Gas Distribution Asset Management Plan Update

Information Disclosure 2017

CONTENTS

List of Figures

List of Tables

1. INTRODUCTION

This Asset Management Plan (AMP) Update (the Update) has been prepared to inform Vector's customers and other stakeholders of material changes and updates to our asset management planning since 30 June 2016, when the last full Gas Distribution AMP (2016 – 2026) was published.[1] In particular the update contains updated 10-year capital investment and maintenance programmes for the gas distribution network. These have been revised to reflect the Commerce Commission's (the Commission) default price-path (DPP) set on 30 May 2017 that applies to the period 1 October 2017 to 30 September 2022.

Vector notes the final DPP failed to include in the calculation of revenues, capital expenditure associated with the additional customer connections anticipated by Vector given the heightened level of residential development activity in Auckland occurring over the 2016 calendar year and expected to continue for the foreseeable future. The failure to include the additional capital expenditure within revenues for the next five years significantly compromises Vector's willingness to provide gas reticulation enabling infrastructure for the expected development activity.

The decision to exclude the additional forecasted consumer connections capital expenditure is also at odds with the Commission's changes to constant price revenue growth rate (CPRG) for the DPP. The CPRG estimates the growth of revenues holding prices constant i.e. growth from changing volumes. The Commission's final DPP increased Vector's CPRG by 0.37% from the draft DPP decision. The decision to increase CPRG without any corresponding change to connections capital expenditure is punitive given Vector is expected to meet higher anticipated growth without making any changes to the connections resources needed to meet the expected volume growth.

The Commission also excluded additional expenditure for non-network operating expenditures and non-network commissioned assets. The additional non-network expenditures were the result of the sale of Vector's gas transmission and non-Auckland gas distribution business to First Gas Ltd (FGL). These businesses historically bore a portion of the cost for non-network activities.

The level of commitment to some of these non-network activities has not scaled down because of the FGL transactions. The decision to exclude Vector's non-network capital expenditures will require the business to review some of the IT platform enhancements forecasted to occur soon. The Commission's decision to exclude the non-network expenditures departs from its settled position on changes to economies of scale expressed in the 2010 Input Methodologies Reasons Paper which makes the decision more extraordinary.

While the AMP takes into account 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, it is tempered by the expenditure allowances the Commission determines in the DPP.

2. REGULATORY UPDATE

Vector's gas distribution network is subject to price and quality regulation under Part 4 of the Commerce Act 1986 administered by the Commerce Commission. Under Part 4 of the Commerce Act 1986, the Commission sets price and quality requirements on a five-year basis through a default price-path. The current five year DPP for gas pipeline businesses (GPBs) expires on 30 September 2017. The Commission reset the DPP on 30 May 2017. The new DPP will cover the period 1 October 2017 to 30 September 2022.

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

Parameters for setting the DPP such as forecast capital expenditure, operating expenditure, demand growth and inflation are set by the Commission with discretion. Other parameters necessary for setting the DPP are defined by Input Methodologies. The Commission recently completed its prescribed, once in seven year, review of IMs on 20 December 2016 (the IM review). The IM review resulted in a material change to the weighted average cost of capital (WACC) for GPBs. The change to the GPB WACC IMs will materially reduce revenues for Vector's gas distribution network for the 2017-2022 DPP.

The Commission's allowances for capital expenditure and operating expenditure have a significant bearing on returns for Vector's gas distribution network. Where the Commission's DPP allowances vary significantly to a supplier's needs then the supplier may apply for a customised price path under Part 4. However, other factors within the Commission's discretion also materially influence financial returns under the DPP such as the ability to meet the Commission's demand growth forecasts and forecast inflation. The latter being a significant input into determining revaluation income used to calculate revenues. Where inflation forecasts are much higher than actual inflation this will also have a material impact on suppliers achieving revenues forecasted by the DPP. This was Vector's experience for the 2013-2017 GPB DPP i.e. the revaluation rate for each year of the 2013-2017 DPP forecasted inflation above two percent for the DPP. However, inflation failed to reach this level for the whole DPP period. The exaggerated revaluation rate significantly overestimated revaluation income for the DPP and contributed to suppliers failing to attain forecasted revenues over the DPP.

3. SUSTAINABILITY

Vector is cognisant of the increasing risks and opportunities posed by a changing environmental and social context. Examples of some of the challenges that are arising which are relevant to Vector include the rapid urbanisation of Auckland, increasing storm events linked to climate change, international commitments to reduce carbon emissions, and increasing inequality and poverty among our communities.

From a business perspective, these issues create new opportunities to apply innovation and technology to deliver services to customers but also create risks that need to be assessed and managed. This is particularly relevant for the long-term investment in network infrastructure to ensure resilience and accommodate a future which will by necessity be based on a low carbon economy.

Vector's approach will be to focus on the issues of materiality to both the business and its stakeholders, improving its understanding of these issues and embedding the appropriate response through the business. Given the scale of the issues the business will look to collaborate and where appropriate partner with other organisations in its response

4. NETWORK DEVELOPMENT PLANNING

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.

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 gas connections on Vector's network. Since Vector published its 2016 AMP we have experienced a step change in residential development requests for gas reticulation.

The volume of requests received in the second half of 2016 and early 2017 suggests gross ICP connections is likely to follow the "2017 Anticipated connections forecast" as shown in Figure 1 below. We note even this forecast is likely to be conservative for the later years of the DPP and beyond. Given the heightened focus on housing shortages in Auckland, policy makers at all levels of government are putting in place initiatives to help stimulate and expedite building activity. The forecasted sustained increase in building activity in Auckland is supported by the government's recent announcement on 16 May 2017 to build 34,000 homes in Auckland over the next 10 years.[2]

In this respect, Vector is frustrated the upcoming DPP determined by the Commission will not capture revisions to Vector's customer connections commissioned assets forecast for the 2017-2022 period. The Commission's failure to include the additional customer connections capital expenditure forecast means Vector cannot begin to recover the capital for the additional assets until after 2022. This severely compromises Vector's role with providing the enabling infrastructure to cater for Auckland's immediate housing requirements and population growth. The Commission's decision to exclude the additional connections expenditure is also at odds with other aspects of government policy which are designed to meet the demands of Auckland's population growth and housing needs.

As discussed above, the Commission's decision to exclude Vector's forecasted customer connections capital expenditure is also at odds with the changes from the draft to final DPP for CPRG. The final DPP increased Vector's CPRG from the draft decision. The decision to increase CPRG demonstrates the Commission's expectation of a higher level of growth (including connections) to occur over the regulatory period. Therefore, the decision not to consider any revisions to Vector's connections capital expenditure after Vector informed the Commission of its revised needs for the DPP appears to be punitive. The Commission's revised view on CPRG suggests a greater level of activity for the DPP but failing to include Vector's revised connections capital expenditure forecast does not provide Vector with the resources for meeting the growth.

Vector is committed to providing the enabling infrastructure for Auckland growth but does have a legitimate expectation for receiving compensation for doing so. Accordingly, Vector does have concerns about commissioning assets without any commensurate compensation in revenues.

