Electricity Asset Management Plan Update

Information Disclosure 2017

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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 its asset management planning since 31 March 2016, when the last Electricity AMP (2016-2026) 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.

2 CONTEXT

In the world of electricity, innovation and disruption is occurring across the entire value chain. As a company, Vector is embracing such change. While it may be early days, customers now have the ability to generate, store, use and sell electricity - all against the backdrop of a much greater customer focus on sustainability. These abilities are only going to be enhanced as technology improves and customer adoption grows.

As a company, we are at the front end of having to meet Auckland's growth, which even by global standards, is extremely high. Such exceptional and simultaneous population growth, city expansion and intensification is also occurring in the context of increased weather volatility associated with climate change and the need to decarbonise our lifestyles and economy. This requires new thinking around infrastructure investment, a shift to clean energy technology and a changing role for the end consumer in energy management to deliver resilience and reduce carbon emissions.

We are providing customers options to support Auckland consumers' long term interests including the support of clean energy solutions. Such options, including solar, battery, demand side solutions and electric vehicle technology are increasingly popular internationally and are what Auckland customers will quickly come to expect.

Further underscoring the need for flexibility, careful network investment and a more sophisticated understanding of the dynamics occurring on the network, is that average household consumption is declining. This is a result of people renovating, building standards improving, adoption of energy efficient appliances and lighting, and responsive technology allowing demand response options at peak times. When this is considered against the backdrop of Auckland undergoing unprecedented growth and the significant impact that evolving technology like electric vehicles and battery storage will have on the network, information on customer trends and behaviours is fundamental to our ability to deploy capital efficiently as well as to ensure customers get solutions they require. The current transmission pricing uncertainty also highlights the need for flexibility. Current proposals suggest that Aucklanders end up paying considerably more in transmission costs than was previously the case, resulting in a possible change in consumption patterns. Vector's strategy of enhancing our data analytical capability and focusing on enabling integration platforms to manage the convergence of customer and network data will continue over this period.

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

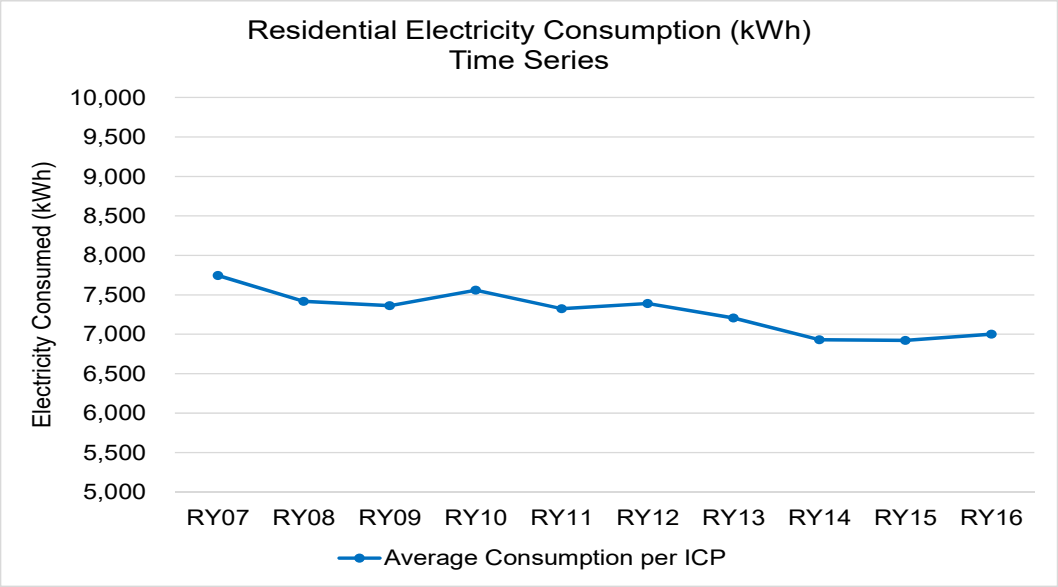

Figure 1: Average household electricity consumption

The value we can realise in embracing and understanding change in the way we utilise assets on the network, while also meeting Auckland's growing and urgent infrastructure needs, is value that consumers don't have to fund. This is an approach informed and supported by our majority consumer trust owner, Entrust.

The period covered by the current AMP will continue to trial new, sustainable technology solutions on the network and beyond the customer's point of connection to realise this value. This will include Vector aiming to become a global leader in the field of network control platforms to ensure multiple devices and connections can be managed and coordinated whether these are customer or network centric. This update to the AMP also reflects the continuation of our strategy to use digital channels to communicate and interface with customers.

The safety of our staff and the public is a key driver underpinning the forecasted investment. The adoption of de-energised work practices and other safety improvement initiatives, as expected, has had an impact on the cost of planning and executing the works program. This updated AMP reflects this change, but we are still working with our service providers and our customers to establish the appropriate level of costs.

Vector's adoption of industry-leading and continually evolving workplace safety practices has also had a significant impact on Vector's ability to maintain the reliability target set by the regulator using historic work practices. In addition, the increase in congestion on Auckland's roads and a noticeable increase in vegetation related faults from trees and debris outside the allowable, regulatory cut zone have had a significant impact on our ability to meet fault response targets set on past data. We have not increased expenditure to compensate for the change in work practices, traffic congestion or out of zone vegetation, since the associated costs can only be recovered from our customers. Our strategy is to continue to work with the economic and safety regulators to set appropriate targets and have targeted investment programs for areas on the network where the actual service levels are impacting our customers.

3 NETWORK DEVELOPMENT PLANNING UPDATE

This section discusses factors that have led to material changes to the network development plan described in section 5 of Vector's 2016 AMP and the subsequent 2017 AMP Update.

Future Network Technology

Vector is actively researching and implementing a number of new, sustainable technology initiatives to improve future network performance and development. These include various energy storage systems for the applications of network peak-shaving and backup supply, with the potential to provide grid support services. A key project delivered under this stream of work was a 1MW / 2.3MWh network-scale energy storage system installed at the Glen Innes zone substation in FY17.

With the increasing availability and improved economics of connected devices, there are a number of projects investigating ways of achieving a much more advanced level of visibility, reporting, control and automation on the electricity network. Similarly, a programme is underway to review the existing hot water load management scheme and to consider modern replacements for this infrastructure. A partnership between Entrust, Auckland Council and Vector, has been established and it will deliver free hot water heat control units, up to 15,000 LED lightbulbs, and energy advice to homeowners in Papakura and Takanini.

Auckland growth

Auckland's population is forecast to grow at an annual rate of 1.7% over the next ten years, increasing the number of electricity connections on Vector's network by approximately 10,000 per annum. This growth is driving investment in new reticulation assets or smart technology to enable existing assets to meet the demand.

The increasing population is placing considerable strain on Auckland's transport infrastructure driving a number of road widening projects by Auckland Transport and NZTA, resulting in considerable investment in the relocation of existing electricity assets.

The current AMP reflects Vector's initial assessments of the impacts of declining usage per customer and a growing population. The network impacts of emerging technology such as electric vehicles, home energy management systems and incentives for off peak consumption via retail tariffs have the potential to significantly affect the mid to longer term planning horizon.

Across the globe the energy industry is in a period of significant transition driven by changing consumer requirements, the digitisation of the energy value chain and the development and adoption of new (and at times competing) technology. Considerable uncertainty underpins this transition, disrupting the traditional practice of long term planning by creating a number of possible and at times divergent energy futures.

In response to this uncertainty, Vector has developed a detailed network scenario model that allows multivariate scenario analysis to be applied to the network. The scenarios have been supported by detailed customer research that provides a foundation of understanding of the customer lead disruption.

Vector is looking to incorporate the results of this scenario analysis into the future Asset Management Plans.

Network Planning Criteria

The security of supply standards have been updated since the 2016 AMP. The changes made are designed to actively identify and manage risks associated with high impact, low probability events, recognition of the large loads and risks associated with meshed sub transmission networks, while maintaining the impetus to improve utilisation of network assets. The distribution load thresholds have been normalised to 1.5MVA, (as against 2.5MVA for overhead and 1MVA for underground

networks), acknowledgement of N security presented by distribution substations with minimal 400V distribution back-up, while targeting future 400V networks with an improved level of connectivity over that currently available.

Two criteria are directed towards use of network batteries where they add value. The two applications envisaged are where demand marginally exceeds the security levels of existing zone substations and the installation of batteries may defer a major reinforcement project. The second area is to provide distribution network support during outages and voltage support during normal operation. Applications are also being explored within solar and batteries micro-grid solutions particularly in locations at the extremities of the network that suffer poor reliability.

The last item targets critical spares by placing limits on the time the network may remain on reduced security.

The revised standard contains a mix of demand and customer-based targets while offering an opportunity to use emerging technologies as solutions.

4 LIFE-CYCLE ASSET MANAGEMENT UPDATE

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 6 of the 2016 AMP and the subsequent 2017 AMP Update.

Asset Maintenance and Inspection

Maintenance Standards Review

A full review of all maintenance standards is underway and will be completed by the end of FY17. As these reviews are completed, new standards will supersede the existing documents referenced in the 2016 AMP. No major changes to maintenance requirements are planned, the review will focus on accurate observation reporting (refer to section 6.1 of the 2016 AMP), although some improvement / optimisation of maintenance activities will be included.

Vector has also significantly changed the way it undertakes work on the overhead network, completing a higher proportion of work de-energised in order to reduce the risk to worker safety. This has meant a knock-on impact to customer experience due to the higher number of outages required to complete maintenance tasks. A review will be undertaken before the end of FY17 of the frequency of all preventative maintenance tasks, aiming to ensure they are aligned in such a way that they can be completed together, reducing the impact to customers.

Risk Based Prioritisation

Vector is developing a risk-based maintenance prioritisation framework. At the moment, Vector schedules the majority of its preventative maintenance inspections using a time-based philosophy. Notable observations requiring corrective actions, including replacement, are assigned a 'priority' rating based on a specified time period in which a corrective action is required. Although some observations are allocated a standard priority, as a result of the requirements of the maintenance standards, most are determined on site by the inspector using a combination of expected failure timeframe and anticipated consequences. These observations are then recorded as a corrective action task in Vector's SAP-PM system.

