Firstgas

GAS DISTRIBUTION

Asset Management Plan 2018

Appendices

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A. GLOSSARY

TERM	DEFINITION
AMMAT	Asset Management Maturity Assessment Tool
ALARP	As Low as Reasonably Practicable
AMP	Asset Management Plan
Asset grades	Grade 1: means end of service life, immediate intervention required Grade 2: means material deterioration but asset condition still within serviceable life parameters. Intervention likely to be required within 3 years Grade 3: means normal deterioration requiring regular monitoring Grade 4: means good or as new condition Grade unknown: means condition unknown or not yet assessed
ARR	Asset Replacement and Renewal
CAPEX	Capital Expenditure– the expenditure used to create new or upgrade existing physical assets in the network, as well as non-network assets e.g. IT or facilities
CCC	Climate Change Commission, government body proposed to be established through the Zero Carbon Bill
CMMS	Computerised Maintenance Management System
COO	Chief Operating Officer
CS	Compressor Station – station that contains Gas Compression Plant.
CP	Cathodic Protection
CPI	Consumer Price Index
CRM	Customer Relationship Management
DCVG	Direct Current Voltage Gradient – a survey technique used for assessing the effectiveness of corrosion protection on buried steel structures
DFA	Delegated Financial Authority
DP	Delivery Point
DPP	Default Price Path
DRS	District Regulating Station
EAM	Enterprise Asset Management
EHMP	Electrical Hazard Management Plan
EPR	Earth Potential Rise
FDC	Finance During Construction
FEED	Front End Engineering Design
FIK	Flange Insulation Kits

TERM	DEFINITION
FSP	Field Service Provided
FY2019	Financial year ending 30 September 2019
GC	Gas Chromatographs
GDB	Gas Distribution Business
GIC	Gas Industry Company – New Zealand gas industry regulatory body
GIS	Geographical Information System
GM	General Manager
GMS	Gas Measurement System – commonly referred to as a gas meter
GNS	Institute of Geological and Nuclear Sciences
GTB	Gas Transmission Business
HDD	Horizontal Directional Drilling
HSEQ	Health, Safety, Environment and Quality
ICA	Interconnection Agreement
ICP	Installation Control Point – the connection point from a customer to the First Gas network
ICT	Information and Communications Technology
ILI	In Line Inspection
IMs	Input Methodologies – documents set by the Commerce Commission which promote certainty for suppliers and consumers in relation to the rules, requirements, and processes applying to the regulation under Part 4 of the Commerce Act 1986
IP	Intermediate pressure
IPS	Invensys Process Systems
IS	Information Systems
IT	Information Technology
kPa	Kilo-Pascal, a unit of pressure
KPI	Key Performance Indicators
LOS	Line of Sight
LPT	Low Pressure Trip
MAOP	Maximum Allowable Operating Pressure
MINOP	Minimum Operating Pressure
MCS	Vendor brand of pressure safety valve
MLV	Main Line Valve – valve installed on the main transmission pipelines used to isolate sections of the pipeline for emergency or maintenance purposes

TERM	DEFINITION
MP	Medium pressure
NRAMS	Non-Routine Activity Management System
NZTA	New Zealand Transport Agency
NZUAG	New Zealand Utilities Access Group
OEM	Original Equipment Manufacturer
OPEX	Operational Expenditure – the ongoing costs directly associated with running the Gas Distribution System. This includes costs both directly related to the network (e.g. routine and corrective maintenance, service interruptions/incidents, land management) and non-network related expenditure (e.g. network and business support)
OT	Off Take
PE	Polyethylene
PIG	Pipeline Inspection Gauge Tool
PIMP	Pipeline Integrity Management Plan
PIMS	Pipeline Integrity Management System
PLC	Programmable Logic Controllers
PJ	Petajoule (unit of energy) = 10^{15} Joules = 1,000 TJ
PRE	Pipeline Reported Escapes
PSV	Pressure Safety Valve – safety device to relieve excess pressure in system to protect system
RAB	Regulatory Asset Base – the measure of the net value of network and non-network assets used in price regulation
RCI	Routine and Corrective Maintenance and Inspection
ROAIMS	Rosen Asset Integrity Management System
RTE	Response Time to Emergencies
SCADA	Supervisory Control and Data Acquisition
SCMH	Standard Cubic Meters per hour (unit of gas flow rate)
SIE	Service Interruptions, Incidents and Emergencies
SMS	Safety Management Study
STA	Standard Threat Assessment
TJ	Terajoule (unit of energy) = 10^{12} Joules
WBH	Water Bath Heater – a shell and tube heat exchanger utilising to heat gas

APPENDIX B: INFORMATION DISCLOSURE SCHEDULES

This appendix includes the following Information Disclosure Schedules:

Schedule 11a – Report on Forecast Capital Expenditure
Schedule 11b – Report on Forecast Operational Expenditure
Schedule 12a – Report on Asset Condition
Schedule 12b – Report on Forecast Utilisation
Schedule 12c – Report on Forecast Demand
Schedule 13 – AMMAT
Schedule 14a – Commentary on Escalation

B.1: Schedule 11A – Forecaset Capex

Company Name	First Gas Limited
AMP Planning Period	1 October 2018 – 30 September 2028

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*
	for year ended	**30 Sep 18**	**30 Sep 19**	**30 Sep 20**	**30 Sep 21**	**30 Sep 22**	**30 Sep 23**	**30 Sep 24**	**30 Sep 25**	**30 Sep 26**	**30 Sep 27**	**30 Sep 28**
	11a(i): Expenditure on Assets Forecast	**$000 (nominal dollars)**										
	Consumer connection	6,862	7,021	7,767	8,590	9,549	10,335	11,209	12,181	13,265	13,715	14,197
	System growth	2,461	2,964	3,617	3,429	3,964	2,271	2,253	2,804	3,177	3,335	3,402
	Asset replacement and renewal	1,583	4,501	4,158	4,029	4,245	3,700	4,113	4,654	4,748	4,965	5,064
	Asset relocations	2,263	866	739	754	828	845	862	879	1,049	1,070	1,092
	Reliability, safety and environment:											
	Quality of supply	-	-	-	-	-	-	-	-	-	-	-
	Legislative and regulatory	-	-	-	-	-	-	-	-	-	-	-
	Other reliability, safety and environment	-	-	-	-	-	-	-	-	-	-	-
	Total reliability, safety and environment	-	-	-	-	-	-	-	-	-	-	-
	Expenditure on network assets	13,169	15,352	16,280	16,802	18,587	17,152	18,437	20,519	22,238	23,085	23,754
	Expenditure on non-network assets	202	474	202	527	351	489	488	161	177	494	147
	Expenditure on assets	13,371	15,826	16,482	17,329	18,937	17,640	18,925	20,680	22,415	23,579	23,901
plus	Cost of financing	47	61	64	67	74	68	73	80	86	91	92
less	Value of capital contributions	1,774	1,471	1,413	1,470	1,582	1,634	1,690	1,752	1,927	1,878	1,912
plus	Value of vested assets											
	Capital expenditure forecast	11,645	14,416	15,133	15,926	17,428	16,074	17,307	19,007	20,574	21,791	22,081
	Assets commissioned	12,483	13,724	14,932	15,677	16,996	16,182	16,846	18,405	19,933	21,178	21,607
	for year ended	*Current Year CY* **30 Sep 18**	*CY+1* **30 Sep 19**	*CY+2* **30 Sep 20**	*CY+3* **30 Sep 21**	*CY+4* **30 Sep 22**	*CY+5* **30 Sep 23**	*CY+6* **30 Sep 24**	*CY+7* **30 Sep 25**	*CY+8* **30 Sep 26**	*CY+9* **30 Sep 27**	*CY+10* **30 Sep 28**
		$000 (in constant prices)										
	Consumer connection	6,862	6,882	7,462	8,090	8,818	9,356	9,948	10,599	11,316	11,470	11,641
	System growth	2,461	2,905	3,475	3,230	3,660	2,056	2,000	2,440	2,710	2,789	2,789
	Asset replacement and renewal	1,583	4,411	3,995	3,795	3,920	3,350	3,650	4,050	4,050	4,153	4,153
	Asset relocations	2,263	849	710	710	765	765	765	765	895	895	895
	Reliability, safety and environment:											
	Quality of supply	-	-	-	-	-	-	-	-	-	-	-
	Legislative and regulatory	-	-	-	-	-	-	-	-	-	-	-
	Other reliability, safety and environment	-	-	-	-	-	-	-	-	-	-	-
	Total reliability, safety and environment	-	-	-	-	-	-	-	-	-	-	-
	Expenditure on network assets	13,169	15,047	15,642	15,825	17,163	15,527	16,363	17,854	18,971	19,307	19,477
	Expenditure on non-network assets	202	416	112	450	254	413	433	140	151	413	121
	Expenditure on assets	13,371	15,463	15,754	16,275	17,417	15,940	16,796	17,994	19,122	19,720	19,598
	Subcomponents of expenditure on assets (where known)											
	Research and development	-	-	-	-	-	-	-	-	-	-	-

