement and Renewal	FY22
Sabulite TX Replace	Asset Replacement and Renewal	FY23
Manukau SWBD Replace	Asset Replacement and Renewal	FY23
Quay SWBD Replace	Asset Replacement and Renewal	FY23
Sabulite 33kV SWGR Replace	Asset Replacement and Renewal	FY23
Waimauku 33kV TX Replace	Asset Replacement and Renewal	FY24
McNab 33kV TX Replace	Asset Replacement and Renewal	FY24
Hobsonville 11kV SWBD Replace	Asset Replacement and Renewal	FY24
St Heliers SWBD Replace	Asset Replacement and Renewal	FY24
Rockfield 11kV SWBD Replace	Asset Replacement and Renewal	FY24
Hobson SWBD Replace	Asset Replacement and Renewal	FY24
Hobson 22kV SWBD Replace	Asset Replacement and Renewal	FY24
Tunnel - SCADA EOC HMI Replace	Asset Replacement and Renewal	FY23
Mt Albert SUBT Cable Replace	Asset Replacement and Renewal	FY25
Northcote SWBD Replace	Asset Replacement and Renewal	FY25
Woodford Ave 11kV SWBD Replace	Asset Replacement and Renewal	FY25
Westfield SUBT Cable Replace	Asset Replacement and Renewal	FY25
Rosebank SWBD Replace	Asset Replacement and Renewal	FY25
White Swan SWBD Replace	Asset Replacement and Renewal	FY25
James St 11kV SWBD Replace	Asset Replacement and Renewal	FY25

Project Name	Expenditure Category	Commissioning Date
South Howick 11kV SWBD Replace	Asset Replacement and Renewal	FY25
Otara TX Replace	Asset Replacement and Renewal	FY25
Takanini SUBT Cable Replace	Asset Replacement and Renewal	FY25
Laingholm 11kV SWBD Replace	Asset Replacement and Renewal	FY25
Wiri SWBD Replace	Asset Replacement and Renewal	FY25
Tunnel - Train, Generator, Rolling Stock Replace	Asset Replacement and Renewal	FY15
Tunnel - Atmospheric Sensors Replace	Asset Replacement and Renewal	FY15
Hepburn 33kV SWBD Replace	Asset Relocations	FY17
Takanini 33kV SWBD Replace	Asset Relocations	FY17
Penrose 33kV SWBD Replace	Asset Relocations	FY17
Wairau 110kV Mast Relocate	Asset Relocations	FY16
East West Link Relocate	Asset Relocations	FY21
Mill Rd - Redoubt Rd Relocate	Asset Relocations	FY18
Lincoln Rd Stage 2 Relocate	Asset Relocations	FY16
Mt St John Ave OIP	Asset Relocations	FY16
Arney Road OIP	Asset Relocations	FY15
Seventh Avenue OIP	Asset Relocations	FY15
Golf Road OIP	Asset Relocations	FY15
AMETI 4 Panmure - Pakuranga	Asset Relocations	FY15
Reeves Rd Flyover Relocate	Asset Relocations	FY15
Wainui Rd Relocate	Asset Relocations	FY15
Henderson 33kV SWBD Replace	Asset Relocations	FY18
Roskill 33kV SWBD Replace	Asset Relocations	FY19
Albany 33kV SWBD Replace	Asset Relocations	FY19
SH20A/Kirkbride Relocate	Asset Relocations	FY19
Second Harbour Crossing Relocate	Asset Relocations	FY22

Schedule 17 Certification for Year-beginning Disclosures

Clause 2.9.1 of section 2.9

We, Peter Bird and

Alison Paterson, being directors of Vector Limited certify that, having made all reasonable enquiry, to the best of our knowledge:

a) the following attached information of Vector 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.

Director

Director

24 March 2015

Date