The new risk-based prioritisation framework will utilise specific asset failure modes, condition data, site exposure factors and assessment of consequences by asset failure mode. This will enable Vector to better prioritise the corrective actions resulting from the maintenance inspections, which will result in a more optimal investment outcome. We anticipate to have this framework in place

during FY18 and the output from the model will improve steadily over the next 2-3 years as better observation data is recorded as part of the planned maintenance inspections.

Pending the deployment of the risk based prioritisation tools, the FY17 and FY18 annual maintenance plans have been compiled based on the present data contained within the asset notification pool, focusing first on public safety and then on network reliability.

Overhead Lines (and hardware)

The inspection frequency for overhead network condition assessment (ONCA) has been changed from yearly to 2-yearly. This was decided based on the results of multiple annual maintenance inspections which showed a large number of asset condition notifications re-noted multiple times without any evidence of further deterioration. This change affects the visual inspections of Vector's overhead hardware including: poles, lines, crossarms, overhead switchgear, overhead transformers, pole mounted capacitors and pole cable risers / terminations.

A programme of proactive small diameter conductor replacement is scheduled to be completed in FY17. The programme targets areas with a known high failure rate, with a particular emphasis on populated areas where the risk of a broken conductor is much higher than in rural areas.

Overhead Structures

The inspection standard for poles (ENS-0057) has been updated to amend the requirements around inspection of concrete poles. The previous routine 10-yearly inspection for structural design has been amended to be trigged on a condition assessment basis as part of the two-yearly routine inspections. Poles showing signs of stress are identified in order to prevent climbing and to allow further inspection and structural analysis. Those that do not meet the serviceability requirements, in accordance with AS/NZS 7000, are managed though Vector's 'tagged pole' processes. The requirement for inspections on wooden poles has not changed.

A network-wide survey of all Vector owned steel towers is due to commence in FY17. This survey will include a structural analysis and detailed condition assessment of the structure, line hardware and foundation. Any remedial works will be scheduled for completion in FY18.

Ground Mounted Distribution Switchgear

Triggered by an event in Western Australia, Vector issued a safety alert preventing access to a switchgear oil tank when any component within the tank remains live. This has prevented Vector from continuing with condition-based maintenance of oil filled switchgear based on the results of a live tank oil sample (LTOS) test. Internal inspections are now undertaken de-energised and programmed on a time based programme at an 8-yearly frequency.

At the start of FY17, Vector became aware of a number of oil-filled switchgear units whose maintenance inspections had been delayed, resulting in the last inspection date exceeding the required 8-year inspection period. The delays were primarily due to the difficulty in arranging outages with large commercial customers and the high SAIDI impact of outages on key network switching points. In recognition of the safety risk this presents, affected units have been prohibited from live operation until maintenance is completed. An accelerated programme of maintenance is underway and is expected to be completed in FY18.

Asset Replacement and Renewal

Primary Switchboard Replacement Programme for Zone Substations

The primary purpose of circuit breakers (CBs) is to distribute electricity from zone substations to the distribution network and from there to customers in a safe and reliable manner. There are three distinct technologies used in the switchgear in Vector's zone substations. The technology is

representative of the age as well as the operational risks associated with each type: the oldest technology is the oil type switchboards that are reaching end of life.

Vector has 68 zone substations that contains oil filled CBs and 20 have been identified from Vector's periodic risk assessment as having serious risk of failure within the short term (the short term risk period is estimated as five years). Failure in medium voltage electrical switchgear can be sudden and catastrophic and can cause extensive collateral damage, and have the potential to cause injury or death to persons.

Vector is undertaking a program to replace the 11kV switchgear in 20 zone substations over the next five years. The projects will be undertaken in bundles to achieve economy of scale cost savings for both installation and procurement of plant.

Asset Condition Notifications (High Priority Review)

The capital expenditure forecast in the previous AMP for the distribution network, starting from FY21, was increased. During compilation of the FY17 and FY18 maintenance plans, it was determined that the previous forecast increase from FY21 should be brought forward to address high priority notifications that may present a risk to public safety. An additional $20m has been included in FY18 for the distribution network. $15m of this expenditure will target high priority notifications. The remaining $5m will be added to the existing programme of works on non-Vector owned Right of Way (ROW) assets. However, the total capital investment on the distribution network is forecast to decrease from the investment level in FY18. It is anticipated that the increased understanding of risk from the risk based prioritisation model previously described, will support this forecast, although this position will be reviewed once the risk based prioritisation process is fully implemented.

Right of Way Assets

Vector has continued to allocate a significant portion of capital investment into Right of Way (ROW) maintenance, aiming to address the increasing rate of deterioration and failure of non-Vector owned assets, deployed on service lines along Right of Ways. As a result, the capital expenditure forecast for FY18 has increased $5m from $8m to $13m to reflect the potential public safety risk these third party owned assets present.

Sub-Transmission Cables

Vector still operates two 22kV gas-filled PILC cables that are approaching the end of their economic service life.

The first is a 22kV gas-filled cable between Kingsland zone substation 22kV bus and transformer T1 in Ponsonby zone substation. This cable is due for replacement in FY19 and FY20. Two (in parallel) 22kV paper insulated cables that supply transformer T2 in Ponsonby from Kingsland were installed in 1949 and will also be replaced under the project to replace the gas-filled cable.

The second cable is a 22kV gas-filled cable between Liverpool zone substation and Quay St zone substation. This cable is located between the Liverpool zone substation 22kV bus and Quay St 22kV bus in Auckland's CBD. Over the last number of years parts of the 11kV network in the CBD have been converted to 22kV which has reinforced the backstop capability between these two centre-city nodes. As a result of this reinforcement, a review is being undertaken to assess the need to replace the gas-filled cable between Liverpool and Quay zone substations.

Distribution Transformers

The high-priority programme to retrofit additional support brackets to overhead distribution transformers and mitigate the risk of the transformer falling from the pole is progressing. However, site investigations have found that not all sites were able to be rectified with the retrofit support

bracket due to a range of historical site specific transformer installation designs. Further investigation work to rectify the remainder of the transformers is underway.

Mobile Generator Connection Units

Vector owns two mobile generator connection units (MGCU) which are 10 years old. A number of refurbishment tasks have been identified with the transformers and connecting cables. In addition, Vector has identified a number of operational improvements which will improve safety for the staff operating the units. Refurbishment plans are currently being developed and the refurbishment of the two units is expected to be completed in FY18.

16mm² Bare Copper 11kV Overhead lines

A number of areas exist predominantly in Vector's northern overhead network in which 16mm² bare Copper conductors were used in the 11kV network at the time of installation in the 1970s. The conductors were fit for purpose at the time from both an electrical and mechanical point of view but failure of these type of conductors is becoming more frequent now that these conductors have been in service for 40 plus years. Vector is developing a plan to upgrade the network in a staged approach over a number of years. Ancillary plant such as post insulators, strain insulators, crossarms, and stays will be replaced to suit the new Aluminium conductors that will provide both increased energy transfer capacity and mechanical strength.

Oil-filled 11kV Ring Main Units

Vector owns and operates a sizeable fleet, ~9300, of oil-filled ground-mounted ring main units (RMUs) in its 11kV network and more than half of this population has reached or is approaching a service life of 40 years. There has been disruptive failures of a number of oil-filled units and Vector has implemented switching restrictions preventing operation of certain types of RMU while energised while for other types a remote switching initiating device must be used to switch RMUs while energised. Due to the significant number of oil-filled RMUs in Vector's network, switching restrictions have resulted in substantially increased network switching to bypass oil-filled switches that are believed to pose risk during live operation.

Many ageing oil-filled RMUs exist in the Auckland CBD where development is presently unprecedented with a large number of new substations being installed to service new building developments. The increased volume and complexity of switching operations to isolate 11kV circuits in order to install new substations may have increased the likelihood of switching error or incident. Increased switching and resultant outages are also leading to customer dissatisfaction.

Vector is developing a program to replace oil-filled ground mounted distribution switches that have the highest risk of failure and/or are in locations where live operation poses a risk to the public or to the building in which it is located. This program is anticipated be undertaken over a number of years.

Vegetation management

The impact of vegetation on Vector's network over last four regulatory years has been significant. Vegetation becomes particularly problematic during high winds. The rights electricity distributors have to address vegetation are governed by the Electricity (Hazards from Trees) Regulations 2003 (the Tree Regulations). The Tree Regulations specify specific cut-zones for different conductor types. In Vector's experience, these cut-zones have proved to be ineffective, especially during high wind events, where a significant proportion of vegetation contacts have resulted from vegetation residing outside of the cut zone.

The other challenge of the Tree Regulations, has been the obligation of the "first cut". This refers to the requirement for the electricity distributor to bear the burden of the cost for cutting vegetation within the circumferences defined by the Tree Regulations. Vector had originally considered the

requirement in the Tree Regulations applied on a “property” basis – i.e. where the cost of the first cut is borne where the electricity distributor visits a property to cut offending vegetation. Subsequent advice has indicated the Tree Regulations must be interpreted on a vegetation basis. Therefore, Vector is still incurring costs for “first cuts” 12 years after the Tree Regulations came into effect. The requirement to do “first cuts” in many instances has very limited reliability benefits for the network. In this respect, Vector welcomes the government’s forthcoming review of the Tree Regulations to ensure they meet the purposes of network businesses.

5 RISK MANAGEMENT

Vector is continuously looking for ways to improve safe work practices. In July 2015, Vector introduced a policy requiring de-energised working. A comprehensive and robust risk assessment process adapted from international practices (UK) was introduced that only allows live work in very exceptional circumstances. Initially the new process focused on high voltage (glove and barrier) work, but it is now extended to work on the low voltage network too.

In practise, the change has meant a total re-think of how work is performed on the network. A significant amount of effort and resource has been invested into developing systems for the coordination and planning of work meaning a smaller number of larger shutdowns and increased efficiency of crews during outages, which has decreased the impact of outages. The increased costs associated with more upfront planning is somewhat offset by the efficiencies seen completing work in volume within an area.