		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
for year ended		30 Sep 18	30 Sep 19	30 Sep 20	30 Sep 21	30 Sep 22	30 Sep 23	30 Sep 24	30 Sep 25	30 Sep 26	30 Sep 27	30 Sep 28
Difference between nominal and constant price forecasts		$000										
Consumer connection		-	140	305	499	732	979	1,261	1,582	1,949	2,245	2,556
System growth		-	59	142	199	304	215	253	364	467	546	612
Asset replacement and renewal		-	90	163	234	325	350	463	604	698	813	912
Asset relocations		-	17	29	44	63	80	97	114	154	175	197
Reliability, safety and environment:												
Quality of supply		-	-	-	-	-	-	-	-	-	-	-
Legislative and regulatory		-	-	-	-	-	-	-	-	-	-	-
Other reliability, safety and environment		-	-	-	-	-	-	-	-	-	-	-
Total reliability, safety and environment		-	-	-	-	-	-	-	-	-	-	-
Expenditure on network assets		-	305	638	977	1,424	1,624	2,073	2,665	3,267	3,778	4,277
Expenditure on non-network assets		-	58	90	77	97	76	55	21	26	81	26
Expenditure on assets		-	363	728	1,054	1,521	1,700	2,128	2,686	3,293	3,859	4,304

		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
for year ended		30 Sep 18	30 Sep 19	30 Sep 20	30 Sep 21	30 Sep 22	30 Sep 23
11a(ii): Consumer Connection							
*Consumer types defined by GDB**		$000 (in constant prices)					
Mains Extensions/Subdivsions			3,200	3,264	3,329	3,396	3,396
Service Connections - Residential			2,841	3,266	3,756	4,321	4,753
Service Connections - Commercial			798	888	960	1,056	1,162
Customer Easements			43	44	45	45	46
** include additional rows if needed*							
Consumer connection expenditure		-	6,882	7,462	8,090	8,818	9,356
less Capital contributions funding consumer connection							
Consumer connection less capital contributions		-	6,882	7,462	8,090	8,818	9,356
11a(iii): System Growth							
Intermediate pressure							
Main pipe			1,550	2,720	2,510	1,760	100
Service pipe			-	-	-	-	-
Stations			840	450	-	1,145	-
Line valve			-	-	-	-	-
Special crossings			-	-	-	-	-
Intermediate Pressure total		-	2,390	3,170	2,510	2,905	100
Medium pressure							
Main pipe			515	305	720	755	1,956
Service pipe			-	-	-	-	-
Stations			-	-	-	-	-
Line valve			-	-	-	-	-
Special crossings			-	-	-	-	-
Medium Pressure total		-	515	305	720	755	1,956

92	**Low Pressure**						
93	Main pipe	-	-	-	-	-	-
94	Service pipe	-	-	-	-	-	-
95	Line valve	-	-	-	-	-	-
96	Special crossings	-	-	-	-	-	-
97	**Low Pressure total**	-	-	-	-	-	-
98	**Other network assets**						
99	Monitoring and control systems	-	-	-	-	-	-
100	Cathodic protection systems	-	-	-	-	-	-
101	Other assets (other than above)	-	-	-	-	-	-
102	**Other network assets total**	-	-	-	-	-	-
103							
104	**System growth expenditure**	-	2,905	3,475	3,230	3,660	2,056
105	*less* Capital contributions funding system growth	-	-	-	-	-	-
106	**System growth less capital contributions**	-	2,905	3,475	3,230	3,660	2,056
107							
108							
109		*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	for year ended	**30 Sep 18**	**30 Sep 19**	**30 Sep 20**	**30 Sep 21**	**30 Sep 22**	**30 Sep 23**
110	**11a(iv): Asset Replacement and Renewal**						
111	**Intermediate pressure**	**$000 (in constant prices)**					
112	Main pipe		20	20	20	20	20
113	Service pipe		-	-	-	-	-
114	Stations		1,742	330	150	150	220
115	Line valve		100	100	100	100	100
116	Special crossings		60	60	-	-	-
117	**Intermediate Pressure total**	-	1,922	510	270	270	340
118	**Medium pressure**						
119	Main pipe		2,214	3,210	3,235	3,485	2,760
120	Service pipe		-	-	-	-	-
121	Station		-	-	-	-	-
122	Line valve		-	-	-	-	-
123	Special crossings		-	-	-	-	-
124	**Medium Pressure total**	-	2,214	3,210	3,235	3,485	2,760
125	**Low Pressure**						
126	Main pipe		-	-	-	-	-
127	Service pipe		-	-	-	-	-
128	Line valve		-	-	-	-	-
129	Special crossings		-	-	-	-	-
130	**Low Pressure total**	-	-	-	-	-	-

131		**Other network assets**					
132		Monitoring and control systems		125	125	125	-	100
133		Cathodic protection systems		50	50	50	50	50
134		Other assets (other than above)		100	100	115	115	100
135		**Other network assets total**	-	275	275	290	165	250
136								
137		**Asset replacement and renewal expenditure**	-	4,411	3,995	3,795	3,920	3,350
138	*less*	Capital contributions funding asset replacement and renewal	-	-	-	-	-	-
139		**Asset replacement and renewal less capital contributions**	-	4,411	3,995	3,795	3,920	3,350
140								

11a(v): Asset Relocations

142		*Project or programme**					
143		provisional forecast		849	710	710	765	765
144								
145								
146								
147								
148		** include additional rows if needed*						
149		All other projects or programmes - asset relocations						
150		**Asset relocations expenditure**	-	849	710	710	765	765
151	*less*	Capital contributions funding asset relocations						
152		**Asset relocations less capital contributions**	-	849	710	710	765	765
153								

11a(vi): Quality of Supply

154			*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
155		for year ended	**30 Sep 18**	**30 Sep 19**	**30 Sep 20**	**30 Sep 21**	**30 Sep 22**	**30 Sep 23**
156								
157		*Project or programme**	**$000 (in constant prices)**					
158		Category not utilised						
159								
160								
161								
162								
163		** include additional rows if needed*						
164		All other projects or programmes - quality of supply						
165		**Quality of supply expenditure**	-	-	-	-	-	-
166	*less*	Capital contributions funding quality of supply						
167		**Quality of supply less capital contributions**	-	-	-	-	-	-
168								

11a(vii): Legislative and Regulatory

	Project or programme						
	Category not utilised						
	** include additional rows if needed*						
	All other projects or programmes - legislative and regulatory						
	Legislative and regulatory expenditure	-	-	-	-	-	-
less	Capital contributions funding legislative and regulatory						
	Legislative and regulatory less capital contributions	-	-	-	-	-	-

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

	*Project or programme**						
	Category not utilised						
	** include additional rows if needed*						
	All other projects or programmes - other reliability, safety and environment						
	Other reliability, safety and environment expenditure	-	-	-	-	-	-
less	Capital contributions funding other reliability, safety and environment						
	Other Reliability, safety and environment less capital contributions	-	-	-	-	-	-

11a(ix): Non-Network Assets

Routine expenditure

	*Project or programme**						
	ICT		398	108	441	100	111
	Building Refurbishment		18	4	9	9	9
	** include additional rows if needed*						
	All other projects or programmes - routine expenditure	-	-	-	-	-	-
	Routine expenditure	-	416	112	450	109	120