We could re-allocate other expenditures such as reinforcement to meet forthcoming connections expenditure but note this does create inherent challenges around prudent asset management from a reliability perspective. We also have concern about re-allocation of expenditures being perceived as the "new" normal for the re-allocation.

To mitigate against the likelihood of connections expenditure under-recovery, Vector is considering options to limit the extent of under-recovered consumer connection expenditure. This is likely to include revisions to our capital contribution policy for gas reticulation for residential developments. We may also say "no" to developers looking to furnish developments with reticulated gas for dwelling hot water or space heating needs. As part of an approach to limit connections spend, we could also look to other "second choice" solutions such as encouraging developers / customers to consider bottled gas as the supporting fuel for installed gas solutions for hot water, space heating or cooking. This is especially relevant in the context of our gas pipeline business which does not provide any redress for capital return for assets commissioned above the DPP forecast as exists in the electricity distribution.

Given the above, Vector will use the levers available to it to manage growth within the constraints of the DPP. This will involve trade-offs which could increase network reliability risk. Therefore trade-offs will be carefully considered.

[2] Justice Minister Amy Adams 16 May 2017 press release https://www.beehive.govt.nz/release/govt-build-34000-new-houses-auckland

Figure 1 below shows Vector's gross forecast customer connections in the residential and commercial markets.

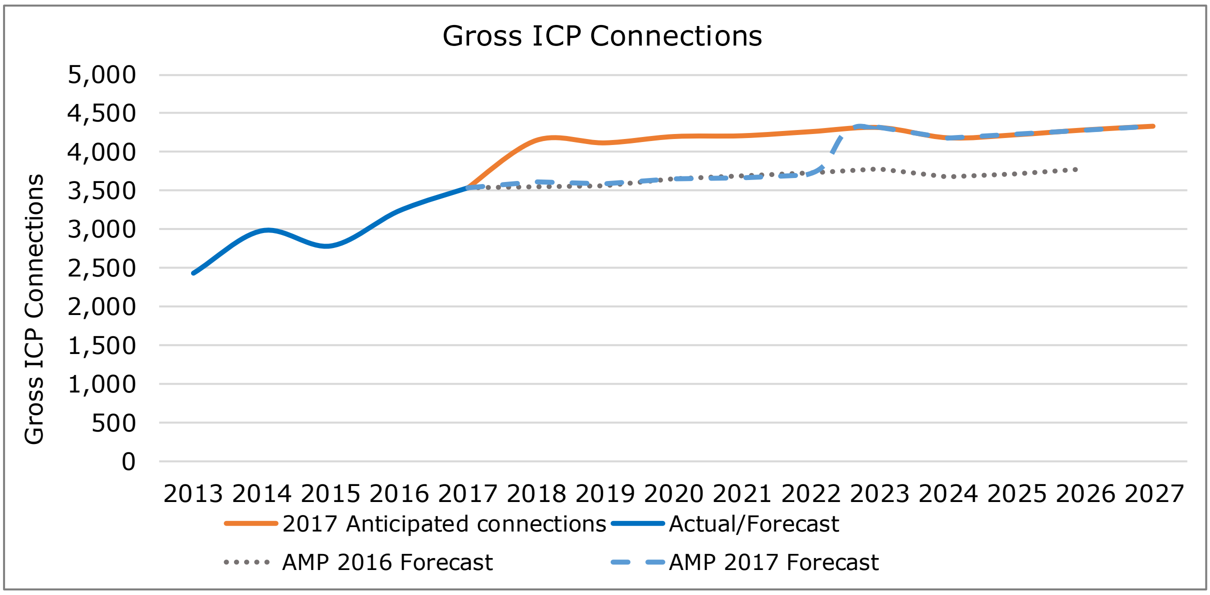

Figure 1: Forecast gross gas connections

North Shore MP4 – Devonport Reinforcement Project

Vector's network modelling has indicated that the North Shore MP4 network in the Devonport area is at risk of breaching Vector's minimum operating pressure criteria in FY20. As a result, system reinforcement is required to support future growth opportunities and enhance network security. The following projects are planned in FY18 (or under investigation):

- Install additional system pressure monitoring points within the Devonport area to further validate the network modelling; and
- Extend the existing IP20 pipeline and construct a new district regulator station closer to the constrained part of the network (under investigation).

5. LIFE-CYCLE ASSET MANAGEMENT

This section discusses aspects that have led to material changes to Vector's asset life-cycle management practices previously described in section 6 of the 2016 AMP.

Pipeline bracket replacement - Auckland Harbour Bridge

Vector carries out annual inspections of aboveground pipeline crossings to assess the condition of the pipeline coating and the pipeline support brackets and fixings. Recent preventive maintenance inspections of the IP20 pipeline installed on the Auckland Harbour Bridge have identified integrity issues with a significant proportion of the pipeline supports.

The 200 mm NB steel pipeline was constructed in 1983; it is installed on the original bridge superstructure only (i.e. not on the clip-on section) and is attached to the bridge via an estimated 170 support brackets which utilise roller fittings. When the pipeline was originally installed, heat shrink sleeves were fitted to the pipe at the support bracket locations to provide a protective barrier between the rollers and the pipeline coating. Over time the rollers and the rubber heat-shrink sleeves have sustained damage due to the axial-movement of the pipe (e.g. due to thermal expansion) against the rollers; the heat-shrink sleeves have also sustained damage from on-going bridge maintenance activities.

In the early 2000s, stainless steel shields were installed between the rollers and the rubber heat-shrink sleeves at a number of support bracket locations to protect the sleeve from roller damage. The shields have proved effective and at most of the locations where the shields have been installed the rollers remain in reasonable condition however the effectiveness of the shields has been compromised by repeated over-spray from ongoing bridge painting activities.

A more comprehensive work programme is now required to repair damaged rollers and heat-shrink sleeves and upgrade the support bracket configuration where required to minimise on-going damage to the pipeline or the brackets. Physical access to the pipeline is restricted, and rope access is required for a large number of support-bracket locations.

A small pilot project was undertaken during FY17 to develop appropriate work methodologies and pipeline support-bracket upgrade designs and determine typical fabrication and installation costs. The experience gained from the pilot project indicated that the total cost of the upgrade programme would be approximately $1M and that a 5 year programme of work (i.e. coordinated with the Bridge Authority work programme) would be practical and achievable. A 5 year programme of work (FY18 to FY22) with an annual expenditure of $200k has therefore been included in the 10-year capex forecast.

Public safety barriers at aboveground crossings

A recent external independent-audit of Vector's Safety Management System (as required by NZS 7901) noted that a review of a particular bridge crossing site (i.e. carried out as part of the audit) found that there were no barriers installed at the site to prevent the public from accessing the pipes attached to the side of the bridge - e.g. to attempt to walk along the pipe. A subsequent high-level review carried out by Vector found that approximately 35% of above ground crossings had the pipelines installed in such a way that there was the potential for the pipes to be accessed by the general public.

A more detailed risk assessment of these sites will be completed during FY17 to determine any additional site-specific controls that are required; a 2 year programme of work (FY18 to FY19) with an annual expenditure of $200k has been included in the 10-year capex forecast for the installation of additional controls for public safety at identified higher risk sites.