In addition, Vector has also changed how it responds to potential ‘low lines’ reported by the public. The new risk based process results in the line being immediately de-energised through the HV network until a fault person arrives on site to confirm the potential electrical risk to the public.

6 NETWORK PERFORMANCE

The Commerce Commission sets the SAIDI and SAIFI reliability limits with regard to a snapshot of historical reliability data, the reference period. For the most recent Default Price Path (DPP) the Commission used a 10-year historic average from regulatory year 2005 to 2014. The extension of the reference period to 10 years captures a relatively benign period of weather on the upper North Island. Vector also notes the setting of reliability targets based on historical data fails to address changes to the operating environment not as apparent in historical data. In this respect, Vector notes the rapidly increasing passenger fleet in the Auckland region is creating challenges for its business not as apparent during the reference period. As discussed, the more recent change to Vector’s health and safety practices on its network in relation to energised/de-energised works and remote isolations for sagging or down lines is having an impact on our reliability performance that is not reflected in reference period reliability results.

Vector is currently reviewing the existing customer service levels (SAIDI/SAIFI) as a result of safety improvement initiatives which have reduced the use of live-line work practices. It is expected that updated forecasts will be published in the 2018 AMP once tangible evidence of the change impact has been collated to support a revision to the forecasted targets.

7 ASSET MANAGEMENT MATURITY UPDATE

A number of initiatives are underway to improve asset condition data capture, storage, reporting and analysis. To support these initiatives, Vector’s current review of its maintenance standards will now include the specific data requirements for each asset class. This will better inform what

changes are required to Vector's asset management systems and processes, improve consistency and quality of data captured across Vector's field service providers and support network-wide improvements in asset information. Further improvements are also expected in business intelligence and analytical systems to improve the data and tools available for decision making, specifically in relation to asset performance and risk.

8 CAPITAL EXPENDITURE FORECAST

This section describes the capital expenditure forecasts for the electricity distribution network assets for the next 10-year planning period, and provides a comparison with the 10-year forecast prepared and disclosed in the 2016 AMP (disclosed in March 2016).

Capital Expenditure Forecast

Table 1 below shows the forecast capital expenditure during the planning period, broken down into the asset categories defined in the Commerce Commission's Electricity Distribution Information Disclosure Determination 2012. The figures are presented in 2018. For reference purposes, Vector has also included the corresponding capital expenditure forecast disclosed in the 2016 AMP escalated to 2018 prices using a PPI of 2% (Table 2).

FY17 AMP	Financial Year ($000)									
	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
Consumer connection	56,585	42,209	37,813	37,346	37,741	38,135	35,611	35,935	36,277	36,610
System growth	38,000	44,097	46,674	43,425	43,820	36,419	35,248	39,158	33,636	33,842
Asset replacement and renewal	95,620	88,310	88,811	87,410	84,343	70,494	69,721	64,572	65,407	65,178
Asset relocations	20,647	19,375	18,461	14,397	14,384	12,753	12,753	12,753	12,753	12,753
Reliability, safety and environment:										
Quality of supply	-	-	-	-	-	-	-	-	-	-
Legislative and regulatory	-	-	-	-	-	-	-	-	-	-
Other reliability, safety and environment	2,203	1,690	1,690	1,690	1,690	1,690	1,924	1,690	1,690	1,690
Non network assets	24,680	18,777	12,415	14,710	12,404	12,441	14,930	14,051	12,587	14,344
Total Capital Expenditure	**237,735**	**214,458**	**205,864**	**198,978**	**194,382**	**171,932**	**170,188**	**168,159**	**162,350**	**164,417**

Table 1 : Proposed capital expenditure forecast

FY16 AMP	Financial Year ($000)								
	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26
Consumer connection	48,367	42,871	41,641	41,301	39,067	39,201	38,570	38,932	34,025
System growth	43,009	35,714	43,009	36,944	40,628	36,756	40,002	36,257	33,609
Asset replacement and renewal	78,755	70,839	80,389	76,764	76,616	80,372	67,393	72,364	64,669
Asset relocations	16,066	9,959	10,346	10,346	10,346	10,346	10,346	10,346	10,346
Reliability, safety and environment:									
Quality of supply	-	-	-	-	-	-	-	-	-
Legislative and regulatory	-	-	-	-	-	-	-	-	-
Other reliability, safety and environment	1,894	1,722	1,722	1,722	1,722	1,722	1,961	1,722	1,722
Non network assets	12,296	9,226	14,698	11,555	11,309	10,544	12,402	11,254	12,020
Total Capital Expenditure	**200,388**	**170,331**	**191,805**	**178,632**	**179,689**	**178,941**	**170,675**	**170,875**	**156,391**

Table 2 : Capital expenditure forecast disclosed in the 2016 AMP escalated to 2018 prices

Comparison to Previous AMP

Figure 2 and Table 3 below shows changes in the capital expenditure forecast by expenditure category between this AMP and the last published AMP (covering the period 1 April 2016 to 31 March 2026).

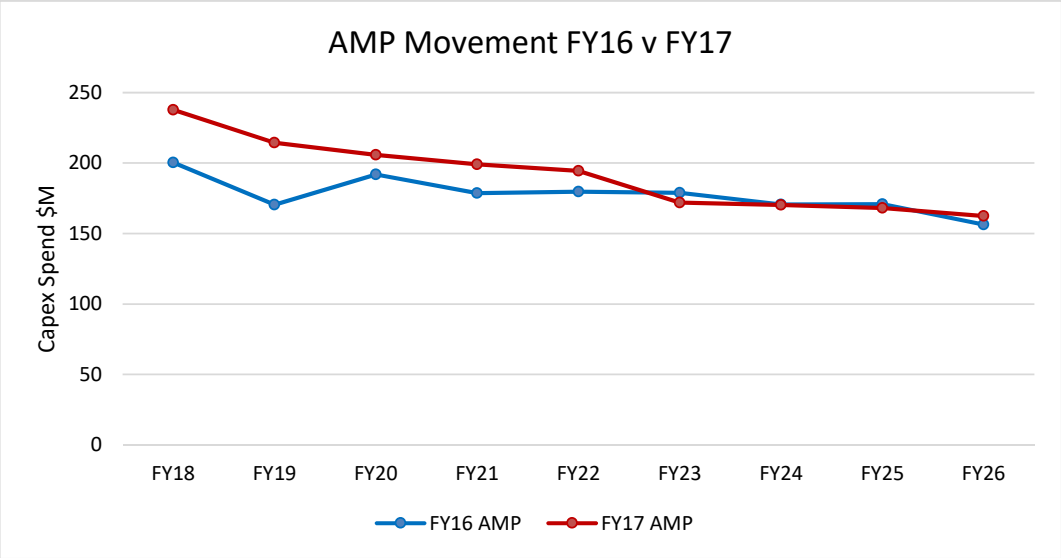

Figure 2: Movement between this AMP and the previous AMP's capital expenditure forecast

2016/2017 AMP Variances	Financial Year ($000)									
	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total
Consumer connection	8,217	(662)	(3,828)	(3,955)	(1,326)	(1,066)	(2,959)	(2,997)	2,252	(6,322)
System growth	(5,009)	8,383	3,666	6,482	3,192	(337)	(4,754)	2,901	27	14,550
Asset replacement and renewal	16,864	17,471	8,422	10,646	7,727	(9,878)	2,328	(7,793)	738	46,525
Asset relocations	4,581	9,416	8,115	4,050	4,038	2,407	2,407	2,407	2,407	39,827
Reliability, safety and environment:										
Quality of supply	-	-	-	-	-	-	-	-	-	-
Legislative and regulatory	-	-	-	-	-	-	-	-	-	-
Other reliability, safety and environment	310	(32)	(32)	(32)	(32)	(32)	(37)	(32)	(32)	48
Non network assets	12,385	9,551	(2,283)	3,155	1,095	1,897	2,528	2,797	567	31,691
Total Capital Expenditure	**37,347**	**44,127**	**14,059**	**20,346**	**14,694**	**(7,010)**	**(487)**	**(2,717)**	**5,959**	**126,320**

Table 3 : Comparison between this AMP and the previous AMP's capital expenditure forecast

Explanation of Major Capital Expenditure Variances

This section highlights the significant changes in capital expenditure over the 9-year period for which the 2016 AMP and the 2017 AMP overlap, reflect the following key changes:

- A $47M increase in asset renewal spend is forecast to address condition notifications of distributed assets that have potential risks to cause public harm, to expedite protection and control measures with the deployment of smart devices, and to allow for an increase in costs associated with de-energised safe work practises.
- A $40M increase is asset relocation with $20M cost associated with the City Railway Loop project and various Transpower led initiatives to replace outdoor switchgear to indoor switchgear.
- An increase of $32M in non-network spend that is largely attributed to investment in network system optimisation and management platform.
- An increase in system growth capex ($15M) is in keeping with Auckland growth projection and continual investment in new network technologies. This is partially offset by a reduction in consumer connection capex due to a lower estimated reticulation and connection charge per site that resulted in a lower overall cost despite higher number of forecast development sites.

9 OPERATIONAL EXPENDITURE FORECAST

This section describes the operational expenditure forecasts for the electricity distribution network assets for the next 10-year planning period, and provides a comparison with the 10-year forecast prepared and disclosed in the 2016 AMP (disclosed in March 2016).

Operational Expenditure Forecast

Table 4 below shows the forecast operational expenditure during the planning period, broken down into the asset categories defined in the Commerce Commission's Electricity Distribution Information Disclosure Determination. The figures are presented in 2018. For reference, Vector has also included the corresponding operational expenditure forecast disclosed in the 2016 AMP escalated to 2018 prices using a PPI of 2% (Table 5).