Atypical expenditure

	*Project or programme**						
	ICT						
	Building Refurbishment					145	293
	All other projects or programmes - routine expenditure						
	** include additional rows if needed*						
	All other projects or programmes - atypical expenditure						
	Atypical expenditure	-	-	-	-	145	293
	Expenditure on non-network assets	-	416	112	450	254	413

B.2: Schedule 11B – Forecaset Opex

Company Name	**First Gas Limited**
AMP Planning Period	**1 October 2018 – 30 September 2028**

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												
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	**30 Sep 18**	**30 Sep 19**	**30 Sep 20**	**30 Sep 21**	**30 Sep 22**	**30 Sep 23**	**30 Sep 24**	**30 Sep 25**	**30 Sep 26**	**30 Sep 27**	**30 Sep 28**
9	**Operational Expenditure Forecast**	**$000 (in nominal dollars)**										
10	Service interruptions, incidents and emergencies	2,921	2,980	3,040	3,101	3,163	3,227	3,291	3,357	3,424	3,493	3,562
11	Routine and corrective maintenance and inspection	1,297	1,882	1,920	1,959	1,998	2,038	2,079	2,120	2,163	2,206	2,250
12	Asset replacement and renewal	-	-	-	-	-	-	-	-	-	-	-
13	**Network opex**	4,218	4,863	4,960	5,060	5,161	5,265	5,370	5,477	5,587	5,699	5,813
14	System operations and network support	1,558	1,589	1,621	1,654	1,687	1,720	1,755	1,790	1,826	1,862	1,900
15	Business support	1,700	1,735	1,769	1,805	1,841	1,878	1,915	1,954	1,993	2,033	2,073
16	**Non-network opex**	3,258	3,324	3,390	3,459	3,528	3,598	3,670	3,744	3,819	3,895	3,973
17	**Operational expenditure**	7,476	8,186	8,351	8,519	8,689	8,863	9,040	9,221	9,405	9,594	9,785
18		*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 Sep 18**	**30 Sep 19**	**30 Sep 20**	**30 Sep 21**	**30 Sep 22**	**30 Sep 23**	**30 Sep 24**	**30 Sep 25**	**30 Sep 26**	**30 Sep 27**	**30 Sep 28**
20		**$000 (in constant prices)**										
21	Service interruptions, incidents and emergencies	2,921	2,921	2,921	2,921	2,921	2,921	2,921	2,921	2,921	2,921	2,921
22	Routine and corrective maintenance and inspection	1,297	1,845	1,845	1,845	1,845	1,845	1,845	1,845	1,845	1,845	1,845
23	Asset replacement and renewal	-	-	-	-	-	-	-	-	-	-	-
24	**Network opex**	4,218	4,766	4,766	4,766	4,766	4,766	4,766	4,766	4,766	4,766	4,766
25	System operations and network support	1,558	1,558	1,558	1,558	1,558	1,558	1,558	1,558	1,558	1,558	1,558
26	Business support	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700
27	**Non-network opex**	3,258	3,258	3,258	3,258	3,258	3,258	3,258	3,258	3,258	3,258	3,258
28	**Operational expenditure**	7,476	8,024	8,024	8,024	8,024	8,024	8,024	8,024	8,024	8,024	8,024
29	**Subcomponents of operational expenditure (where known)**											
30	Research and development	-	-	-	-	-	-	-	-	-	-	-
	Insurance	-	-	-	-	-	-	-	-	-	-	-
32												
33		*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 Sep 18**	**30 Sep 19**	**30 Sep 20**	**30 Sep 21**	**30 Sep 22**	**30 Sep 23**	**30 Sep 24**	**30 Sep 25**	**30 Sep 26**	**30 Sep 27**	**30 Sep 28**
35	**Difference between nominal and real forecasts**	**$000**										
36	Service interruptions, incidents and emergencies	-	59	119	180	242	306	370	436	503	572	641
37	Routine and corrective maintenance and inspection	-	37	75	114	153	193	234	275	318	361	405
38	Asset replacement and renewal	-	-	-	-	-	-	-	-	-	-	-
39	**Network opex**	-	97	194	294	395	499	604	711	821	933	1,047
40	System operations and network support	-	32	64	96	129	163	197	232	268	305	342
41	Business support	-	35	69	105	141	178	215	254	293	333	373
42	**Non-network opex**	-	66	133	201	270	341	413	486	561	637	715
43	**Operational expenditure**	-	163	327	495	666	839	1,017	1,198	1,382	1,570	1,762

B.3: Schedule 12A – Asset Condition

Company Name	**First Gas Limited**
AMP Planning Period	**1 October 2018 – 30 September 2028**

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.	-	4.90%	43.10%	52.00%	-	4	5.90
16	Intermediate Pressure	Line valve	IP line valves	No.	-	6.70%	65.80%	9.60%	17.90%	3	-
17	Intermediate Pressure	Special crossings	IP crossings	No.	8.70%	-	87.00%	4.30%	-	3	7.30
18	Medium Pressure	Main pipe	MP PE main pipe	km	-	-	14.55%	85.45%	-	3	0.70
19	Medium Pressure	Main pipe	MP steel main pipe	km	-	7.60%	92.40%	-	-	3	1.90
20	Medium Pressure	Main pipe	MP other main pipe	km	-	-	-	-	-	N/A	-
21	Medium Pressure	Service pipe	MP PE service pipe	km	-	-	15.00%	85.00%	-	3	0.50
22	Medium Pressure	Service pipe	MP steel service pipe	km	-	100.00%	-	-	-	3	-
23	Medium Pressure	Service pipe	MP other service pipe	km	-	-	-	-	-	N/A	-
24	Medium Pressure	Stations	Medium pressure DRS	No.	-	-	41.70%	58.30%	-	4	-
25	Medium Pressure	Line valve	MP line valves	No.	0.10%	6.50%	76.40%	7.90%	9.10%	3	0.10
26	Medium Pressure	Special crossings	MP special crossings	No.	-	-	93.20%	5.10%	1.70%	3	7.30
27	Low Pressure	Main pipe	LP PE main pipe	km	-	-	-	100.00%	-	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	-	-	100.00%	-	-	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.	-	-	100.00%	-	-	3	-
34	Low Pressure	Special crossings	LP special crossings	No.	-	-	-	-	-	N/A	-
35	All	Monitoring and control systems	Remote terminal units	No.	-	-	-	-	-	N/A	-
36	All	Cathodic protection systems	Cathodic protection	No.	2.90%	5.90%	85.30%	5.90%	-	4	8.40

B.4: Schedule 12B – Forecast Utilisation

Company Name	First Gas Limited
AMP Planning Period	1 October 2018 – 30 September 2028

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

Forecast Utilisation of Heavily Utilised Pipelines

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	Utilisation: *Current Year CY* g/e 30 Sep 18	*CY+1* g/e 30 Sep 19	*CY+2* g/e 30 Sep	*CY+3* g/e 30 Sep 21	*CY+4* g/e 30 Sep	*CY+5* g/e 30 Sep	Comment
Kapiti	Paraparaumu	PR Paraparaumu IP20	1,900	950	2,588	1,007	scmh	1,581	1,606	1,632	1,658	1,685	1,711	System reinforcement is planned in FY19 which would lift the MinOp figures to 1,500.
							kPa	857	1,506	1,502	1,499	1,495	1,490	
Waikato	Waitoa	WT Waitoa MP4	400	200	627	13	scmh	614	630	646	663	680	698	No remaining capacity at MinOp is available in the system for the future. System reinforcement is planned in FY18.
							kPa	216	206	195	184	171	157	
Waikato	Cambridge	Cambridge IP20	1,900	950	1,266	131	scmh	1,555	1,685	1,685	1,685	1,685	1,685	No constraints have been identified in the system, however recent commercial requests from developers and the forecast increase in residential users indicate that the network will fall below the minimum pressure criteria. System reinforcement is planned in FY19.
							kPa	1,108	973	973	973	973	973	
Waikato	Hamilton	Hamilton IP10	1,000	800	15,160	931	scmh	14,229	14,772	14,829	14,887	14,944	15,002	No remaining capacity at MinOp is available in the system. System reinforcement is planned in FY19.
							kPa	766	694	690	687	683	679	
Waikato	Hamilton	Hamilton MP4	400	200	10,246	127	scmh	10,119	10,646	10,687	10,727	10,768	10,809	No constraints have been identified in the system, however, to enhance network security, system reinforcement is planned in FY19.
							kPa	253	221	221	220	219	218	
							scmh							
							kPa							
							scmh							
							kPa							
							scmh							
							kPa							
							scmh							
							kPa							
							scmh							
							kPa							

** 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.*

Disclaimer for supply

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

Notes and assumptions

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%.
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. First Gas Limited'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.
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 is populated using the respective network system as tabulated in Appendix I of the First Gas Distribution Asset Management Plan 2018 - 2028.