Leakage survey changes

During FY15 a new vehicle-mounted leak detection unit called SELMA was purchased by Vector. The unit (which is mounted on a survey vehicle owned and operated by FSP Electrix) is used for scheduled and ad-hoc leakage survey of mains and service pipes; these surveys were previously carried out by conventional walking survey. The equipment is mounted on the bumper of the vehicle and employs laser technology to identify methane releases. The equipment detects leaks in front and to the side of the driving path, and its sensitivity allows detection at normal urban-driving speeds. The equipment automatically records the survey route and the location and details of any leaks detected.

During FY16 and FY17 the existing preventive maintenance cycles for leakage survey were modified on a trial basis - i.e. the existing annual survey cycle was left unchanged, but all other leakage survey cycles were reduced to two years. This trial was undertaken to assess the efficiency gains that the SELMA leak detection equipment could provide, and test the viability of moving the existing 4 and 5 year cycles to a 2-year cycle to improve the overall safety of the network.

An analysis of reported gas escapes over the period of the trial shows a marked increase in the number of leaks detected by leakage survey and a corresponding decrease in the number of public reported escapes (PRE). Because of the improved safety outcomes that the more frequent survey cycle provides, Vector will retain the 2-year leakage survey cycle going forward. The significant cost efficiencies of the SELMA leakage survey equipment has resulted in a reduction in ongoing leakage survey preventive maintenance costs while providing more comprehensive leakage survey data. This allows Vector to take a proactive approach in managing gas leaks and mitigate potential impact to the public to achieve a better public safety outcome. These changes have been reflected in the 10 year opex forecast.

6. CAPITAL EXPENDITURE FORECAST

This section describes the capital expenditure forecasts for the gas 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.

Capital Expenditure Forecast

* The forecasts are inclusive of cost of finance and in line with Vector's business practice

*Table **1*** below shows the forecast capital expenditure during the planning period, broken down into the asset categories defined in the Commerce Commission's Gas Distribution Information Disclosure Determination 2012. The figures are presented in 2018 prices. 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 1.9% (* The forecasts are inclusive of cost of finance and in line with Vector's business practice

*Table **2***).

FY17 AMP	Financial Year ($000)									
	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
Consumer connection	16,404	14,357	14,556	14,605	14,760	18,447	18,107	18,264	18,474	18,603
System growth	2,525	1,934	742	1,603	377	2,678	724	2,293	438	377
Asset replacement and renewal	1,732	1,452	1,962	1,962	1,962	1,758	1,758	1,758	1,758	1,758
Asset relocations	2,831	3,209	3,417	2,817	2,705	2,519	2,519	2,519	2,519	2,519
Quality of supply	393	416	537	204	142	0	0	0	0	0
Legislative and regulatory	0	0	0	0	0	0	0	0	0	0
Other reliability, safety and environment	497	418	0	0	0	0	0	0	0	0
Network Capex	**24,384**	**21,785**	**21,215**	**21,191**	**19,945**	**25,402**	**23,107**	**24,834**	**23,189**	**23,257**
Non Network Assets	1,732	1,661	1,392	1,686	1,391	1,517	1,863	1,741	1,537	1,782
Total Capex	**26,116**	**23,446**	**22,607**	**22,877**	**21,336**	**26,919**	**24,970**	**26,575**	**24,727**	**25,039**

* The forecasts are inclusive of cost of finance and in line with Vector's business practice

Table 1 : Proposed capital expenditure forecast

FY16 AMP	Financial Year ($000)								
	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26
Consumer connection	14,696	14,821	15,095	15,236	15,371	15,424	15,162	15,339	15,527
System growth	1,352	1,720	834	1,695	469	540	1,141	1,141	469
Asset replacement and renewal	1,325	1,248	1,758	1,758	1,758	1,758	1,758	1,758	1,758
Asset relocations	3,078	2,385	3,021	2,136	1,516	1,794	1,794	1,794	1,794
Quality of supply	393	416	537	204	142	0	0	0	0
Legislative and regulatory	0	0	0	0	0	0	0	0	0
Other reliability, safety and environment	214	214	0	0	0	0	0	0	0
Network Capex	**21,058**	**20,803**	**21,245**	**21,029**	**19,256**	**19,516**	**19,855**	**20,032**	**19,547**
Non Network Assets	1,768	1,406	1,487	1,776	1,585	1,570	1,807	1,611	1,508
Total Capex	**22,826**	**22,210**	**22,732**	**22,805**	**20,841**	**21,086**	**21,662**	**21,643**	**21,055**

* The forecasts are inclusive of cost of finance and in line with Vector's business practice

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 July 2017 to 30 June 2026).

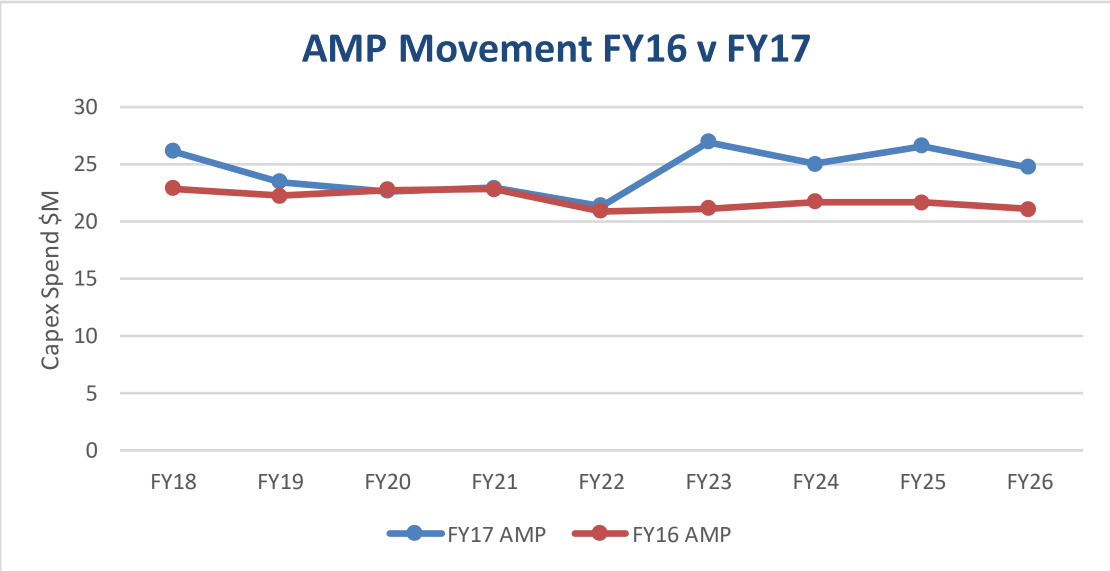

Figure 2: Movement between this AMP and the previous AMP's capital expenditure forecast