2017 AMP	Financial Year ($000)									
	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
Service interruptions and emergencies	10,024	10,098	10,172	10,247	10,323	10,399	10,476	10,554	10,632	10,711
Vegetation management	4,946	4,985	5,024	5,063	5,103	5,143	5,183	5,224	5,265	5,306
Routine and corrective maintenance and inspection	15,746	13,849	13,984	14,119	14,255	14,391	14,527	14,664	14,802	14,940
Asset replacement and renewal	13,848	16,974	17,060	17,148	17,236	16,814	16,901	16,988	17,076	17,164
System operations and network support	34,839	34,866	34,894	34,922	34,949	34,978	35,006	35,034	35,063	35,092
Business support	39,265	39,265	39,265	39,265	39,265	39,265	39,265	39,265	39,265	39,265
Total Operational Expenditure	**118,667**	**120,037**	**120,399**	**120,763**	**121,130**	**120,989**	**121,358**	**121,729**	**122,103**	**122,479**

Table 4 : Proposed operational expenditure forecast

2016 AMP	Financial Year ($000)								
	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26
Service interruptions and emergencies	9,687	9,761	9,837	9,653	9,468	9,282	9,096	9,169	9,242
Vegetation management	4,432	4,466	4,500	4,534	4,568	4,603	4,638	4,673	4,708
Routine and corrective maintenance and inspection	12,361	12,586	12,817	13,055	13,293	13,532	13,771	14,011	14,251
Asset replacement and renewal	15,377	18,496	18,496	18,496	18,496	16,417	16,417	16,417	16,417
System operations and network support	43,690	43,782	43,814	43,847	43,880	43,914	43,947	43,981	44,015
Business support	29,679	29,679	29,679	29,679	29,679	29,679	29,679	29,679	29,679
Total Operational Expenditure	**115,226**	**118,770**	**119,142**	**119,263**	**119,384**	**117,426**	**117,548**	**117,929**	**118,312**

Table 5 : Operational expenditure forecast disclosed in the 2016 AMP escalated to 2018 prices

Comparison to previous AMP

Figure 3 and Table 6 below shows the changes in the operational expenditure forecasts by expenditure category between this AMP and the last published AMP (covering the period 1 April 2016 to 31 March 2026).

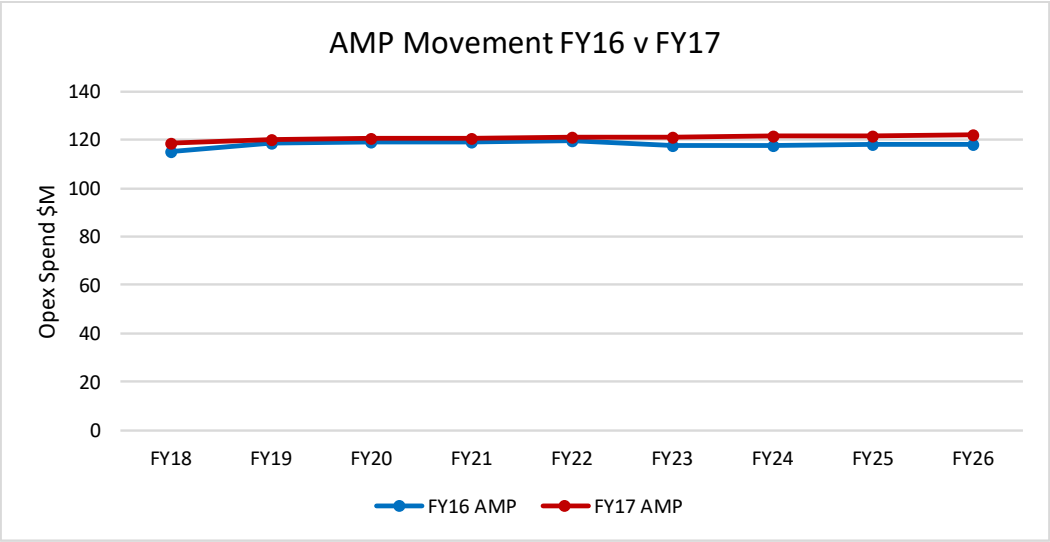

Figure 3: Movement between this AMP and the previous AMP's operational expenditure forecast

2016/2017 AMP Variances	Financial Year ($000)									
	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total
Service interruptions and emergencies	337	336	335	594	855	1,117	1,380	1,385	1,390	7,731
Vegetation management	514	519	524	530	535	540	545	551	556	4,815
Routine and corrective maintenance and inspection	3,385	1,263	1,167	1,064	961	859	756	653	551	10,659
Asset replacement and renewal	(1,529)	(1,522)	(1,435)	(1,348)	(1,260)	398	484	572	659	(4,982)
System operations and network support	(8,852)	(8,915)	(8,921)	(8,926)	(8,931)	(8,936)	(8,942)	(8,947)	(8,952)	(80,321)
Business support	9,586	9,586	9,586	9,586	9,586	9,586	9,586	9,586	9,586	86,273
Total Operational Expenditure	**3,441**	**1,267**	**1,256**	**1,500**	**1,746**	**3,563**	**3,810**	**3,800**	**3,791**	**24,175**

Table 6 : Comparison between this AMP and the previous AMP's operational expenditure forecast

Explanation of Major Operational Expenditure Variances

This section highlights the significant changes in operational expenditure over the 9-year period for which the 2016 AMP and the 2017 AMP overlap, reflect the following key changes:

- Non-network costs have increased overall by $6M. There is an increase in business support largely driven by an increase in the electricity cost share with the sale of the gas transmission and non-Auckland gas distribution businesses. This is partially offset by a decrease in system operations and network support cost, largely as the result of Vector Limited entering into a new agreement for the provision of the telecommunications services, which will result in a replacement of operating expenditure with capital expenditure.
- An increase of $11M in expected routine and corrective maintenance and inspection costs to reflect a catch up of costs relating to oil switchgear, additional costs for the inspection of low lines and vegetation surveys and a 5% increase in costs associated with de-energisation.
- An increase of $8M in expected service interruptions and emergencies to reflect the growing size of the network each year and a 17.5% increase in costs associated with de-energised works.
- An increase of $5M in vegetation management costs based on the FY17 forecast costs which includes an additional expenditure beyond the Top 40 feeder focus.
- Compared to the historical level of expenditure, additional resource is forecast in asset replacement and renewal to respond to the increased number of defects in the asset condition notification pool. However, the forecast increase in the 2016 AMP was relatively aggressive, and is moderated (reduced) in the 2017 AMP. The decrease in costs has been partially offset by a 5% increase in costs associated with de-energised works.

10 APPENDIX

Electricity Asset Management Plan Update

Information Disclosure 2017

Appendix 1
Report on Forecast Capital Expenditure

Company Name	Vector Electricity
AMP Planning Period	1 April 2016 to 31 March 2027

SCHEDULE 11a: REPORT ON FORECAST CAPITAL EXPENDITURE

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

sch ref

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
		RY17	**RY18**	**RY19**	**RY20**	**RY21**	**RY22**	**RY23**	**RY24**	**RY25**	**RY26**	**RY27**
	11a(i): Expenditure on Assets Forecast	**$000 (in nominal dollars)**										
	Consumer connection	56,291	57,829	46,128	39,984	39,265	40,242	41,476	40,309	40,676	41,879	43,113
	System growth	33,984	36,078	42,004	46,338	45,424	45,793	40,884	38,728	42,437	39,698	39,074
	Asset replacement and renewal	83,545	95,225	90,391	90,762	91,612	90,622	80,320	77,448	74,415	75,143	76,689
	Asset relocations	18,625	21,648	19,731	19,106	16,072	15,303	14,278	14,112	14,394	14,682	14,976
	Reliability, safety and environment:											
	Quality of supply	1,511	988	-	-	-	-	-	-	-	-	-
	Legislative and regulatory	861	66	-	-	-	-	-	-	-	-	-
	Other reliability, safety and environment	572	1,965	1,828	1,715	1,749	1,784	1,820	2,051	1,959	1,931	1,970
	Total reliability, safety and environment	2,944	3,019	1,828	1,715	1,749	1,784	1,820	2,051	1,959	1,931	1,970
	Expenditure on network assets	195,389	213,799	200,082	197,905	194,122	193,744	178,778	172,648	173,881	173,333	175,822
	Non-network assets	12,213	21,970	20,496	14,460	14,888	13,944	13,621	15,990	16,269	15,061	16,492
	Expenditure on assets	207,602	235,769	220,578	212,365	209,010	207,688	192,399	188,638	190,150	188,394	192,314
plus	Cost of financing	3,787	4,221	4,135	4,146	4,069	4,057	3,710	3,595	3,679	3,609	3,648
less	Value of capital contributions	50,770	52,084	43,829	38,997	36,533	36,752	36,964	35,776	36,134	37,175	38,243
plus	Value of vested assets											
	Capital expenditure forecast	160,619	187,906	180,884	177,514	176,546	174,993	159,145	156,457	157,695	154,828	157,719
	Value of commissioned assets	247,345	188,113	182,352	179,940	179,852	174,026	160,366	155,459	159,400	153,812	159,427

	Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
	$000 (in constant prices)										
Consumer connection	56,291	56,671	44,321	37,652	36,250	36,424	36,805	35,068	34,693	35,019	35,344
System growth	33,984	35,356	40,358	43,636	41,936	41,448	36,279	33,692	36,195	33,195	32,033
Asset replacement and renewal	83,545	93,319	86,850	85,469	84,578	82,024	71,274	67,378	63,470	62,834	62,869
Asset relocations	18,625	21,215	18,958	17,992	14,838	13,851	12,670	12,277	12,277	12,277	12,277
Reliability, safety and environment:											
Quality of supply	1,511	968	-	-	-	-	-	-	-	-	-
Legislative and regulatory	861	65	-	-	-	-	-	-	-	-	-
Other reliability, safety and environment	572	1,926	1,756	1,615	1,615	1,615	1,615	1,784	1,671	1,615	1,615
Total reliability, safety and environment	2,944	2,959	1,756	1,615	1,615	1,615	1,615	1,784	1,671	1,615	1,615
Expenditure on network assets	195,389	209,520	192,243	186,364	179,217	175,362	158,643	150,199	148,306	144,940	144,138
Non-network assets	12,213	21,530	19,693	13,617	13,745	12,621	12,087	13,911	13,876	12,594	13,520
Expenditure on assets	207,602	231,050	211,936	199,981	192,962	187,983	170,730	164,110	162,182	157,534	157,658
Subcomponents of expenditure on assets (where known)											
Energy efficiency and demand side management, reduction of energy losses											
Overhead to underground conversion	2,169	8,992	6,895	6,875	6,875	6,875	6,875	6,875	6,875	6,875	6,875
Research and development	8,390	6,719	5,319	5,319	5,319	5,319	5,319	5,319	5,319	5,319	5,319