B.5: Schedule 12C – Forecast Demand

Company Name	**First Gas Limited**
AMP Planning Period	**1 October 2018 – 30 September 2028**

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

Consumer types defined by GDB	*Current year CY* **30 Sep 18**	*CY+1* **30 Sep 19**	*CY+2* **30 Sep 20**	*CY+3* **30 Sep 21**	*CY+4* **30 Sep 22**	*CY+5* **30 Sep 23**
Residential	1,300	1,495	1,719	1,977	2,274	2,501
Commercial	119	131	144	158	174	191
Industrial	2	2	4	2	2	2
[GDB consumer type]						
[GDB consumer type]						
Total	1,421	1,628	1,867	2,137	2,450	2,694

12c(ii): Gas Delivered

	Current year CY **30 Sep 18**	*CY+1* **30 Sep 19**	*CY+2* **30 Sep 20**	*CY+3* **30 Sep 21**	*CY+4* **30 Sep 22**	*CY+5* **30 Sep 23**
Number of ICPs at year end (at year end)	63,280	64,708	66,375	68,312	70,562	73,170
Maximum daily load (GJ per day)	49,564	49,861	50,160	50,461	50,764	51,068
Maximum monthly load (GJ per month)	918,033	923,541	929,082	934,657	940,265	945,906
Number of directly billed ICPs (at year end)	-	-	-	-	-	-
Total gas conveyed (GJ per annum)	9,056,012	9,110,348	9,165,010	9,220,000	9,275,320	9,330,972
Average daily delivery (GJ per day)	24,811	24,960	25,041	25,260	25,412	25,564
Load factor	82.20%	82.20%	82.20%	82.20%	82.20%	82.20%

B.6: Schedule 13 – AMMAT

Company Name	**First Gas Limited**
AMP Planning Period	**1 October 2018 – 30 September 2028**
Asset Management Standard Applied	**PAS55000-Transitioning to ISO55000 Standard**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY

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

Question No.	Function	Question	Score	Evidence—Summary	Why	Who	Record/documented Information
3	Asset management policy	To what extent has an asset management policy been documented, authorised and communicated?	3	Asset Management Policy is authorised, published and communicated to all relevant stakeholders.	Widely used AM practice standards require an organisation to document, authorise and communicate its asset management policy (eg, as required in PAS 55 para 4.2 i). A key pre-requisite of any robust policy is that the organisation's top management must be seen to endorse and fully support it. Also vital to the effective implementation of the policy, is to tell the appropriate people of its content and their obligations under it. Where an organisation outsources some of its asset-related activities, then these people and their organisations must equally be made aware of the policy's content. Also, there may be other stakeholders, such as regulatory authorities and shareholders who should be made aware of it.	Top management. The management team that has overall responsibility for asset management.	The organisation's asset management policy, its organisational strategic plan, documents indicating how the asset management policy was based upon the needs of the organisation and evidence of communication.
10	Asset management strategy	What has the organisation done to ensure that its asset management strategy is consistent with other appropriate organisational policies and strategies, and the needs of stakeholders?	2	An Asset Management Strategy has been formally developed and incorporated into the AMP. Some work to be done in aligning to other organisational policies and requirements of relevant stakeholders.	In setting an organisation's asset management strategy, it is important that it is consistent with any other policies and strategies that the organisation has and has taken into account the requirements of relevant stakeholders. This question examines to what extent the asset management strategy is consistent with other organisational policies and strategies (eg, as required by PAS 55 para 4.3.1 b) and has taken account of stakeholder requirements as required by PAS 55 para 4.3.1 c). Generally, this will take into account the same polices, strategies and stakeholder requirements as covered in drafting the asset management policy but at a greater level of detail.	Top management. The organisation's strategic planning team. The management team that has overall responsibility for asset management.	The organisation's asset management strategy document and other related organisational policies and strategies. Other than the organisation's strategic plan, these could include those relating to health and safety, environmental, etc. Results of stakeholder consultation.
11	Asset management strategy	In what way does the organisation's asset management strategy take account of the lifecycle of the assets, asset types and asset systems over which the organisation has stewardship?	2	Asset Management Strategy has been developed and incorporated into the AMP. Need to expand to cover all asset, asset types and asset systems.	Good asset stewardship is the hallmark of an organisation compliant with widely used AM standards. A key component of this is the need to take account of the lifecycle of the assets, asset types and asset systems. (For example, this requirement is recognised in 4.3.1 d) of PAS 55). This question explores what an organisation has done to take lifecycle into account in its asset management strategy.	Top management. People in the organisation with expert knowledge of the assets, asset types, asset systems and their associated life-cycles. The management team that has overall responsibility for asset management. Those responsible for developing and adopting methods and processes used in asset management	The organisation's documented asset management strategy and supporting working documents.
26	Asset management plan(s)	How does the organisation establish and document its asset management plan(s) across the life cycle activities of its assets and asset systems?	2	First Gas has developed an Asset Management Plan for the Transmission Network. This plan covers the transmission network holistically. It includes the full asset lifecycle. Plans for critical assets are identified in the AMP. The plan meets the objectives of the Asset Management Policy as well as key performance standards such as AS2885.	The asset management strategy need to be translated into practical plan(s) so that all parties know how the objectives will be achieved. The development of plan(s) will need to identify the specific tasks and activities required to optimize costs, risks and performance of the assets and/or asset system(s), when they are to be carried out and the resources required.	The management team with overall responsibility for the asset management system. Operations, maintenance and engineering managers.	The organisation's asset management plan(s).