2016/2017 AMP Variances	Financial Year ($000)									
	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total
Consumer connection	1,709	(464)	(539)	(631)	(611)	3,023	2,945	2,925	2,947	11,302
System growth	1,173	214	(92)	(92)	(92)	2,138	(418)	1,152	(31)	3,953
Asset replacement and renewal	408	204	204	204	204	0	0	0	0	1,223
Asset relocations	(247)	824	397	681	1,188	726	726	726	726	5,746
Quality of supply	0	0	0	0	0	0	0	0	0	0
Legislative and regulatory	0	0	0	0	0	0	0	0	0	0
Other reliability, safety and environment	283	204	0	0	0	0	0	0	0	487
Network Capex	**3,326**	**981**	**(30)**	**163**	**689**	**5,886**	**3,252**	**4,802**	**3,642**	**22,711**
Non Network Assets	(36)	255	(95)	(90)	(194)	(53)	56	130	29	2
Total Capex	**3,289**	**1,237**	**(125)**	**72**	**495**	**5,833**	**3,308**	**4,932**	**3,671**	**22,713**

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, and reflects the following key changes:

- An increase of $11M in consumer connection largely attributed to a higher number of subdivisions and connections forecast from FY23 onwards. As discussed above, Vector anticipates a "step change" in customer connections for the forthcoming DPP period. The AMP has been prepared on the customer connections that can reasonably be achieved within the constraints imposed by the expenditure allowances determined by the Commission. Commercial connection costs per site have also increased led by the high level of construction activity in Auckland, attributing to a $2M increase in cost over the 9-year comparable period. Note potential customer specific projects are not included in the forecast due to the high risk of projects not proceeding.
- An increase of $6M in asset relocation spend for cost associated with the Light Rail Transit project.

- An increase of $4M in system growth expenditure to support subdivision development in west Auckland (Westgate and Hobsonville), and to reinforce capacity in central Auckland to allow for future intensifications.
- A $1M increase in asset replacement and renewal cost associated with the replacement of pipeline bracket on the Auckland Harbour Bridge.

7. OPERATIONAL EXPENDITURE FORECAST

This section describes the operational expenditure forecasts for the gas 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.

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 Gas Distribution Information Disclosure Determination. The figures are presented in 2018 prices. For reference, Vector has also included the corresponding operational expenditure forecast disclosed in the 2016 AMP escalated to 2018 prices using a PPI of 1.9% (Table 5).

2017 AMP	Financial Year ($000)									
	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
Service interruptions, incidents and emergencies	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100
Routine and corrective maintenance and inspection	2,499	2,500	2,502	2,504	2,505	2,507	2,509	2,510	2,512	2,514
Asset replacement and renewal	0	0	0	0	0	0	0	0	0	0
System operations and network support	2,644	2,644	2,644	2,644	2,644	2,644	2,644	2,644	2,644	2,644
Business support	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754	4,754
Total Operational Expenditure	**11,996**	**11,998**	**11,999**	**12,001**	**12,003**	**12,004**	**12,006**	**12,008**	**12,010**	**12,011**

Table 4 : Proposed operational expenditure forecast

2016 AMP	Financial Year ($000)								
	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26
Service interruptions, incidents and emergencies	2,029	2,029	2,029	2,029	2,029	2,029	2,029	2,029	2,029
Routine and corrective maintenance and inspection	2,547	2,549	2,552	2,555	2,558	2,561	2,563	2,566	2,569
Asset replacement and renewal	0	0	0	0	0	0	0	0	0
System operations and network support	3,133	3,133	3,133	3,133	3,133	3,133	3,133	3,133	3,133
Business support	4,497	4,497	4,497	4,497	4,497	4,497	4,497	4,497	4,497
Total Operational Expenditure	**12,206**	**12,208**	**12,211**	**12,214**	**12,217**	**12,220**	**12,222**	**12,225**	**12,228**

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 July 2017 to 30 June 2026).

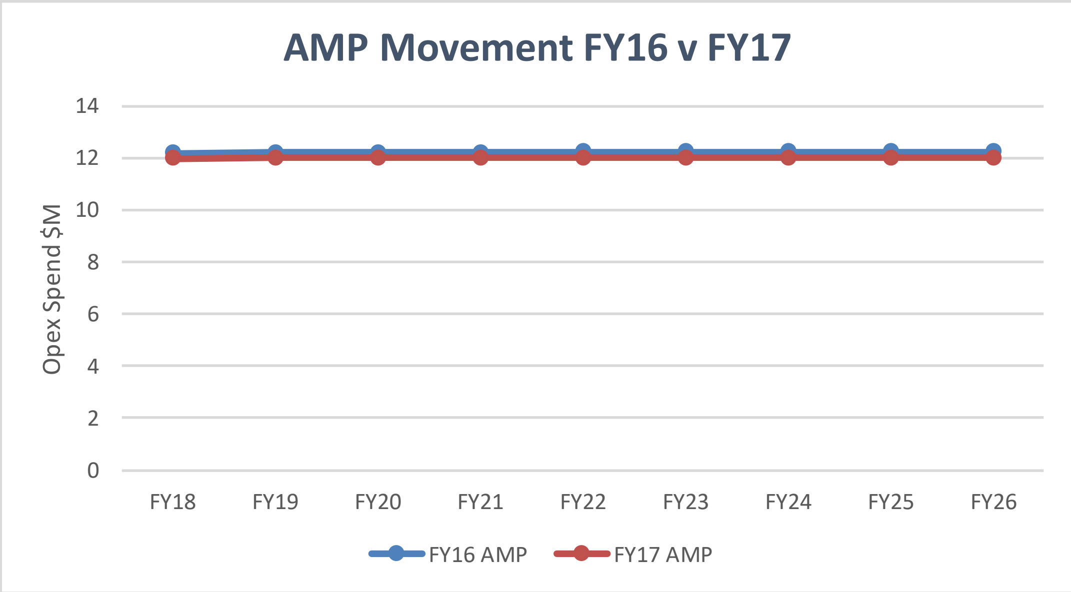

Figure 3: Movement between this AMP and the previous AMP's operational expenditure forecast

2016/2017 AMP Variances	Financial Year ($000)									
	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	Total
Service interruptions, incidents and emergencies	70	70	70	70	70	70	70	70	70	634
Routine and corrective maintenance and inspection	(48)	(49)	(50)	(51)	(52)	(54)	(55)	(56)	(57)	(472)
Asset replacement and renewal	0	0	0	0	0	0	0	0	0	0
System operations and network support	(489)	(489)	(489)	(489)	(489)	(489)	(489)	(489)	(489)	(4,404)
Business support	257	257	257	257	257	257	257	257	257	2,315
Total Operational Expenditure	**(210)**	**(211)**	**(212)**	**(213)**	**(214)**	**(215)**	**(216)**	**(218)**	**(219)**	**(1,927)**

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 a net decrease of $2M due to an adjustment in the corporate overhead allocation. Some cost reclassifications are reflected in the lower cost in system operations and network support and proportionally higher business support spend to better align to expenditure categories.
- Vector's investment in the vehicle-mounted leak detection unit (SELMA) has improved the efficiency of leak survey and resulted in a decrease in routine and corrective maintenance and inspection, while providing more comprehensive leakage data. This has slightly increased the service interruptions, incidents and emergencies cost, enabling Vector to proactively manage leakage issues and achieve a better public safety outcome.