Company Name: Vector Electricity
AMP Planning Period: 1 April 2016 to 31 March 2027

SCHEDULE 11a: REPORT ON FORECAST CAPITAL EXPENDITURE

This schedule requires a breakdown of forecast expenditure on assets for the current disclosure year and a 10 year planning period. The forecasts should be consistent with the supporting information set out in the AMP. The forecast is to be expressed in both constant price and nominal dollar terms. Also required is a forecast of the value of commissioned assets (i.e., the value of RAB additions)
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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
59	**Difference between nominal and constant price forecasts**	$000										
60	Consumer connection	-	1,158	1,807	2,332	3,015	3,818	4,671	5,241	5,983	6,860	7,769
61	System growth	-	722	1,646	2,702	3,488	4,345	4,605	5,036	6,242	6,503	7,041
62	Asset replacement and renewal	-	1,906	3,541	5,293	7,034	8,598	9,046	10,070	10,945	12,309	13,820
63	Asset relocations	-	433	773	1,114	1,234	1,452	1,608	1,835	2,117	2,405	2,699
64	Reliability, safety and environment:											
65	Quality of supply	-	20	-	-	-	-	-	-	-	-	-
66	Legislative and regulatory	-	1	-	-	-	-	-	-	-	-	-
67	Other reliability, safety and environment	-	39	72	100	134	169	205	267	288	316	355
68	**Total reliability, safety and environment**	-	60	72	100	134	169	205	267	288	316	355
69	**Expenditure on network assets**	-	4,279	7,839	11,541	14,905	18,382	20,135	22,449	25,575	28,393	31,684
70	Non-network assets	-	440	803	843	1,143	1,323	1,534	2,079	2,393	2,467	2,972
71	**Expenditure on assets**	-	4,719	8,642	12,384	16,048	19,705	21,669	24,528	27,968	30,860	34,656
72												

		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
74	**11a(ii): Consumer Connection**						
75	*Consumer types defined by EDB**	$000 (in constant prices)					
76	Service Connection	12,726	16,446	13,849	13,670	13,899	14,131
	Customer Substations	9,679	13,145	11,840	7,965	7,023	7,023
77	Business subdivisions	2,984	2,495	2,185	2,069	2,001	1,979
78	Residential Subdivisions	25,404	19,953	12,665	10,338	9,717	9,681
	Capacity Changes	4,166	3,380	3,271	3,271	3,271	3,271
79	Street Lighting	1,321	1,252	511	339	339	339
	Relocations	-	-	-	-	-	-
80	Easements	11	-	-	-	-	-
81	*include additional rows if needed						
82	**Consumer connection expenditure**	56,291	56,671	44,321	37,652	36,250	36,424
83	*less* Capital contributions funding consumer connection	41,055	43,040	34,129	29,366	28,458	28,649
84	**Consumer connection less capital contributions**	15,236	13,631	10,192	8,286	7,792	7,775
85	**11a(iii): System Growth**						
86	Subtransmission	819	1,397	296	3,170	1,453	662
87	Zone substations	20,496	10,228	23,980	27,206	25,557	22,548
88	Distribution and LV lines	167	-	-	-	-	-
89	Distribution and LV cables	6,462	11,737	9,253	7,941	9,607	12,919
90	Distribution substations and transformers	1,378	-	-	-	-	-
91	Distribution switchgear	178	8,317	6,762	5,319	5,319	5,319
92	Other network assets	4,484	3,677	67	-	-	-
93	**System growth expenditure**	33,984	35,356	40,358	43,636	41,936	41,448
94	*less* Capital contributions funding system growth						
95	**System growth less capital contributions**	33,984	35,356	40,358	43,636	41,936	41,448

Company Name	Vector Electricity
AMP Planning Period	1 April 2016 to 31 March 2027

SCHEDULE 11a: REPORT ON FORECAST CAPITAL EXPENDITURE

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sch ref		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
105	**11a(iv): Asset Replacement and Renewal**	**$000 (in constant prices)**					
106	Subtransmission	243	51	5,863	4,742	968	2,028
107	Zone substations	17,128	24,598	22,439	25,511	31,424	28,760
108	Distribution and LV lines	34,194	39,126	32,668	29,974	26,989	25,994
109	Distribution and LV cables	3,580	3,459	3,418	3,394	3,394	3,394
110	Distribution substations and transformers	14,119	12,275	10,822	10,539	10,539	10,539
111	Distribution switchgear	12,036	10,440	9,182	8,937	8,937	8,937
112	Other network assets	2,245	3,370	2,458	2,372	2,327	2,372
113	**Asset replacement and renewal expenditure**	83,545	93,319	86,850	85,469	84,578	82,024
114	*less* Capital contributions funding asset replacement and renewal						
115	**Asset replacement and renewal less capital contributions**	83,545	93,319	86,850	85,469	84,578	82,024
116	**11a(v):Asset Relocations**						
117	*Project or programme**						
118	Overground to underground conversions	2,169	8,992	6,895	6,875	6,875	6,875
119							
120							
121							
123	**include additional rows if needed*						
124	All other asset relocations projects or programmes	16,456	12,223	12,063	11,117	7,963	6,976
125	**Asset relocations expenditure**	18,625	21,215	18,958	17,992	14,838	13,851
126	*less* Capital contributions funding asset relocations	9,715	8,001	7,983	7,357	5,270	4,616
127	**Asset relocations less capital contributions**	8,910	13,214	10,975	10,635	9,568	9,235
128							
129	**11a(vi):Quality of Supply**						
130	*Project or programme**						
131							
132							
133							
134							
135							
136	**include additional rows if needed*						
137	All other quality of supply projects or programmes	1,511	968	-	-	-	-
138	**Quality of supply expenditure**	1,511	968	-	-	-	-
139	*less* Capital contributions funding quality of supply						
140	**Quality of supply less capital contributions**	1,511	968	-	-	-	-
141							

Company Name	Vector Electricity
AMP Planning Period	1 April 2016 to 31 March 2027

SCHEDULE 11a: REPORT ON FORECAST CAPITAL EXPENDITURE

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11a(vii): Legislative and Regulatory

sch ref		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
	*Project or programme**						
	include additional rows if needed						
	All other legislative and regulatory projects or programmes	861	65	-	-	-	-
	Legislative and regulatory expenditure	861	65	-	-	-	-
less	Capital contributions funding legislative and regulatory						
	Legislative and regulatory less capital contributions	861	65	-	-	-	-

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

		$000 (in constant prices)					
	*Project or programme**						
	include additional rows if needed						
	All other reliability, safety and environment projects or programmes	572	1,926	1,756	1,615	1,615	1,615
	Other reliability, safety and environment expenditure	572	1,926	1,756	1,615	1,615	1,615
less	Capital contributions funding other reliability, safety and environment						
	Other reliability, safety and environment less capital contributions	572	1,926	1,756	1,615	1,615	1,615

Company Name	Vector Electricity
AMP Planning Period	1 April 2016 to 31 March 2027

SCHEDULE 11a: REPORT ON FORECAST CAPITAL EXPENDITURE

This schedule requires a breakdown of forecast expenditure on assets for the current disclosure year and a 10 year planning period. The forecasts should be consistent with the supporting information set out in the AMP. The forecast is to be expressed in both constant price and nominal dollar terms. Also required is a forecast of the value of commissioned assets (i.e., the value of RAB additions)
EDBs must provide explanatory comment on the difference between constant price and nominal dollar forecasts of expenditure on assets in Schedule 14a (Mandatory Explanatory Notes).
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sch ref		*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
176							
177							
178	**11a(ix): Non-Network Assets**						
179	**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	7,458	13,161	12,041	8,326	8,404	7,717
188	**Routine expenditure**	7,458	13,161	12,041	8,326	8,404	7,717
189	**Atypical expenditure**						
190	*Project or programme**						
191							
192							
193							
194							
195							
196	**include additional rows if needed*						
197	All other atypical projects or programmes	4,755	8,369	7,652	5,291	5,341	4,904
198	**Atypical expenditure**	4,755	8,369	7,652	5,291	5,341	4,904
199							
200	**Non-network assets expenditure**	12,213	21,530	19,693	13,617	13,745	12,621

Electricity Asset Management Plan Update

Information Disclosure 2017

Appendix 2
Report on Forecast Operational Expenditure

Company Name	Vector Electricity
AMP Planning Period	1 April 2017- 31 March 2027

SCHEDULE 11b: REPORT ON FORECAST OPERATIONAL EXPENDITURE

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

sch ref												
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 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**	**31 Mar 26**	**31 Mar 27**
9	**Operational Expenditure Forecast**	**$000 (in nominal dollars)**										
10	Service interruptions and emergencies	8,678	9,713	10,283	10,569	10,860	11,159	11,466	11,782	12,107	12,440	12,783
11	Vegetation management	5,349	4,938	5,076	5,219	5,365	5,515	5,670	5,829	5,992	6,159	6,332
12	Routine and corrective maintenance and inspection	12,042	15,445	14,613	14,520	14,955	15,400	15,858	16,330	16,814	17,311	17,822
13	Asset replacement and renewal	10,898	13,288	16,519	17,735	18,183	18,641	18,689	19,019	19,499	19,991	20,496
14	**Network Opex**	36,966	43,384	46,490	48,043	49,364	50,715	51,683	52,960	54,412	55,902	57,433
15	System operations and network support	29,800	34,730	35,563	36,313	37,071	37,840	38,628	39,434	40,256	41,093	41,949
16	Business support	37,975	39,123	40,057	40,870	41,689	42,521	43,371	44,241	45,126	46,027	46,947
17	**Non-network opex**	67,775	73,853	75,621	77,182	78,760	80,361	81,999	83,676	85,382	87,120	88,896
18	**Operational expenditure**	104,741	117,237	122,111	125,226	128,124	131,076	133,682	136,635	139,795	143,022	146,329