Company Name	**First Gas Limited**
AMP Planning Period	**1 October 2018 – 30 September 2028**
Asset Management Standard Applied	**PAS55000-Transitioning to ISO55000 Standard**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
3	Asset management policy	To what extent has an asset management policy been documented, authorised and communicated?	The organisation does not have a documented asset management policy.	The organisation has an asset management policy, but it has not been authorised by top management, or it is not influencing the management of the assets.	The organisation has an asset management policy, which has been authorised by top management, but it has had limited circulation. It may be in use to influence development of strategy and planning but its effect is limited.	The asset management policy is authorised by top management, is widely and effectively communicated to all relevant employees and stakeholders, and used to make these persons aware of their asset related obligations.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
10	Asset management strategy	What has the organisation done to ensure that its asset management strategy is consistent with other appropriate organisational policies and strategies, and the needs of stakeholders?	The organisation has not considered the need to ensure that its asset management strategy is appropriately aligned with the organisation's other organisational policies and strategies or with stakeholder requirements. OR The organisation does not have an asset management strategy.	The need to align the asset management strategy with other organisational policies and strategies as well as stakeholder requirements is understood and work has started to identify the linkages or to incorporate them in the drafting of asset management strategy.	Some of the linkages between the long-term asset management strategy and other organisational policies, strategies and stakeholder requirements are defined but the work is fairly well advanced but still incomplete.	All linkages are in place and evidence is available to demonstrate that, where appropriate, the organisation's asset management strategy is consistent with its other organisational policies and strategies. The organisation has also identified and considered the requirements of relevant stakeholders.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
11	Asset management strategy	In what way does the organisation's asset management strategy take account of the lifecycle of the assets, asset types and asset systems over which the organisation has stewardship?	The organisation has not considered the need to ensure that its asset management strategy is produced with due regard to the lifecycle of the assets, asset types or asset systems that it manages. OR The organisation does not have an asset management strategy.	The need is understood, and the organisation is drafting its asset management strategy to address the lifecycle of its assets, asset types and asset systems.	The long-term asset management strategy takes account of the lifecycle of some, but not all, of its assets, asset types and asset systems.	The asset management strategy takes account of the lifecycle of all of its assets, asset types and asset systems.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
26	Asset management plan(s)	How does the organisation establish and document its asset management plan(s) across the life cycle activities of its assets and asset systems?	The organisation does not have an identifiable asset management plan(s) covering asset systems and critical assets.	The organisation has asset management plan(s) but they are not aligned with the asset management strategy and objectives and do not take into consideration the full asset life cycle (including asset creation, acquisition, enhancement, utilisation, maintenance decommissioning and disposal).	The organisation is in the process of putting in place comprehensive, documented asset management plan(s) that cover all life cycle activities, clearly aligned to asset management objectives and the asset management strategy.	Asset management plan(s) are established, documented, implemented and maintained for asset systems and critical assets to achieve the asset management strategy and asset management objectives across all life cycle phases.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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AMP Planning Period	**1 October 2018 – 30 September 2028**
Asset Management Standard Applied	**PAS55000-Transitioning to ISO55000 Standard**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	Why	Who	Record/documented Information
27	Asset management plan(s)	How has the organisation communicated its plan(s) to all relevant parties to a level of detail appropriate to the receiver's role in their delivery?	3	The AMP is communicated to all relevant personnel through the First Gas website. Key stakeholders will be issued with a copy of the AMP for reference.	Plans will be ineffective unless they are communicated to all those, including contracted suppliers and those who undertake enabling function(s). The plan(s) need to be communicated in a way that is relevant to those who need to use them.	The management team with overall responsibility for the asset management system. Delivery functions and suppliers.	Distribution lists for plan(s). Documents derived from plan(s) which detail the receivers role in plan delivery. Evidence of communication.
29	Asset management plan(s)	How are designated responsibilities for delivery of asset plan actions documented?	3	First Gas AMP places responsibility for delivery of the AMP with the Chief Operating Officer. The Chief Operating Officer delegates the responsibility of the sections of the AMP through the organisation. These responsibilities and documented in First Gas position descriptions as appropriate.	The implementation of asset management plan(s) relies on (1) actions being clearly identified, (2) an owner allocated and (3) that owner having sufficient delegated responsibility and authority to carry out the work required. It also requires alignment of actions across the organisation. This question explores how well the plan(s) set out responsibility for delivery of asset plan actions.	The management team with overall responsibility for the asset management system. Operations, maintenance and engineering managers. If appropriate, the performance management team.	The organisation's asset management plan(s). Documentation defining roles and responsibilities of individuals and organisational departments.
31	Asset management plan(s)	What has the organisation done to ensure that appropriate arrangements are made available for the efficient and cost effective implementation of the plan(s)? (Note this is about resources and enabling support)	3	First Gas has arrangements in place to cover the requirements of the planning, delivery and execution of our works plan.	It is essential that the plan(s) are realistic and can be implemented, which requires appropriate resources to be available and enabling mechanisms in place. This question explores how well this is achieved. The plan(s) not only need to consider the resources directly required and timescales, but also the enabling activities, including for example, training requirements, supply chain capability and procurement timescales.	The management team with overall responsibility for the asset management system. Operations, maintenance and engineering managers. If appropriate, the performance management team. If appropriate, the performance management team. Where appropriate the procurement team and service providers working on the organisation's asset-related activities.	The organisation's asset management plan(s). Documented processes and procedures for the delivery of the asset management plan.
33	Contingency planning	What plan(s) and procedure(s) does the organisation have for identifying and responding to incidents and emergency situations and ensuring continuity of critical asset management activities?	3	First Gas has appropriate emergency plan(s) and procedure(s) in place to respond to incidents and to ensure continuity of critical asset management activities consistent with policies and asset management objectives. Training and external agency alignment is in place. EMP is tested in emergency exercises regularly. These include emergency service involvement.	Widely used AM practice standards require that an organisation has plan(s) to identify and respond to emergency situations. Emergency plan(s) should outline the actions to be taken to respond to specified emergency situations and ensure continuity of critical asset management activities including the communication to, and involvement of, external agencies. This question assesses if, and how well, these plan(s) triggered, implemented and resolved in the event of an incident. The plan(s) should be appropriate to the level of risk as determined by the organisation's risk assessment methodology. It is also a requirement that relevant personnel are competent and trained.	The manager with responsibility for developing emergency plan(s). The organisation's risk assessment team. People with designated duties within the plan(s) and procedure(s) for dealing with incidents and emergency situations.	The organisation's plan(s) and procedure(s) for dealing with emergencies. The organisation's risk assessments and risk registers.

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AMP Planning Period	**1 October 2018 – 30 September 2028**
Asset Management Standard Applied	**PAS55000-Transitioning to ISO55000 Standard**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