8. APPENDIX

Gas Distribution Asset Management Plan Update

Information Disclosure 2017

Appendix 1
Report on Forecast Capital Expenditure

Company Name	**Vector Limited**
AMP Planning Period	**1 July 2016 - 30 Jun 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)

GDBs must provide explanatory comment on the difference between constant price and nominal dollar forecasts of expenditure on assets in Schedule 14a (Mandatory Explanatory Notes).

This information is not part of audited disclosure information.

sch ref		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
8	for year ended	**30 Jun 17**	**30 Jun 18**	**30 Jun 19**	**30 Jun 20**	**30 Jun 21**	**30 Jun 22**	**30 Jun 23**	**30 Jun 24**	**30 Jun 25**	**30 Jun 26**	**30 Jun 27**
9	**11a(i): Expenditure on Assets Forecast**	**$000 (nominal dollars)**										
10	Consumer connection	17,978	16,196	14,465	14,973	15,339	15,842	20,235	20,298	20,925	21,632	22,262
11	System growth	497	2,443	1,909	748	1,650	397	2,877	795	2,574	503	442
12	Asset replacement and renewal	1,335	1,703	1,457	2,010	2,052	2,097	1,920	1,963	2,006	2,050	2,095
13	Asset relocations	1,856	2,780	3,216	3,498	2,943	2,889	2,749	2,810	2,872	2,935	2,999
14	Reliability, safety and environment:											
15	Quality of supply	-	393	424	560	217	154	-	-	-	-	-
16	Legislative and regulatory	438	-	-	-	-	-	-	-	-	-	-
17	Other reliability, safety and environment	166	485	416	-	-	-	-	-	-	-	-
18	**Total reliability, safety and environment**	604	878	840	560	217	154	-	-	-	-	-
19	**Expenditure on network assets**	22,270	24,000	21,887	21,789	22,201	21,379	27,781	25,866	28,377	27,120	27,798
20	Non-network assets	1,546	1,717	1,682	1,439	1,779	1,500	1,672	2,099	2,005	1,808	2,142
21	**Expenditure on assets**	23,816	25,717	23,569	23,228	23,980	22,879	29,453	27,965	30,382	28,928	29,940
22												
	plus Cost of financing	337	399	360	329	358	319	456	392	461	401	411
24	*less* Value of capital contributions	3,732	4,448	4,847	5,177	4,703	4,714	5,046	5,100	5,232	5,378	5,517
25	*plus* Value of vested assets	-	-	-	-	-	-	-	-	-	-	-
26	**Capital expenditure forecast**	20,421	21,668	19,082	18,380	19,635	18,484	24,863	23,257	25,611	23,951	24,834
27												
28	Value of commissioned assets	21,076	21,582	19,082	18,380	19,634	18,483	24,865	23,256	25,609	23,951	24,835
29												
30		*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
31	for year ended	**30 Jun 17**	**30 Jun 18**	**30 Jun 19**	**30 Jun 20**	**30 Jun 21**	**30 Jun 22**	**30 Jun 23**	**30 Jun 24**	**30 Jun 25**	**30 Jun 26**	**30 Jun 27**
32		**$000 (in constant prices)**										
33	Consumer connection	17,978	15,892	13,907	14,100	14,149	14,298	17,870	17,540	17,692	17,896	18,021
34	System growth	497	2,397	1,835	704	1,522	358	2,541	687	2,176	416	358
35	Asset replacement and renewal	1,335	1,671	1,401	1,893	1,893	1,893	1,696	1,696	1,696	1,696	1,696
36	Asset relocations	1,856	2,728	3,092	3,294	2,715	2,607	2,428	2,428	2,428	2,428	2,428
37	Reliability, safety and environment:											
38	Quality of supply	-	386	408	527	200	139	-	-	-	-	-
39	Legislative and regulatory	438	-	-	-	-	-	-	-	-	-	-
40	Other reliability, safety and environment	166	476	400	-	-	-	-	-	-	-	-
41	**Total reliability, safety and environment**	604	862	808	527	200	139	-	-	-	-	-
42	**Expenditure on network assets**	22,270	23,550	21,043	20,518	20,479	19,295	24,535	22,351	23,992	22,436	22,503
43	Non-network assets	1,546	1,685	1,617	1,355	1,641	1,354	1,477	1,814	1,695	1,496	1,734
44	**Expenditure on assets**	23,816	25,235	22,660	21,873	22,120	20,649	26,012	24,165	25,687	23,932	24,237
45	**Subcomponents of expenditure on assets (where known)**											
46	Research and development	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
47												

Row			Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
49		for year ended	30 Jun 17	30 Jun 18	30 Jun 19	30 Jun 20	30 Jun 21	30 Jun 22	30 Jun 23	30 Jun 24	30 Jun 25	30 Jun 26	30 Jun 27
50	**Difference between nominal and constant price forecasts**		$000										
51	Consumer connection		-	304	558	873	1,190	1,544	2,365	2,758	3,233	3,736	4,241
52	System growth		-	46	74	44	128	39	336	108	398	87	84
53	Asset replacement and renewal		-	32	56	117	159	204	224	267	310	354	399
54	Asset relocations		-	52	124	204	228	282	321	382	444	507	571
55	Reliability, safety and environment:												
56	Quality of supply		-	7	16	33	17	15	-	-	-	-	-
57	Legislative and regulatory		-	-	-	-	-	-	-	-	-	-	-
58	Other reliability, safety and environment		-	9	16	-	-	-	-	-	-	-	-
59	**Total reliability, safety and environment**		-	16	32	33	17	15	-	-	-	-	-
60	**Expenditure on network assets**		-	450	844	1,270	1,722	2,084	3,246	3,515	4,385	4,684	5,295
61	Non-network assets		-	32	65	84	138	146	195	285	310	312	408
62	**Expenditure on assets**		-	482	909	1,354	1,860	2,230	3,441	3,800	4,695	4,996	5,703

70

11a(ii): Consumer Connection

Row			Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
72		for year ended	30 Jun 17	30 Jun 18	30 Jun 19	30 Jun 20	30 Jun 21	30 Jun 22
73	*Consumer types defined by GDB**		$000 (in constant prices)					
74	Mains Extensions/Subdivisions		7,801	5,231	3,337	3,342	3,370	3,398
75	Service Connections - Residential		8,460	9,165	9,094	9,287	9,313	9,440
76	Service Connections - Commercial		1,717	1,496	1,476	1,471	1,466	1,460
77	Customer Easements		-	-	-	-	-	-
78								
79	** include additional rows if needed*							
80	**Consumer connection expenditure**		17,978	15,892	13,907	14,100	14,149	14,298
81	*less* Capital contributions funding consumer connection		1,994	1,893	1,764	1,790	1,794	1,813
82	**Consumer connection less capital contributions**		15,984	13,999	12,143	12,310	12,355	12,485