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 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**	**31 Mar 26**	**31 Mar 27**
21		**$000 (in constant prices)**										
22	Service interruptions and emergencies	8,678	9,519	9,880	9,953	10,026	10,100	10,175	10,250	10,326	10,403	10,480
23	Vegetation management	5,349	4,839	4,877	4,915	4,953	4,992	5,031	5,071	5,110	5,150	5,191
24	Routine and corrective maintenance and inspection	12,042	15,136	14,040	13,674	13,806	13,939	14,072	14,206	14,340	14,475	14,610
25	Asset replacement and renewal	10,898	13,023	15,871	16,701	16,787	16,873	16,585	16,545	16,630	16,716	16,803
26	**Network Opex**	36,966	42,517	44,668	45,243	45,572	45,904	45,863	46,072	46,407	46,744	47,084
27	System operations and network support	29,800	34,035	34,169	34,196	34,223	34,251	34,278	34,306	34,334	34,362	34,390
28	Business support	37,975	38,341	38,487	38,487	38,487	38,487	38,487	38,487	38,487	38,487	38,487
29	**Non-network opex**	67,775	72,376	72,656	72,683	72,710	72,738	72,765	72,793	72,821	72,849	72,877
30	**Operational expenditure**	104,741	114,894	117,324	117,926	118,283	118,642	118,628	118,865	119,228	119,593	119,961
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	2,619	2,524	2,575	2,627	2,680	2,733	2,788	2,844	2,901	2,959	3,018
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												
41	**Difference between nominal and real forecasts**	**$000**										
42	Service interruptions and emergencies	-	194	403	616	834	1,058	1,291	1,532	1,781	2,038	2,303
43	Vegetation management	-	99	199	304	412	523	638	758	882	1,009	1,141
44	Routine and corrective maintenance and inspection	-	309	573	846	1,149	1,461	1,786	2,124	2,474	2,836	3,211
45	Asset replacement and renewal	-	266	648	1,034	1,397	1,768	2,105	2,473	2,869	3,275	3,693
46	**Network Opex**	-	867	1,822	2,801	3,792	4,811	5,820	6,888	8,005	9,157	10,349
47	System operations and network support	-	694	1,394	2,117	2,847	3,589	4,350	5,129	5,923	6,731	7,559
48	Business support	-	782	1,570	2,382	3,202	4,033	4,884	5,754	6,639	7,540	8,459
49	**Non-network opex**	-	1,476	2,964	4,499	6,050	7,623	9,234	10,883	12,562	14,271	16,018
50	**Operational expenditure**	-	2,344	4,787	7,300	9,841	12,434	15,054	17,770	20,567	23,428	26,368

Electricity Asset Management Plan Update

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Appendix 3
Report on Asset Condition

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

SCHEDULE 12a: REPORT ON ASSET CONDITION

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

sch ref						Asset condition at start of planning period (percentage of units by grade)						
	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.	0.00%	0.06%	59.50%	40.44%	-	4	6.11%
11	All	Overhead Line	Wood poles	No.	-	1.45%	73.41%	25.14%	-	4	9.65%
12	All	Overhead Line	Other pole types	No.	-	-	-	100.00%	-	4	-
13	HV	Subtransmission Line	Subtransmission OH up to 66kV conductor	km	-	-	87.44%	12.56%	-	3	-
14	HV	Subtransmission Line	Subtransmission OH 110kV+ conductor	km	-	-	72.28%	27.72%	-	3	-
15	HV	Subtransmission Cable	Subtransmission UG up to 66kV (XLPE)	km	0.14%	0.66%	10.44%	88.76%	-	2	0.80%
16	HV	Subtransmission Cable	Subtransmission UG up to 66kV (Oil pressurised)	km	-	0.29%	82.79%	16.92%	-	2	0.29%
17	HV	Subtransmission Cable	Subtransmission UG up to 66kV (Gas pressurised)	km	-	-	100.00%	-	-	2	60.00%
18	HV	Subtransmission Cable	Subtransmission UG up to 66kV (PILC)	km	-	-	92.13%	7.87%	-	2	25.69%
19	HV	Subtransmission Cable	Subtransmission UG 110kV+ (XLPE)	km	-	-	-	100.00%	-	2	-
20	HV	Subtransmission Cable	Subtransmission UG 110kV+ (Oil pressurised)	km	-	-	65.93%	34.07%	-	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	-	-	4.85%	95.15%	-	2	-
24	HV	Zone substation Buildings	Zone substations up to 66kV	No.	-	1.98%	6.93%	91.09%	-	4	1.98%
25	HV	Zone substation Buildings	Zone substations 110kV+	No.	-	-	28.57%	71.43%	-	4	-
26	HV	Zone substation switchgear	22/33kV CB (Indoor)	No.	-	-	14.40%	85.60%	-	4	7.57%
27	HV	Zone substation switchgear	22/33kV CB (Outdoor)	No.	-	10.80%	56.90%	32.30%	-	4	12.75%
28	HV	Zone substation switchgear	33kV Switch (Ground Mounted)	No.	-	-	-	-	-	N/A	-
29	HV	Zone substation switchgear	33kV Switch (Pole Mounted)	No.	-	-	96.52%	3.48%	-	4	-
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.	-	16.60%	34.40%	49.00%	-	4	33.26%
34	HV	Zone substation switchgear	3.3/6.6/11/22kV CB (pole mounted)	No.	-	-	-	-	-	N/A	-

					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
39	HV	Zone Substation Transformer	Zone Substation Transformers	No.	-	1.39%	52.31%	46.30%	-	4	9.35%
40	HV	Distribution Line	Distribution OH Open Wire Conductor	km	-	0.00%	67.33%	32.67%	-	3	0.26%
41	HV	Distribution Line	Distribution OH Aerial Cable Conductor	km	-	-	-	-	-	N/A	-
42	HV	Distribution Line	SWER conductor	km	-	-	-	-	-	N/A	-
43	HV	Distribution Cable	Distribution UG XLPE or PVC	km	0.05%	0.21%	4.65%	95.09%	-	2	1.07%
44	HV	Distribution Cable	Distribution UG PILC	km	0.11%	0.80%	42.61%	56.47%	-	2	0.91%
45	HV	Distribution Cable	Distribution Submarine Cable	km	-	-	86.11%	13.89%	-	2	-
46	HV	Distribution switchgear	3.3/6.6/11/22kV CB (pole mounted) - reclosers and sectionalisers	No.	-	-	0.39%	99.61%	-	4	11.36%
47	HV	Distribution switchgear	3.3/6.6/11/22kV CB (Indoor)	No.	0.61%	-	29.45%	69.94%	-	4	-
48	HV	Distribution switchgear	3.3/6.6/11/22kV Switches and fuses (pole mounted)	No.	2.39%	1.42%	47.47%	48.71%	-	4	9.13%
49	HV	Distribution switchgear	3.3/6.6/11/22kV Switch (ground mounted) - except RMU	No.	0.78%	1.05%	69.08%	29.09%	-	3	8.02%
50	HV	Distribution switchgear	3.3/6.6/11/22kV RMU	No.	0.78%	1.05%	48.90%	49.27%	-	3	3.93%
51	HV	Distribution Transformer	Pole Mounted Transformer	No.	0.99%	0.67%	33.09%	65.25%	-	3	8.13%
52	HV	Distribution Transformer	Ground Mounted Transformer	No.	4.45%	2.32%	35.26%	57.97%	-	3	6.77%
53	HV	Distribution Transformer	Voltage regulators	No.	-	-	-	100.00%	-	4	-
54	HV	Distribution Substations	Ground Mounted Substation Housing	No.	1.79%	1.31%	74.26%	22.64%	-	4	3.10%
55	LV	LV Line	LV OH Conductor	km	-	-	77.98%	22.01%	-	3	0.23%
56	LV	LV Cable	LV UG Cable	km	-	0.28%	36.51%	63.17%	-	2	0.28%
57	LV	LV Streetlighting	LV OH/UG Streetlight circuit	km	-	-	-	-	100.00%	1	0.08%
58	LV	Connections	OH/UG consumer service connections	No.	-	-	-	-	100.00%	1	-
59	All	Protection	Protection relays (electromechanical, solid state and numeric)	No.	-	2.71%	39.82%	57.47%	-	3	2.71%
60	All	SCADA and communications	SCADA and communications equipment operating as a single system	Lot	-	6.64%	26.92%	66.43%	-	4	6.64%
61	All	Capacitor Banks	Capacitors including controls	No.	-	-	80.41%	19.59%	-	3	-
62	All	Load Control	Centralised plant	Lot	-	-	100.00%	-	-	4	-
63	All	Load Control	Relays	No.	-	-	-	-	-	N/A	-
64	All	Civils	Cable Tunnels	km	-	-	8.62%	91.38%	-	4	-