27	Asset management plan(s)	How has the organisation communicated its plan(s) to all relevant parties to a level of detail appropriate to the receiver's role in their delivery?	The organisation does not have plan(s) or their distribution is limited to the authors.	The plan(s) are communicated to some of those responsible for delivery of the plan(s). OR Communicated to those responsible for delivery is either irregular or ad-hoc.	The plan(s) are communicated to most of those responsible for delivery but there are weaknesses in identifying relevant parties resulting in incomplete or inappropriate communication. The organisation recognises improvement is needed as is working towards resolution.	The plan(s) are communicated to all relevant employees, stakeholders and contracted service providers to a level of detail appropriate to their participation or business interests in the delivery of the plan(s) and there is confirmation that they are being used effectively.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
29	Asset management plan(s)	How are designated responsibilities for delivery of asset plan actions documented?	The organisation has not documented responsibilities for delivery of asset plan actions.	Asset management plan(s) inconsistently document responsibilities for delivery of plan actions and activities and/or responsibilities and authorities for implementation inadequate and/or delegation level inadequate to ensure effective delivery and/or contain misalignments with organisational accountability.	Asset management plan(s) consistently document responsibilities for the delivery of actions but responsibility/authority levels are inappropriate/ inadequate, and/or there are misalignments within the organisation.	Asset management plan(s) consistently document responsibilities for the delivery actions and there is adequate detail to enable delivery of actions. Designated responsibility and authority for achievement of asset plan actions is appropriate.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
31	Asset management plan(s)	What has the organisation done to ensure that appropriate arrangements are made available for the efficient and cost effective implementation of the plan(s)? (Note this is about resources and enabling support)	The organisation has not considered the arrangements needed for the effective implementation of plan(s).	The organisation recognises the need to ensure appropriate arrangements are in place for implementation of asset management plan(s) and is in the process of determining an appropriate approach for achieving this.	The organisation has arrangements in place for the implementation of asset management plan(s) but the arrangements are not yet adequately efficient and/or effective. The organisation is working to resolve existing weaknesses.	The organisation's arrangements fully cover all the requirements for the efficient and cost effective implementation of asset management plan(s) and realistically address the resources and timescales required, and any changes needed to functional policies, standards, processes and the asset management information system.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
33	Contingency planning	What plan(s) and procedure(s) does the organisation have for identifying and responding to incidents and emergency situations and ensuring continuity of critical asset management activities?	The organisation has not considered the need to establish plan(s) and procedure(s) to identify and respond to incidents and emergency situations.	The organisation has some ad-hoc arrangements to deal with incidents and emergency situations, but these have been developed on a reactive basis in response to specific events that have occurred in the past.	Most credible incidents and emergency situations are identified. Either appropriate plan(s) and procedure(s) are incomplete for critical activities or they are inadequate. Training/ external alignment may be incomplete.	Appropriate emergency plan(s) and procedure(s) are in place to respond to credible incidents and manage continuity of critical asset management activities consistent with policies and asset management objectives. Training and external agency alignment is in place.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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AMP Planning Period	**1 October 2018 – 30 September 2028**
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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	Why	Who	Record/documented Information
37	Structure, authority and responsibilities	What has the organisation done to appoint member(s) of its management team to be responsible for ensuring that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s)?	3	First Gas has appointed a person who has responsibility for ensuring that the organization's assets deliver the requirements of the asset management strategy, objectives and plan(s). They have been given the necessary authority to achieve this.	In order to ensure that the organisation's assets and asset systems deliver the requirements of the asset management policy, strategy and objectives responsibilities need to be allocated to appropriate people who have the necessary authority to fulfil their responsibilities. (This question, relates to the organisation's assets eg, para b), s 4.4.1 of PAS 55, making it therefore distinct from the requirement contained in para a), s 4.4.1 of PAS 55).	Top management. People with management responsibility for the delivery of asset management policy, strategy, objectives and plan(s). People working on asset-related activities.	Evidence that managers with responsibility for the delivery of asset management policy, strategy, objectives and plan(s) have been appointed and have assumed their responsibilities. Evidence may include the organisation's documents relating to its asset management system, organisational charts, job descriptions of post-holders, annual targets/objectives and personal development plan(s) of post-holders as appropriate.
40	Structure, authority and responsibilities	What evidence can the organisation's top management provide to demonstrate that sufficient resources are available for asset management?	3	First Gas has a process for determining what resources are required for asset management activities and in most cases these are available but in some instances resources remain insufficient.	Optimal asset management requires top management to ensure sufficient resources are available. In this context the term 'resources' includes manpower, materials, funding and service provider support.	Top management. The management team that has overall responsibility for asset management. Risk management team. The organisation's managers involved in day-to-day supervision of asset-related activities, such as frontline managers, engineers, foremen and chargehands as appropriate.	Evidence demonstrating that asset management plan(s) and/or the process(es) for asset management plan implementation consider the provision of adequate resources in both the short and long term. Resources include funding, materials, equipment, services provided by third parties and personnel (internal and service providers) with appropriate skills competencies and knowledge.
42	Structure, authority and responsibilities	To what degree does the organisation's top management communicate the importance of meeting its asset management requirements?	3	First Gas communicates the importance of meeting its asset management requirements to all relevant parts of the organisation.	Widely used AM practice standards require an organisation to communicate the importance of meeting its asset management requirements such that personnel fully understand, take ownership of, and are fully engaged in the delivery of the asset management requirements (eg, PAS 55 s 4.4.1 g).	Top management. The management team that has overall responsibility for asset management. People involved in the delivery of the asset management requirements.	Evidence of such activities as road shows, written bulletins, workshops, team talks and management walk-abouts would assist an organisation to demonstrate it is meeting this requirement of PAS 55.
45	Outsourcing of asset management activities	Where the organisation has outsourced some of its asset management activities, how has it ensured that appropriate controls are in place to ensure the compliant delivery of its organisational strategic plan, and its asset management policy and strategy?	2	First Gas has controls in place for the engagement of third party suppliers/contractors that ensure the provision of services is in line with First Gas objectives.	Where an organisation chooses to outsource some of its asset management activities, the organisation must ensure that these outsourced process(es) are under appropriate control to ensure that all the requirements of widely used AM standards (eg, PAS 55) are in place, and the asset management policy, strategy objectives and plan(s) are delivered. This includes ensuring capabilities and resources across a time span aligned to life cycle management. The organisation must put arrangements in place to control the outsourced activities, whether it be to external providers or to other in-house departments. This question explores what the organisation does in this regard.	Top management. The management team that has overall responsibility for asset management. The manager(s) responsible for the monitoring and management of the outsourced activities. People involved with the procurement of outsourced activities. The people within the organisations that are performing the outsourced activities. The people impacted by the outsourced activity.	The organisation's arrangements that detail the compliance required of the outsourced activities. For example, this this could form part of a contract or service level agreement between the organisation and the suppliers of its outsourced activities. Evidence that the organisation has demonstrated to itself that it has assurance of compliance of outsourced activities.