11a(iii): System Growth

Row		CY	CY+1	CY+2	CY+3	CY+4	CY+5
84	**Intermediate pressure**						
85	Main pipe	-	-	-	-	-	-
86	Service pipe	-	-	-	-	-	-
87	Stations	-	300	899	600	300	300
88	Line valve	-	-	-	-	-	-
89	Special crossings	-	-	187	-	-	-
90	**Intermediate Pressure total**	-	300	1,086	600	300	300
91	**Medium pressure**						
92	Main pipe	497	1,749	352	46	1,164	-
93	Service pipe	-	-	-	-	-	-
94	Stations	-	290	290	-	-	-
95	Line valve	-	-	-	-	-	-
96	Special crossings	-	-	49	-	-	-
97	**Medium Pressure total**	497	2,039	691	46	1,164	-
98	**Low Pressure**						
99	Main pipe	-	-	-	-	-	-
100	Service pipe	-	-	-	-	-	-
101	Line valve	-	-	-	-	-	-
102	Special crossings	-	-	-	-	-	-
103	**Low Pressure total**	-	-	-	-	-	-
104	**Other assets**						
105	Monitoring and control systems	-	58	58	58	58	58
106	Cathodic protection systems	-	-	-	-	-	-
107	Other assets (other than above)	-	-	-	-	-	-
108	**Other total**	-	58	58	58	58	58
109							
110	**System growth expenditure**	497	2,397	1,835	704	1,522	358
111	*less* Capital contributions funding system growth						
112	**System growth less capital contributions**	497	2,397	1,835	704	1,522	358

11a(iv): Asset Replacement and Renewal

for year ended	Current Year CY 30 Jun 17	CY+1 30 Jun 18	CY+2 30 Jun 19	CY+3 30 Jun 20	CY+4 30 Jun 21	CY+5 30 Jun 22
Intermediate pressure	**$000 (in constant prices)**					
Main pipe	-	-	-	-	-	-
Service pipe	-	-	-	-	-	-
Stations	70	501	305	305	305	305
Line valve	-	-	-	-	-	-
Special crossings	41	246	246	246	246	246
Intermediate Pressure total	111	747	551	551	551	551
Medium pressure						
Main pipe	1,042	590	590	1,082	1,082	1,082
Service pipe	50	-	-	-	-	-
Station	-	98	98	98	98	98
Line valve	-	-	-	-	-	-
Special crossings	-	-	-	-	-	-
Medium Pressure total	1,092	688	688	1,180	1,180	1,180
Low Pressure						
Main pipe	-	-	-	-	-	-
Service pipe	-	-	-	-	-	-
Line valve	-	-	-	-	-	-
Special crossings	-	-	-	-	-	-
Low Pressure total	-	-	-	-	-	-
Other assets						
Monitoring and control systems	-	-	-	-	-	-
Cathodic protection systems	132	143	69	69	69	69
Other assets (other than above)	-	93	93	93	93	93
Other total	132	236	162	162	162	162
Asset replacement and renewal expenditure	1,335	1,671	1,401	1,893	1,893	1,893
less Capital contributions funding asset replacement and renewal						
Asset replacement and renewal less capital contributions	1,335	1,671	1,401	1,893	1,893	1,893

11a(v): Asset Relocations

*Project or programme**						
** include additional rows if needed*						
All other asset relocations projects or programmes	1,856	2,728	3,092	3,294	2,715	2,607
Asset relocations expenditure	1,856	2,728	3,092	3,294	2,715	2,607
less Capital contributions funding asset relocations	1,739	2,555	2,897	3,085	2,544	2,442
Asset relocations less capital contributions	117	173	195	209	171	165

11a(vi): Quality of Supply

	for year ended	Current Year CY 30 Jun 17	CY+1 30 Jun 18	CY+2 30 Jun 19	CY+3 30 Jun 20	CY+4 30 Jun 21	CY+5 30 Jun 22
*Project or programme**		**$000 (in constant prices)**					
** include additional rows if needed*							
All other quality of supply projects or programmes		-	386	408	527	200	139
Quality of supply expenditure		-	386	408	527	200	139
less Capital contributions funding quality of supply							
Quality of supply less capital contributions		-	386	408	527	200	139

11a(vii): Legislative and Regulatory

	30 Jun 17	30 Jun 18	30 Jun 19	30 Jun 20	30 Jun 21	30 Jun 22
Project or programme						
** include additional rows if needed*						
All other legislative and regulatory projects or programmes	438	-	-	-	-	-
Legislative and regulatory expenditure	438	-	-	-	-	-
less Capital contributions funding legislative and regulatory						
Legislative and regulatory less capital contributions	438	-	-	-	-	-

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

	30 Jun 17	30 Jun 18	30 Jun 19	30 Jun 20	30 Jun 21	30 Jun 22
*Project or programme**						
** include additional rows if needed*						
All other reliability, safety and environment projects or programmes	166	476	400	-	-	-
Other reliability, safety and environment expenditure	166	476	400	-	-	-
less Capital contributions funding other reliability, safety and environment						
Other Reliability, safety and environment less capital contributions	166	476	400	-	-	-

211	**11a(ix): Non-Network Assets**						
212	**Routine expenditure**						
213	*Project or programme**						
214							
215							
216							
217							
218							
219	** include additional rows if needed*						
220	All other routine expenditure projects or programmes	1,156	1,260	1,209	1,013	1,227	1,012
221	**Routine expenditure**	1,156	1,260	1,209	1,013	1,227	1,012
222	**Atypical expenditure**						
223	*Project or programme**						
224							
225							
226							
227							
228							
229	** include additional rows if needed*						
230	All other atypical expenditure projects or programmes	390	425	408	342	414	342
231	**Atypical expenditure**	390	425	408	342	414	342
232							
233	**Non-network assets expenditure**	1,546	1,685	1,617	1,355	1,641	1,354

Gas Distribution Asset Management Plan Update

Information Disclosure 2017

Appendix 2
Report on Forecast Operational Expenditure

Company Name	**Vector Limited**
AMP Planning Period	**1 July 2017 to 30 Jun 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.
GDBs must provide explanatory comment on the difference between constant price and nominal dollar operational expenditure forecasts in Schedule 14a (Mandatory Explanatory Notes).
This information is not part of audited disclosure information.

sch ref		Current year CY	CY+1	CY+2	CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
8	for year ended	**30 Jun 17**	**30 Jun 18**	**30 Jun 19**	**30 Jun 20**	**30 Jun 21**	**30 Jun 22**	**30 Jun 23**	**30 Jun 24**	**30 Jun 25**	**30 Jun 26**	**30 Jun 27**
9	**Operational Expenditure Forecast**	**$000 (in nominal dollars)**										
10	Service interruptions, incidents and emergencies	2,066	2,099	2,143	2,188	2,233	2,282	2,333	2,384	2,436	2,490	2,545
11	Routine and corrective maintenance and inspection	2,430	2,499	2,551	2,607	2,664	2,723	2,786	2,849	2,913	2,980	3,048
12	Asset replacement and renewal	-	-	-	-	-	-	-	-	-	-	-
13	**Network opex**	4,496	4,598	4,694	4,795	4,897	5,005	5,119	5,233	5,349	5,470	5,593
14	System operations and network support	2,916	2,644	2,698	2,755	2,812	2,874	2,937	3,002	3,068	3,135	3,204
15	Business support	4,536	4,754	4,852	4,954	5,057	5,169	5,282	5,399	5,517	5,639	5,763
16	**Non-network opex**	7,452	7,398	7,550	7,709	7,869	8,043	8,219	8,401	8,585	8,774	8,967
17	**Operational expenditure**	11,948	11,996	12,244	12,504	12,766	13,048	13,338	13,634	13,934	14,244	14,560