Electricity Asset Management Plan Update

Information Disclosure 2017

Appendix 4
Report on Forecast Capacity

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

SCHEDULE 12b: REPORT ON FORECAST CAPACITY

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

sch ref

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	18.9	24	N-1	18	79%	24	69%	No constraint within +5 years	Meets Vector security criteria
Auckland Airport	17	25	N-1	0	68%	25	91%	Other	Meets customers security criteria
Avondale	28.7	24	N-1 switched	22.1	120%	24	100%	No constraint within +5 years	Meets Vector security criteria,
Bairds	22.2	24	N-1	20.8	93%	24	92%	No constraint within +5 years	Meets Vector security criteria
Balmain	8.6	0	N	14.9	-	-	-	No constraint within +5 years	Meets Vector security criteria
Balmoral	12.5	24	N-1	15.5	52%	24	51%	No constraint within +5 years	Meets Vector security criteria
Belmont	12.8	14	N-1	10.4	91%	14	79%	No constraint within +5 years	Meets Vector security criteria
Birkdale	23.6	24	N-1	17.2	98%	24	86%	No constraint within +5 years	Meets Vector security criteria
Brickworks	10.4	0	N	12.8	-	18	84%	No constraint within +5 years	The constraint will be relieved by the installation of the second transformer
Browns Bay	15.3	10	N-1 switched	17.2	153%	15	85%	No constraint within +5 years	The transformers are scheduled for replacement
Bush Road	23.4	23.8	N-1	13.6	98%	24	85%	No constraint within +5 years	Meets Vector security criteria
Carbine	14.5	21.5	N-1	7.6	67%	22	90%	No constraint within +5 years	Meets Vector security criteria
Chevalier	19.9	18.9	N-1 switched	14.2	105%	19	104%	No constraint within +5 years	Meets Vector security criteria
Clendon	20.5	24	N-1	15.7	85%	24	74%	No constraint within +5 years	Meets Vector security criteria
Clevedon	2.9	0	N	2.9	-	-	-	No constraint within +5 years	Meets Vector security criteria
Coatesville	10.1	0	N	9.4	-	-	-	No constraint within +5 years	Load forecast to decline. Meets Vector security criteria
Drive	25.1	24	N-1 switched	24.3	105%	24	112%	No constraint within +5 years	Load transfer to Newmarket South substation
East Coast Road	15	0	N	17.6	-	-	-	No constraint within +5 years	Meets Vector security criteria
East Tamaki	15.9	24	N-1	7.4	66%	24	87%	No constraint within +5 years	Meets Vector security criteria
Flatbush	8.1	24	N-1	10.2	34%	24	75%	No constraint within +5 years	Meets Vector security criteria
Forrest Hill	17.4	20	N-1	15.1	87%	20	78%	No constraint within +5 years	Meets Vector security criteria
Freemans Bay	17.8	21.6	N-1	13.9	82%	22	114%	No constraint within +5 years	Load transfer proposed
Glen Innes	12.6	13.4	N-1	13.5	94%	13	92%	No constraint within +5 years	Meets Vector security criteria
Greenhithe	11.7	0	N	7.8	-	-	-	No constraint within +5 years	Load transfer proposed
Greenmount	39.2	48	N-1	25.8	82%	48	84%	No constraint within +5 years	Meets Vector security criteria
Gulf Harbour	7.7	0	N	8.7	-	-	-	No constraint within +5 years	Meets Vector security criteria
Hans	23.1	24	N-1	18.4	96%	24	98%	Transformer	Load transfer to Mangere South substation
Hauraki	8.6	0	N	9	-	-	-	No constraint within +5 years	Meets Vector security criteria
Helensville	14.8	9	N-1 switched	8.6	164%	9	141%	No constraint within +5 years	Load transfer to Kaukapakapa substation
Henderson Valley	16.2	15.2	N-1 switched	20	107%	15	122%	No constraint within +5 years	Meets Vector security criteria
Highbrook	8.1	19.4	N-1	0	42%	19	68%	No constraint within +5 years	Meets Vector security criteria
Highbury	12.5	0	N	12.2	-	-	-	No constraint within +5 years	Load transfer proposed
Hillcrest	22.3	21.7	N-1 switched	15.2	103%	22	85%	No constraint within +5 years	Meets Vector security criteria
Hillsborough	18.2	24	N-1	20.5	76%	24	75%	No constraint within +5 years	Meets Vector security criteria
Hobson 110/11kV	21	30	N-1	11.3	70%	30	78%	No constraint within +5 years	Meets Vector security criteria
Hobson 22/11kV	17.6	18	N-1	8.8	98%	18	111%	No constraint within +5 years	Load transfer to 22kV bus
Hobson 22kV	44	80	N-1	26.6	55%	80	93%	No constraint within +5 years	Meets Vector security criteria
Hobsonville	24.1	16	N-1 switched	13.7	151%	16	277%	No constraint within +5 years	Hload transfer to Hobsonville Point substation
Howick	35.8	46	N-1	15.1	78%	46	70%	No constraint within +5 years	Meets Vector security criteria
James Street	18.7	16	N-1 switched	18.2	117%	16	107%	No constraint within +5 years	Meets Vector security criteria
Keeling Road	17	24	N-1	14	71%	24	-	No constraint within +5 years	Meets Vector security criteria
Kingsland	23.1	24	N-1	19.4	96%	24	96%	No constraint within +5 years	Meets Vector security criteria

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

SCHEDULE 12b: REPORT ON FORECAST CAPACITY

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

sch ref

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
Laingholm	8.8	9	N-1	9.6	98%	9	85%	No constraint within +5 years	Meets Vector security criteria
Lichfield	17.6	20	N-1	0	88%	20	88%	No constraint within +5 years	Meets Vector security criteria
Liverpool	35	48	N-1	19.5	73%	48	86%	No constraint within +5 years	Meets Vector security criteria
Liverpool 22kV	80.8	135	N-1	57.2	60%	135	67%	No constraint within +5 years	Meets Vector security criteria
Mangere Central	27.6	24	N-1 switched	12.3	115%	24	121%	No constraint within +5 years	Load transfer to Managere South substation
Mangere East	27.6	24	N-1 switched	21.5	115%	24	112%	No constraint within +5 years	Load transfer to Managere South substation
Mangere West	17.8	33	N-1	4.2	54%	33	125%	No constraint within +5 years	Load transfer to Managere South substation
Manly	18.2	14	N-1 switched	14.1	130%	14	118%	No constraint within +5 years	Meets Vector security criteria
Manukau	32.2	42.9	N-1	17.9	75%	43	93%	No constraint within +5 years	Meets Vector security criteria
Manurewa	48	46.9	N-1 switched	28.9	102%	47	95%	No constraint within +5 years	Meets Vector security criteria
Maraetai	7.3	18	N-1	4.6	41%	18	60%	No constraint within +5 years	Meets Vector security criteria
McKinnon	16.1	23.8	N-1	12.6	68%	24	86%	No constraint within +5 years	Meets Vector security criteria
Mcleod Road	9.5	0	N	11.6	-	-	-	No constraint within +5 years	Meets Vector security criteria
McNab	43.9	48	N-1	26.9	91%	48	93%	No constraint within +5 years	Meets Vector security criteria
Milford	7.7	0	N	7.9	-	-	-	No constraint within +5 years	Meets Vector security criteria
Mt Albert	7	0	N	6.6	-	-	-	No constraint within +5 years	Meets Vector security criteria
Mt Wellington	19.2	24	N-1	18.4	80%	24	79%	No constraint within +5 years	Meets Vector security criteria
New Lynn	14.1	14	N-1 switched	11.5	101%	14	123%	No constraint within +5 years	Meets Vector security criteria
Newmarket	33.2	48	N-1	26.1	69%	48	132%	No constraint within +5 years	Load transfer to Newmarket South substation
Newton	20	18.9	N-1 switched	19.3	106%	19	125%	No constraint within +5 years	Load transfer to Liverpool 22kV bus
Ngataringa Bay	7.2	0	N	6.1	-	-	-	No constraint within +5 years	Meets Vector security criteria
Northcote	5.8	0	N	6.8	-	-	-	No constraint within +5 years	Meets Vector security criteria
Onehunga	12	14.7	N-1	10.7	82%	24	48%	No constraint within +5 years	Meets Vector security criteria
Orakei	21.8	21.6	N-1 switched	13.8	101%	22	98%	No constraint within +5 years	Meets Vector security criteria
Oratia	5	0	N	8	-	-	-	No constraint within +5 years	Meets Vector security criteria
Orewa	17.5	15.2	N-1 switched	9.7	115%	24	85%	No constraint within +5 years	A planned 11kV switchgear upgrade project will relieve this constraint
Otara	27.9	30.8	N-1	22.5	91%	31	90%	No constraint within +5 years	Meets Vector security criteria
Pacific Steel	18.6	44	N-1	0	42%	44	45%	No constraint within +5 years	Meets Vector security criteria
Pakuranga	22.9	24	N-1	11.5	95%	24	84%	No constraint within +5 years	Meets Vector security criteria
Papakura	26.7	24	N-1 switched	8.9	111%	24	115%	No constraint within +5 years	Meets Vector security criteria
Parnell	10.1	13.3	N-1	10.9	76%	18	70%	No constraint within +5 years	Scheduled transformer project
Ponsonby	15.3	14.4	N-1 switched	9.6	106%	18	78%	No constraint within +5 years	Subtransmission upgrade to remove constraints
Quay	24.4	24	N-1 switched	19.6	102%	24	127%	No constraint within +5 years	Loadf transfer to Quay 22kV bus
Quay 22kV	38.6	60	N-1	31.6	64%	60	83%	No constraint within +5 years	Meets Vector security criteria
Ranui	12	0	N	20.7	-	-	-	No constraint within +5 years	Meets Vector security criteria
Red Beach	14.2	24	N-1	12.7	59%	24	78%	No constraint within +5 years	Meets Vector security criteria
Remuera	29.1	24	N-1 switched	21.1	121%	24	131%	No constraint within +5 years	Load transfer to Newmarket South substation
Riverhead	11.7	9	N-1 switched	10.7	130%	9	131%	No constraint within +5 years	Meets Vector security criteria
Rockfield	23.9	24	N-1	25.9	100%	24	106%	No constraint within +5 years	Meets Vector security criteria
Rosebank	22.4	25.8	N-1	17.5	87%	26	119%	No constraint within +5 years	Meets Vector security criteria
Rosedale	14.5	0	N	8	-	24	68%	No constraint within +5 years	The constraint will be relieved by the installation of the second transformer