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AMP Planning Period	**1 October 2018 – 30 September 2028**
Asset Management Standard Applied	**PAS55000-Transitioning to ISO55000 Standard**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
37	Structure, authority and responsibilities	What has the organisation done to appoint member(s) of its management team to be responsible for ensuring that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s)?	Top management has not considered the need to appoint a person or persons to ensure that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s).	Top management understands the need to appoint a person or persons to ensure that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s).	Top management has appointed an appropriate people to ensure the assets deliver the requirements of the asset management strategy, objectives and plan(s) but their areas of responsibility are not fully defined and/or they have insufficient delegated authority to fully execute their responsibilities.	The appointed person or persons have full responsibility for ensuring that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s). They have been given the necessary authority to achieve this.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
40	Structure, authority and responsibilities	What evidence can the organisation's top management provide to demonstrate that sufficient resources are available for asset management?	The organisation's top management has not considered the resources required to deliver asset management.	The organisations top management understands the need for sufficient resources but there are no effective mechanisms in place to ensure this is the case.	A process exists for determining what resources are required for its asset management activities and in most cases these are available but in some instances resources remain insufficient.	An effective process exists for determining the resources needed for asset management and sufficient resources are available. It can be demonstrated that resources are matched to asset management requirements.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
42	Structure, authority and responsibilities	To what degree does the organisation's top management communicate the importance of meeting its asset management requirements?	The organisation's top management has not considered the need to communicate the importance of meeting asset management requirements.	The organisations top management understands the need to communicate the importance of meeting its asset management requirements but does not do so.	Top management communicates the importance of meeting its asset management requirements but only to parts of the organisation.	Top management communicates the importance of meeting its asset management requirements to all relevant parts of the organisation.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
45	Outsourcing of asset management activities	Where the organisation has outsourced some of its asset management activities, how has it ensured that appropriate controls are in place to ensure the compliant delivery of its organisational strategic plan, and its asset management policy and strategy?	The organisation has not considered the need to put controls in place.	The organisation controls its outsourced activities on an ad-hoc basis, with little regard for ensuring for the compliant delivery of the organisational strategic plan and/or its asset management policy and strategy.	Controls systematically considered but currently only provide for the compliant delivery of some, but not all, aspects of the organisational strategic plan and/or its asset management policy and strategy. Gaps exist.	Evidence exists to demonstrate that outsourced activities are appropriately controlled to provide for the compliant delivery of the organisational strategic plan, asset management policy and strategy, and that these controls are integrated into the asset management system	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	Why	Who	Record/documented Information
48	Training, awareness and competence	How does the organisation develop plan(s) for the human resources required to undertake asset management activities - including the development and delivery of asset management strategy, process(es), objectives and plan(s)?	3	First Gas has training needs of personnel well developed and implemented. There are some known holes in training implementation, however these areas are being rectified.	There is a need for an organisation to demonstrate that it has considered what resources are required to develop and implement its asset management system. There is also a need for the organisation to demonstrate that it has assessed what development plan(s) are required to provide its human resources with the skills and competencies to develop and implement its asset management systems. The timescales over which the plan(s) are relevant should be commensurate with the planning horizons within the asset management strategy considers e.g. if the asset management strategy considers 5, 10 and 15 year time scales then the human resources development plan(s) should align with these. Resources include both 'in house' and external resources who undertake asset management activities.	Senior management responsible for agreement of plan(s). Managers responsible for developing asset management strategy and plan(s). Managers with responsibility for development and recruitment of staff (including HR functions). Staff responsible for training. Procurement officers. Contracted service providers.	Evidence of analysis of future work load plan(s) in terms of human resources. Document(s) containing analysis of the organisation's own direct resources and contractors resource capability over suitable timescales. Evidence, such as minutes of meetings, that suitable management forums are monitoring human resource development plan(s). Training plan(s), personal development plan(s), contract and service level agreements.
49	Training, awareness and competence	How does the organisation identify competency requirements and then plan, provide and record the training necessary to achieve the competencies?	2	First Gas aligns training requirements with established competencies in pipeline technical operation and maintenance. A training and development plan exists to ensure that pipeline personnel involved with the operation and maintenance of the asset are appropriately trained. These have been developed in accordance with the requirements of AS2885 and audited by Lloyd's Register as part of the Certificate of Fitness. Training of personnel is incomplete and a plan is in place to update competencies.	Widely used AM standards require that organisations to undertake a systematic identification of the asset management awareness and competencies required at each level and function within the organisation. Once identified the training required to provide the necessary competencies should be planned for delivery in a timely and systematic way. Any training provided must be recorded and maintained in a suitable format. Where an organisation has contracted service providers in place then it should have a means to demonstrate that this requirement is being met for their employees. (eg, PAS 55 refers to frameworks suitable for identifying competency requirements).	Senior management responsible for agreement of plan(s). Managers responsible for developing asset management strategy and plan(s). Managers with responsibility for development and recruitment of staff (including HR functions). Staff responsible for training. Procurement officers. Contracted service providers.	Evidence of an established and applied competency requirements assessment process and plan(s) in place to deliver the required training. Evidence that the training programme is part of a wider, co-ordinated asset management activities training and competency programme. Evidence that training activities are recorded and that records are readily available (for both direct and contracted service provider staff) e.g. via organisation wide information system or local records database.
50	Training, awareness and competence	How does the organization ensure that persons under its direct control undertaking asset management related activities have an appropriate level of competence in terms of education, training or experience?	3	First Gas aligns training requirements with established competencies in pipeline technical operation and maintenance. A training and development plan exists to ensure that pipeline personnel involved with the operation and maintenance of the asset are appropriately trained. The validation of competency forms part of the Pipeline Certificate of Fitness provided by Lloyds Register.	A critical success factor for the effective development and implementation of an asset management system is the competence of persons undertaking these activities. organisations should have effective means in place for ensuring the competence of employees to carry out their designated asset management function(s). Where an organisation has contracted service providers undertaking elements of its asset management system then the organisation shall assure itself that the outsourced service provider also has suitable arrangements in place to manage the competencies of its employees. The organisation should ensure that the individual and corporate competencies it requires are in place and actively monitor, develop and maintain an appropriate balance of these competencies.	Managers, supervisors, persons responsible for developing training programmes. Staff responsible for procurement and service agreements. HR staff and those responsible for recruitment.	Evidence of a competency assessment framework that aligns with established frameworks such as the asset management Competencies Requirements Framework (Version 2.0); National Occupational Standards for Management and Leadership; UK Standard for Professional Engineering Competence, Engineering Council, 2005.
53	Communication, participation and consultation	How does the organisation ensure that pertinent asset management information is effectively communicated to and from employees and other stakeholders, including contracted service providers?	3	Two way communication is in place between all relevant parties, ensuring that information is effectively communicated to match the requirements of asset management strategy, plan(s) and process(es). Pertinent asset information requirements are regularly reviewed.	Widely used AM practice standards require that pertinent asset management information is effectively communicated to and from employees and other stakeholders including contracted service providers. Pertinent information refers to information required in order to effectively and efficiently comply with and deliver asset management strategy, plan(s) and objectives. This will include for example the communication of the asset management policy, asset performance information, and planning information as appropriate to contractors.	Top management and senior management representative(s), employee's representative(s), employee's trade union representative(s); contracted service provider management and employee representative(s); representative(s) from the organisation's Health, Safety and Environmental team. Key stakeholder representative(s).	Asset management policy statement prominently displayed on notice boards, intranet and internet; use of organisation's website for displaying asset performance data; evidence of formal briefings to employees, stakeholders and contracted service providers; evidence of inclusion of asset management issues in team meetings and contracted service provider contract meetings; newsletters, etc.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
48	Training, awareness and competence	How does the organisation develop plan(s) for the human resources required to undertake asset management activities - including the development and delivery of asset management strategy, process(es), objectives and plan(s)?	The organisation has not recognised the need for assessing human resources requirements to develop and implement its asset management system.	The organisation has recognised the need to assess its human resources requirements and to develop a plan(s). There is limited recognition of the need to align these with the development and implementation of its asset management system.	The organisation has developed a strategic approach to aligning competencies and human resources to the asset management system including the asset management plan but the work is incomplete or has not been consistently implemented.	The organisation can demonstrate that plan(s) are in place and effective in matching competencies and capabilities to the asset management system including the plan for both internal and contracted activities. Plans are reviewed integral to asset management system process(es).	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
49	Training, awareness and competence	How does the organisation identify competency requirements and then plan, provide and record the training necessary to achieve the competencies?	The organisation does not have any means in place to identify competency requirements.	The organisation has recognised the need to identify competency requirements and then plan, provide and record the training necessary to achieve the competencies.	The organisation is the process of identifying competency requirements aligned to the asset management plan(s) and then plan, provide and record appropriate training. It is incomplete or inconsistently applied.	Competency requirements are in place and aligned with asset management plan(s). Plans are in place and effective in providing the training necessary to achieve the competencies. A structured means of recording the competencies achieved is in place.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
50	Training, awareness and competence	How does the organization ensure that persons under its direct control undertaking asset management related activities have an appropriate level of competence in terms of education, training or experience?	The organization has not recognised the need to assess the competence of person(s) undertaking asset management related activities.	Competency of staff undertaking asset management related activities is not managed or assessed in a structured way, other than formal requirements for legal compliance and safety management.	The organization is in the process of putting in place a means for assessing the competence of person(s) involved in asset management activities including contractors. There are gaps and inconsistencies.	Competency requirements are identified and assessed for all persons carrying out asset management related activities - internal and contracted. Requirements are reviewed and staff reassessed at appropriate intervals aligned to asset management requirements.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
53	Communication, participation and consultation	How does the organisation ensure that pertinent asset management information is effectively communicated to and from employees and other stakeholders, including contracted service providers?	The organisation has not recognised the need to formally communicate any asset management information.	There is evidence that the pertinent asset management information to be shared along with those to share it with is being determined.	The organisation has determined pertinent information and relevant parties. Some effective two way communication is in place but as yet not all relevant parties are clear on their roles and responsibilities with respect to asset management information.	Two way communication is in place between all relevant parties, ensuring that information is effectively communicated to match the requirements of asset management strategy, plan(s) and process(es). Pertinent asset information requirements are regularly reviewed.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	Why	Who	Record/documented Information