		Current year CY	CY+1	CY+2	CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
19	for year ended	**30 Jun 17**	**30 Jun 18**	**30 Jun 19**	**30 Jun 20**	**30 Jun 21**	**30 Jun 22**	**30 Jun 23**	**30 Jun 24**	**30 Jun 25**	**30 Jun 26**	**30 Jun 27**
20		**$000 (in constant prices)**										
21	Service interruptions, incidents and emergencies	2,066	2,060	2,060	2,060	2,060	2,060	2,060	2,060	2,060	2,060	2,060
22	Routine and corrective maintenance and inspection	2,430	2,452	2,453	2,455	2,457	2,458	2,460	2,462	2,463	2,465	2,467
23	Asset replacement and renewal	-	-	-	-	-	-	-	-	-	-	-
24	**Network opex**	4,496	4,512	4,513	4,515	4,517	4,518	4,520	4,522	4,523	4,525	4,527
25	System operations and network support	2,916	2,594	2,594	2,594	2,594	2,594	2,594	2,594	2,594	2,594	2,594
26	Business support	4,536	4,665	4,665	4,665	4,665	4,665	4,665	4,665	4,665	4,665	4,665
27	**Non-network opex**	7,452	7,259	7,259	7,259	7,259	7,259	7,259	7,259	7,259	7,259	7,259
28	**Operational expenditure**	11,948	11,771	11,772	11,774	11,776	11,777	11,779	11,781	11,782	11,784	11,786
29	**Subcomponents of operational expenditure (where known)**											
30	Research and development	-	-	-	-	-	-	-	-	-	-	-
	Insurance	185	224	228	233	238	243	248	254	259	265	271
32												

		Current year CY	CY+1	CY+2	CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
34	for year ended	**30 Jun 17**	**30 Jun 18**	**30 Jun 19**	**30 Jun 20**	**30 Jun 21**	**30 Jun 22**	**30 Jun 23**	**30 Jun 24**	**30 Jun 25**	**30 Jun 26**	**30 Jun 27**
35	**Difference between nominal and real forecasts**	**$000**										
36	Service interruptions, incidents and emergencies	-	39	83	128	173	222	273	324	376	430	485
37	Routine and corrective maintenance and inspection	-	47	98	152	207	265	326	387	450	515	581
38	Asset replacement and renewal	-	-	-	-	-	-	-	-	-	-	-
39	**Network opex**	-	86	181	280	380	487	599	711	826	945	1,066
40	System operations and network support	-	50	104	161	218	280	343	408	474	541	610
41	Business support	-	89	187	289	392	504	617	734	852	974	1,098
42	**Non-network opex**	-	139	291	450	610	784	960	1,142	1,326	1,515	1,708
43	**Operational expenditure**	-	225	472	730	990	1,271	1,559	1,853	2,152	2,460	2,774

Gas Distribution Asset Management Plan Update

Information Disclosure 2017

Appendix 3
Report on Asset Condition

Company Name	**Vector Limited**
AMP Planning Period	**1 July 2017 – 30 June 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.

sch ref

7					**Asset condition at start of planning period (percentage of units by grade)**						
8	**Operating Pressure**	**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**
9	Intermediate Pressure	Main pipe	IP PE main pipe	km	-	-	-	-	-	N/A	-
10	Intermediate Pressure	Main pipe	IP steel main pipe	km	-	-	-	100.00%	-	3	-
11	Intermediate Pressure	Main pipe	IP other main pipe	km	-	-	-	-	-	N/A	-
12	Intermediate Pressure	Service pipe	IP PE service pipe	km	-	-	-	-	-	N/A	-
13	Intermediate Pressure	Service pipe	IP steel service pipe	km	-	-	-	100.00%	-	3	-
14	Intermediate Pressure	Service pipe	IP other service pipe	km	-	-	-	-	-	N/A	-
15	Intermediate Pressure	Stations	Intermediate pressure DRS	No.	-	-	24.10%	75.90%	-	4	6.22
16	Intermediate Pressure	Line valve	IP line valves	No.	-	4.70%	77.73%	3.03%	14.55%	3	-
17	Intermediate Pressure	Special crossings	IP crossings	No.	-	10.00%	65.00%	25.00%	-	3	7.84
18	Medium Pressure	Main pipe	MP PE main pipe	km	-	0.48%	1.62%	97.90%	-	3	0.21
19	Medium Pressure	Main pipe	MP steel main pipe	km	-	-	-	100.00%	-	3	-
20	Medium Pressure	Main pipe	MP other main pipe	km	-	100.00%	-	-	-	3	100.00
21	Medium Pressure	Service pipe	MP PE service pipe	km	-	0.25%	99.75%	-	-	3	0.11
22	Medium Pressure	Service pipe	MP steel service pipe	km	-	-	100.00%	-	-	3	-
23	Medium Pressure	Service pipe	MP other service pipe	km	-	-	100.00%	-	-	3	-
24	Medium Pressure	Stations	Medium pressure DRS	No.	-	-	22.22%	77.78%	-	4	-
25	Medium Pressure	Line valve	MP line valves	No.	-	1.62%	81.25%	3.10%	14.02%	3	-
26	Medium Pressure	Special crossings	MP special crossings	No.	-	5.88%	73.53%	20.59%	-	3	2.84
27	Low Pressure	Main pipe	LP PE main pipe	km	-	-	25.83%	74.17%	-	3	-
28	Low Pressure	Main pipe	LP steel main pipe	km	-	-	-	-	-	N/A	-
29	Low Pressure	Main pipe	LP other main pipe	km	-	-	-	-	-	N/A	-
30	Low Pressure	Service pipe	LP PE service pipe	km	-	-	6.51%	93.49%	-	3	-
31	Low Pressure	Service pipe	LP steel service pipe	km	-	-	100.00%	-	-	3	-
32	Low Pressure	Service pipe	LP other service pipe	km	-	-	-	-	-	N/A	-
33	Low Pressure	Line valve	LP line valves	No.	-	-	71.43%	-	28.57%	3	-
34	Low Pressure	Special crossings	LP special crossings	No.	-	-	-	-	-	N/A	-
35	All	Monitoring and control systems	Remote terminal units	No.	-	7.04%	47.89%	45.07%	-	3	25.35
36	All	Cathodic protection systems	Cathodic protection	No.	-	14.29%	61.90%	23.81%	-	4	4.72

Gas Distribution Asset Management Plan Update

Information Disclosure 2017

Appendix 4
Report on Forecast Utilisation

Company Name	**Vector Limited**
AMP Planning Period	**1 July 2017 – 30 June 2027**

SCHEDULE 12b: REPORT ON FORECAST UTILISATION

This Schedule requires a breakdown of current and forecast utilisation (for heavily utilised pipelines) consistent with the information provided in the AMP and the demand forecast in schedule S12c.