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

SCHEDULE 12b: REPORT ON FORECAST CAPACITY

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

sch ref

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
Sabulite Road	20.8	14	N-1 switched	16	149%	14	133%	No constraint within +5 years	Meets Vector security criteria
Sandringham	20.3	24	N-1	20.4	85%	24	84%	No constraint within +5 years	Meets Vector security criteria
Simpson Road	5	0	N	5.3	-	-	-	No constraint within +5 years	Meets Vector security criteria
Snells Beach	6.3	0	N	7	-	-	-	No constraint within +5 years	Meets Vector security criteria
South Howick	27	24	N-1 switched	14.6	113%	24	102%	No constraint within +5 years	Meets Vector security criteria
Spur Road	10.5	0	N	16.6	-	14	123%	No constraint within +5 years	The constraint will be relieved by the installation of the second transformer
St Heliers	20.4	21	N-1	15.8	97%	21	92%	No constraint within +5 years	Meets Vector security criteria
St Johns	17.7	24	N-1	16.3	74%	24	69%	No constraint within +5 years	Meets Vector security criteria
Sunset Road	15.7	14	N-1 switched	13.7	112%	14	107%	No constraint within +5 years	Meets Vector security criteria
Swanson	10.5	0	N	11.9	-	-	-	No constraint within +5 years	Meets Vector security criteria
Sylvia Park	19.7	24	N-1	12.9	82%	24	117%	No constraint within +5 years	Meets Vector security criteria
Takanini	17.4	18	N-1	19.4	97%	18	136%	No constraint within +5 years	Transformer upgrade scheduled
Takapuna	9.2	0	N	10.3	-	24	64%	No constraint within +5 years	Second transformer installed in substation
Te Atatu	22	14	N-1 switched	12.4	157%	14	150%	No constraint within +5 years	Meets Vector security criteria
Te Papapa	22.6	22.5	N-1 switched	9.1	100%	23	109%	No constraint within +5 years	Meets Vector security criteria
Torbay	8.6	0	N	7.7	-	-	-	No constraint within +5 years	Meets Vector security criteria
Triangle Road	14.1	12	N-1 switched	15.3	118%	18	83%	No constraint within +5 years	Transformer replacement project scheduled
Victoria	23.4	22.4	N-1 switched	18.2	104%	22	123%	No constraint within +5 years	Load transfer to Liverpool 22kV bus
Waiake	8.1	0	N	8.6	-			No constraint within +5 years	Meets Vector security criteria
Waiheke	11.8	15	N-1	5.2	79%	15	64%	No constraint within +5 years	Meets Vector security criteria
Waikaukau	7.1	0	N	7.4	-	-	-	No constraint within +5 years	Meets Vector security criteria
Waimauku	10.5	9	N-1	9.1	117%	9	-	No constraint within +5 years	Meets Vector security criteria
Wairau Road	17.3	15.2	N-1 switched	21.4	114%	16	147%	No constraint within +5 years	Meets Vector security criteria
Warkworth	20.1	18	N-1 switched	1.7	112%	18	134%	No constraint within +5 years	Load transfer to Warkworth South substation
Wellsford	8.2	9	N-1	5.4	91%	9	73%	No constraint within +5 years	Meets Vector security criteria
Westfield	26.7	24	N-1 switched	15.2	111%	24	141%	No constraint within +5 years	Load transfer to McNab substation
White Swan	26.2	32.2	N-1	15.4	81%	32	82%	No constraint within +5 years	Meets Vector security criteria
Wiri	41.4	48	N-1	21.6	86%	48	121%	No constraint within +5 years	Load transfer to Wiri West substation
Woodford	9.9	0	N	8	-	-	-	No constraint within +5 years	Meets Vector security criteria

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

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

The security of supply standards have been updated since the 2016 AMP. The changes made are designed to actively identify and manage risks associated with high impact, low probability events, recognition of the large loads and risks associated with meshed sub transmission networks, while maintaining pressure to improve utilisation of network assets.

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Appendix 5
Report on Forecast Network Demand

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

SCHEDULE 12C: REPORT ON FORECAST NETWORK DEMAND

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

sch ref

12c(i): Consumer Connections

Number of ICPs connected in year by consumer type

		Number of connections					
	for year ended	*Current Year CY* 31 Mar 17	*CY+1* 31 Mar 18	*CY+2* 31 Mar 19	*CY+3* 31 Mar 20	*CY+4* 31 Mar 21	*CY+5* 31 Mar 22
*Consumer types defined by EDB**							
Residential & Small Medium Enterprise (SME)		9,582	10,451	9,498	9,592	9,710	9,841
Industrial & Commercial		162	178	178	178	178	178
Connections total		9,744	10,629	9,676	9,770	9,888	10,019

**include additional rows if needed*

Distributed generation

Number of connections		831	812	811	811	812	811
Capacity of distributed generation installed in year (MVA)		3	3	3	3	3	3

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 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22
GXP demand		1,684	1,750	1,862	1,868	1,871	1,873
plus Distributed generation output at HV and above		14	14	14	14	14	14
Maximum coincident system demand		1,698	1,764	1,876	1,882	1,885	1,887
less Net transfers to (from) other EDBs at HV and above		-	-	-	-	-	-
Demand on system for supply to consumers' connection points		1,698	1,764	1,876	1,882	1,885	1,887
Electricity volumes carried (GWh)							
Electricity supplied from GXPs		8,531	8,554	8,560	8,575	8,589	8,603
less Electricity exports to GXPs		-	-	-	-	-	-
plus Electricity supplied from distributed generation		107	105	105	105	105	105
less Net electricity supplied to (from) other EDBs		-	-	-	-	-	-
Electricity entering system for supply to ICPs		8,638	8,659	8,664	8,680	8,694	8,707
less Total energy delivered to ICPs		8,309	8,323	8,330	8,344	8,357	8,370
Losses		329	336	335	336	337	338
Load factor		58%	56%	53%	53%	53%	53%
Loss ratio		3.8%	3.9%	3.9%	3.9%	3.9%	3.9%

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

There is a reduction in the consumer connections forecast compared to the 2016 AMP. The reduction has been in the outlook in SME connections to reflect the weakening of the 90 day interest rate forecast as sourced from the Reserve Bank Monetary Policy Statement.

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

Schedule 12d Report on Forecast Interruptions and Duration

Company Name	**Vector Electricity**
AMP Planning Period	**1 April 2017 – 31 March 2027**
Network / Sub-network Name	**Vector Limited**

SCHEDULE 12d: REPORT FORECAST INTERRUPTIONS AND DURATION

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

sch ref			*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
8								
9		for year ended	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**
10	**SAIDI**							
11	Class B (planned interruptions on the network)		10.2	10.2	10.2	10.2	10.2	10.2
12	Class C (unplanned interruptions on the network)		85.8	85.8	85.8	85.8	85.8	85.8
13	**SAIFI**							
14	Class B (planned interruptions on the network)		0.06	0.06	0.06	0.06	0.06	0.06
15	Class C (unplanned interruptions on the network)		1.23	1.23	1.23	1.23	1.23	1.23

Company Name	**Vector Electricity**
AMP Planning Period	**1 April 2017 – 31 March 2027**
Network / Sub-network Name	**Southern Network**

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

sch ref			*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
8								
9		for year ended	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**
10	**SAIDI**							
11	Class B (planned interruptions on the network)		3.0	3.0	3.0	3.0	3.0	3.0
12	Class C (unplanned interruptions on the network)		58.7	58.7	58.7	58.7	58.7	58.7
13	**SAIFI**							
14	Class B (planned interruptions on the network)		0.30	0.30	0.30	0.30	0.30	0.30
15	Class C (unplanned interruptions on the network)		0.80	0.80	0.80	0.80	0.80	0.80

Company Name	**Vector Electricity**
AMP Planning Period	**1 April 2017 – 31 March 2027**
Network / Sub-network Name	**Northern Network**

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

sch ref			*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
8								
9		for year ended	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**
10	**SAIDI**							
11	Class B (planned interruptions on the network)		21.0	21.0	21.0	21.0	21.0	21.0
12	Class C (unplanned interruptions on the network)		126.5	126.5	126.5	126.5	126.5	126.5
13	**SAIFI**							
14	Class B (planned interruptions on the network)		0.10	0.10	0.10	0.10	0.10	0.10
15	Class C (unplanned interruptions on the network)		1.88	1.88	1.88	1.88	1.88	1.88

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Appendix 7
Schedule 14a Mandatory Explanatory Notes on Forecast Information

Schedule 14a Mandatory Explanatory Notes on Forecast Information

1. This Schedule requires EDBs to provide explanatory notes to reports prepared in accordance with clause 2.6.6.

2. This Schedule is mandatory - EDBs must provide the explanatory comment specified below, in accordance with clause 2.7.2. This information is not part of the audited disclosure information, and so is not subject to the assurance requirements specified in section 2.8.

Commentary on difference between nominal and constant price capital expenditure forecasts (Schedule 11a)

3. In the box below, comment on the difference between nominal and constant price capital expenditure for the current disclosure year and 10 year planning period, as disclosed in Schedule 11a.

Box 1: Commentary on difference between nominal and constant price capital expenditure forecasts

Vector has used the NZIER (New Zealand Institute of Economic Research) September 2016 PPI (Producer Price Index-outputs) forecast from 2017 to 2020. Thereafter we have assumed a long term inflation rate of 2.0%. The constant price capital expenditure forecast is then inflated by the above mentioned PPI forecast to nominal price capital expenditure forecasts.

Commentary on difference between nominal and constant price operational expenditure forecasts (Schedule 11b)

4. In the box below, comment on the difference between nominal and constant price operational expenditure for the current disclosure year and 10 year planning period, as disclosed in Schedule 11b.

Box 2: Commentary on difference between nominal and constant price operational expenditure forecasts

Vector has used the NZIER (New Zealand Institute of Economic Research) September 2016 PPI (Producer Price Index-outputs) forecast from 2017 to 2020. Thereafter we have assumed a long term inflation rate of 2.0%. The constant price operating expenditure forecast is then inflated by the above mentioned PPI forecast to nominal price operating expenditure forecasts.

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Appendix 8
Schedule 17 Certification for Year-beginning Disclosures

Schedule 17 Certification for Year-beginning Disclosures

Clause 2.9.1

We, Bob Thomson, and

James Carmichael, 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 clauses 2.6.3, 2.6.6 and 2.7.2 of the Electricity Distribution Information Disclosure Determination 2012 in all material respects complies with that determination.

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

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

Director

Director

28 March 2017

Date