sch ref

7 **Forecast Utilisation of Heavily Utilised Pipelines**

8 **Utilisation**

sch ref	Region	Network	Pressure system	Nominal operating pressure (NOP) (kPa)	Minimum operating pressure (MinOP) (kPa)	Total capacity at MinOP (scmh)	Remaining capacity at MinOP (scmh)	Unit	*Current Year CY* y/e 30 Jun 17	*CY+1* y/e 30 Jun 18	*CY+2* y/e 30 Jun 19	*CY+3* y/e 30 Jun 20	*CY+4* y/e 30 Jun 21	*CY+5* y/e 30 Jun 22	Comment
11	Auckland	Auckland Central	AU Auckland IP20	1,900	950	77,191	307	scmh	76884	78614	80383	82191	84041	85932	Remaining capacity at MinOP is available in the East Tamaki
12								kPa	1044	1002	956	1712	1711	1709	area. Stated system pressure assumes planned network
13	Auckland	Auckland Central	AU North Shore MP4	400	200	14,772	58	scmh	14714	15045	15383	15729	16083	16445	Remaining capacity at MinOP is available in the Devonport
14								kPa	231	223	214	204	266	259	area. Stated pressure assumes planned network reinforcements
15	Auckland	Warkworth	Warkworth IP20	1,900	950	816	71	scmh	745	764	775	787	798	810	Remaining capacity at MinOP is available at the Warkworth
16								kPa	1035	1015	1002	988	974	959	end of Woodcock's Road
17								scmh							
18								kPa							
19								scmh							
20								kPa							
21								scmh							
22								kPa							
23								scmh							
24								kPa							
25								scmh							
26								kPa							
27								scmh							
28								kPa							
29								scmh							
30								kPa							

31 * *Current year utilisation figures may be estimates. Year 1–5 figures show the utilisation forecast to occur given the expected system configuration for each year, including the effect of any new investment in the pressure system.*

32

33 **Disclaimer for supply enquiries**

34 The information in this table contains modelled estimates of utilisation and capacity. Any interested party seeking to invest in supply from Vector's distribution networks should contact their retailer and confirm availability of capacity.

35

36 **Notes and assumptions**

37 1. A 'heavily utilised' pressure system is a pressure system where the modelled flow rate, at system peak during 2016, is greater than or equal to 500 scmh, and its utilisation (pressure drop) is greater than or equal to 40% from the nominal operating pressure (NOP). The utilisation of a pressure system is calculated using the formula: [1 – (system minimum pressure/nominal operating pressure)] *100%.

38 2. The remaining capacity of a 'heavily utilised' pressure system is obtained by examining the modelled flows at various extremity points in each pressure system, and the level at which the minimum operating pressure (MinOP) is reached. Vector's security standards set the MinOP at 50% of the rated pressure (which equates to approximately 82% of the pipeline capacity) for a pressure system (based on standard operating pressures). The minimum modelled flow rate, analysed at one extremity point, is used to calculate the remaining capacity of the entire pressure system being studied.

39 3. A forecast model of a pressure system is obtained by applying either its forecast flow rate or an annual growth rate in each forecast year; and scaling its loads evenly to give the system total flow. The resulting minimum system pressure is simulated on this basis.
4. The forecast system flow for the Central Auckland network system is based on an annual growth rate of 2.25%. The stated growth rate extrapolates trends across historical actuals, which include the flows most recently observed during 2016.

40 5. Stated annual growth rates are averaged across a 10-year planning period. Owing to seasonality factors influencing the forecasting model the discrete forecast system flows may not mirror the 10-year averaged growth rate incrementally.
6. Schedule 12b provides a snapshot in time of the pressure system capacity, at the date of its preparation, and it should be noted that the figures will change over time. Schedule 12b is provided on the basis that it be used for consumer guidance only.
7. The capacity limits specified in Schedule 12b for each 'heavily utilised' pressure system, highlight only the most constrained part of the pressure system. At that specific location the MinOP is lowest; in reality more capacity may be available at other locations within the pressure or network system.

41 8. Consumers considering using gas or wanting more capacity should always contact Vector to confirm availability. In these cases, Vector will prepare a dedicated model that will provide an accurate assessment of available gas capacity at the specified location.
9. Due to resource constraints, the network models used to compile Schedule 12b are updated on a 3 year rolling cycle, meaning that the model update, forecast and validation of some models may not have been updated since 2014.

42 10. It has been assumed that the load forecasting documented in the AMP Update is correct, and that all assumptions and risks associated with this forecasting have been reviewed and approved as part of a separate exercise associated with signing off the AMP Update.

Gas Distribution Asset Management Plan Update

Information Disclosure 2017

Appendix 5
Report on Forecast Demand

Company Name	**Vector Limited**
AMP Planning Period	**1 July 2017 – 30 June 2027**

SCHEDULE 12c: REPORT ON FORECAST 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	*Current year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	30 Jun 17	**30 Jun 18**	**30 Jun 19**	**30 Jun 20**	**30 Jun 21**	**30 Jun 22**
Consumer types defined by GDB	**$000 (in constant prices)**					
Residential	3,352	3,424	3,398	3,470	3,479	3,527
Commercial	179	187	185	184	184	183
Total	3,531	3,611	3,583	3,654	3,663	3,710

12c(ii): Gas Delivered

	Current year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
30-Jun-16	**30 Jun 17**	**30 Jun 18**	**30 Jun 19**	**30 Jun 20**	**30 Jun 21**	**30 Jun 22**
Number of ICPs at year end	107,342	110,652	113,933	117,159	120,393	123,674
Maximum daily load (GJ/day)	60,213	61,886	62,690	63,493	64,296	65,100
Maximum monthly load (GJ/month)	1,501,215	1,488,883	1,501,377	1,513,871	1,526,366	1,538,860
Number of directly billed ICPs (at year end)	-	-	-	-	-	-
Total gas conveyed (GJ/annum)	14,083,619	14,239,814	14,421,369	14,575,798	14,703,716	14,826,800
Average daily delivery (GJ/day)	38,585	39,013	39,511	39,825	40,284	40,621
Load factor	78.18%	79.70%	80.05%	80.23%	80.28%	80.29%

Gas Distribution Asset Management Plan Update

Information Disclosure 2017

Appendix 6
Schedule 14a Mandatory Explanatory Notes on Forecast Information

Schedule 14a Mandatory Explanatory Notes on Forecast Information

1. This schedule requires GDBs to provide explanatory notes to reports prepared in accordance with clause 2.6.6.

2. This schedule is mandatory—GDBs 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 the 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) March 2017 PPI (Producer Price Index-outputs) forecast from 2017 to 2021. Thereafter we have assumed a long-term inflation rate of 2.20%. 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 the 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) Mach 2017 PPI (Producer Price Index-outputs) forecast from 2017 to 2021. Thereafter we have assumed a long-term inflation rate of 2.20%. The constant price operational expenditure forecast is then inflated by the above-mentioned PPI forecast to nominal price operational expenditure forecasts.

Gas Distribution Asset Management Plan Update

Information Disclosure 2017

Appendix 7
Schedule 17 Certification for Year-beginning Disclosures

Schedule 17 Certification for Year-beginning Disclosures

Clause 2.9.1

We, James Carmichael, and

Karen Sherry, 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 Gas Distribution Information Disclosure Determination 2012 in all material respects complies with that determination.

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

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

Director

Director

30/6/2017

Date