59	Asset Management System documentation	What documentation has the organisation established to describe the main elements of its asset management system and interactions between them?	2	The First Gas AMP describes the main elements of the asset management system. This covers the main elements.	Widely used AM practice standards require an organisation maintain up to date documentation that ensures that its asset management systems (ie, the systems the organisation has in place to meet the standards) can be understood, communicated and operated. (eg, s 4.5 of PAS 55 requires the maintenance of up to date documentation of the asset management system requirements specified throughout s 4 of PAS 55).	The management team that has overall responsibility for asset management. Managers engaged in asset management activities.	The documented information describing the main elements of the asset management system (process(es)) and their interaction.
62	Information management	What has the organisation done to determine what its asset management information system(s) should contain in order to support its asset management system?	3	First Gas use Maximo, Qmap, NRams and Meridian as Asset Management Information systems. These systems contain data to support the whole asset lifecycle. This includes information originating from both internal and external sources.	Effective asset management requires appropriate information to be available. Widely used AM standards therefore require the organisation to identify the asset management information it requires in order to support its asset management system. Some of the information required may be held by suppliers. The maintenance and development of asset management information systems is a poorly understood specialist activity that is akin to IT management but different from IT management. This group of questions provides some indications as to whether the capability is available and applied. Note: To be effective, an asset information management system requires the mobilisation of technology, people and process(es) that create, secure, make available and destroy the information required to support the asset management system.	The organisation's strategic planning team. The management team that has overall responsibility for asset management. Information management team. Operations, maintenance and engineering managers	Details of the process the organisation has employed to determine what its asset information system should contain in order to support its asset management system. Evidence that this has been effectively implemented.
63	Information management	How does the organisation maintain its asset management information system(s) and ensure that the data held within it (them) is of the requisite quality and accuracy and is consistent?	2	First Gas has developed controls that will ensure the data held is of the requisite quality and accuracy. Audits are undertaken. First Gas uses a number of interrelated systems to retain asset information. Maximo - maintenance and event management, Qmap for procedures, NRAMs for non routine asset planning and Meridian for asset information. Controls are in place and being further developed to ensure the accuracy of the data is consistent and maintained.	The response to the questions is progressive. A higher scale cannot be awarded without achieving the requirements of the lower scale. This question explores how the organisation ensures that information management meets widely used AM practice requirements (eg, s 4.4.6 (a), (c) and (d) of PAS 55).	The management team that has overall responsibility for asset management. Users of the organisational information systems.	The asset management information system, together with the policies, procedure(s), improvement initiatives and audits regarding information controls.
64	Information management	How has the organisation's ensured its asset management information system is relevant to its needs?	2	First Gas has recently upgraded its information management system. Prior to this, First Gas investigated the products in the market place and consulted other asset owners to assess the capabilities of these systems against the need of the business. The systems were implemented 'out of the box' and now an assessment of the further needs of the business is being established to close gaps as these are identified.	Widely used AM standards need not be prescriptive about the form of the asset management information system, but simply require that the asset management information system is appropriate to the organisations needs, can be effectively used and can supply information which is consistent and of the requisite quality and accuracy.	The organisation's strategic planning team. The management team that has overall responsibility for asset management. Information management team. Users of the organisational information systems.	The documented process the organisation employs to ensure its asset management information system aligns with its asset management requirements. Minutes of information systems review meetings involving users.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
59	Asset Management System documentation	What documentation has the organisation established to describe the main elements of its asset management system and interactions between them?	The organisation has not established documentation that describes the main elements of the asset management system.	The organisation is aware of the need to put documentation in place and is in the process of determining how to document the main elements of its asset management system.	The organisation in the process of documenting its asset management system and has documentation in place that describes some, but not all, of the main elements of its asset management system and their interaction.	The organisation has established documentation that comprehensively describes all the main elements of its asset management system and the interactions between them. The documentation is kept up to date.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
62	Information management	What has the organisation done to determine what its asset management information system(s) should contain in order to support its asset management system?	The organisation has not considered what asset management information is required.	The organisation is aware of the need to determine in a structured manner what its asset information system should contain in order to support its asset management system and is in the process of deciding how to do this.	The organisation has developed a structured process to determine what its asset information system should contain in order to support its asset management system and has commenced implementation of the process.	The organisation has determined what its asset information system should contain in order to support its asset management system. The requirements relate to the whole life cycle and cover information originating from both internal and external sources.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
63	Information management	How does the organisation maintain its asset management information system(s) and ensure that the data held within it (them) is of the requisite quality and accuracy and is consistent?	There are no formal controls in place or controls are extremely limited in scope and/or effectiveness.	The organisation is aware of the need for effective controls and is in the process of developing an appropriate control process(es).	The organisation has developed a controls that will ensure the data held is of the requisite quality and accuracy and is consistent and is in the process of implementing them.	The organisation has effective controls in place that ensure the data held is of the requisite quality and accuracy and is consistent. The controls are regularly reviewed and improved where necessary.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
64	Information management	How has the organisation's ensured its asset management information system is relevant to its needs?	The organisation has not considered the need to determine the relevance of its management information system. At present there are major gaps between what the information system provides and the organisations needs.	The organisation understands the need to ensure its asset management information system is relevant to its needs and is determining an appropriate means by which it will achieve this. At present there are significant gaps between what the information system provides and the organisations needs.	The organisation has developed and is implementing a process to ensure its asset management information system is relevant to its needs. Gaps between what the information system provides and the organisations needs have been identified and action is being taken to close them.	The organisation's asset management information system aligns with its asset management requirements. Users can confirm that it is relevant to their needs.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	Why	Who	Record/documented Information
69	Risk management process(es)	How has the organisation documented process(es) and/or procedure(s) for the identification and assessment of asset and asset management related risks throughout the asset life cycle?	3	First gas has a risk management procedure that is implemented across the business. As a requirement of AS2885 and the Certificate of Fitness, the assets are risk assessed on a five yearly basis through formal Safety Management Studies. New assets and modifications to assets are assessed for operational risk through a formalised HAZOP process. All risk assessments are documented and actions included in the asset information systems.	Risk management is an important foundation for proactive asset management. Its overall purpose is to understand the cause, effect and likelihood of adverse events occurring, to optimally manage such risks to an acceptable level, and to provide an audit trail for the management of risks. Widely used standards require the organisation to have process(es) and/or procedure(s) in place that set out how the organisation identifies and assesses asset and asset management related risks. The risks have to be considered across the four phases of the asset lifecycle (eg, para 4.3.3 of PAS 55).	The top management team in conjunction with the organisation's senior risk management representatives. There may also be input from the organisation's Safety, Health and Environment team. Staff who carry out risk identification and assessment.	The organisation's risk management framework and/or evidence of specific process(es) and/ or procedure(s) that deal with risk control mechanisms. Evidence that the process(es) and/or procedure(s) are implemented across the business and maintained. Evidence of agendas and minutes from risk management meetings. Evidence of feedback in to process(es) and/or procedure(s) as a result of incident investigation(s). Risk registers and assessments.
79	Use and maintenance of asset risk information	How does the organisation ensure that the results of risk assessments provide input into the identification of adequate resources and training and competency needs?	3	Where risk assessments identify actions, these are incorporated into the asset information system with an action owner and timeframe for close out. This is monitored by management and audited to ensure proper close out. Where resource or training needs are identified, the appropriate actions are raised and actioned within a designated timeframe.	Widely used AM standards require that the output from risk assessments are considered and that adequate resource (including staff) and training is identified to match the requirements. It is a further requirement that the effects of the control measures are considered, as there may be implications in resources and training required to achieve other objectives.	Staff responsible for risk assessment and those responsible for developing and approving resource and training plan(s). There may also be input from the organisation's Safety, Health and Environment team.	The organisations risk management framework. The organisation's resourcing plan(s) and training and competency plan(s). The organisation should be able to demonstrate appropriate linkages between the content of resource plan(s) and training and competency plan(s) to the risk assessments and risk control measures that have been developed.
82	Legal and other requirements	What procedure does the organisation have to identify and provide access to its legal, regulatory, statutory and other asset management requirements, and how is requirements incorporated into the asset management system?	3	First Gas works closely with the Pipeline Certifier, Commerce Commission and industry bodies to maintain an awareness of changes in legislation. The General Manager Regulartory and Commerical is responsible for ensuring changes are incorporated into the business.	In order for an organisation to comply with its legal, regulatory, statutory and other asset management requirements, the organisation first needs to ensure that it knows what they are (eg, PAS 55 specifies this in s 4.4.8). It is necessary to have systematic and auditable mechanisms in place to identify new and changing requirements. Widely used AM standards also require that requirements are incorporated into the asset management system (e.g. procedure(s) and process(es))	Top management. The organisations regulatory team. The organisation's legal team or advisors. The management team with overall responsibility for the asset management system. The organisation's health and safety team or advisors. The organisation's policy making team.	The organisational processes and procedures for ensuring information of this type is identified, made accessible to those requiring the information and is incorporated into asset management strategy and objectives
88	Life Cycle Activities	How does the organisation establish implement and maintain process(es) for the implementation of its asset management plan(s) and control of activities across the creation, acquisition or enhancement of assets. This includes design, modification, procurement, construction and commissioning activities?	2	First Gas is currently reviewing it's processes and procedures for the design, construction, maintenance and operation and modification of the assets across their lifecycle.	Life cycle activities are about the implementation of asset management plan(s) i.e. they are the "doing" phase. They need to be done effectively and well in order for asset management to have any practical meaning. As a consequence, widely used standards (eg, PAS 55 s 4.5.1) require organisations to have in place appropriate process(es) and procedure(s) for the implementation of asset management plan(s) and control of lifecycle activities. This question explores those aspects relevant to asset creation.	Asset managers, design staff, construction staff and project managers from other impacted areas of the business, e.g. Procurement	Documented process(es) and procedure(s) which are relevant to demonstrating the effective management and control of life cycle activities during asset creation, acquisition, enhancement including design, modification, procurement, construction and commissioning.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
69	Risk management process(es)	How has the organisation documented process(es) and/or procedure(s) for the identification and assessment of asset and asset management related risks throughout the asset life cycle?	The organisation has not considered the need to document process(es) and/or procedure(s) for the identification and assessment of asset and asset management related risks throughout the asset life cycle.	The organisation is aware of the need to document the management of asset related risk across the asset lifecycle. The organisation has plan(s) to formally document all relevant process(es) and procedure(s) or has already commenced this activity.	The organisation is in the process of documenting the identification and assessment of asset related risk across the asset lifecycle but it is incomplete or there are inconsistencies between approaches and a lack of integration.	Identification and assessment of asset related risk across the asset lifecycle is fully documented. The organisation can demonstrate that appropriate documented mechanisms are integrated across life cycle phases and are being consistently applied.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
79	Use and maintenance of asset risk information	How does the organisation ensure that the results of risk assessments provide input into the identification of adequate resources and training and competency needs?	The organisation has not considered the need to conduct risk assessments.	The organisation is aware of the need to consider the results of risk assessments and effects of risk control measures to provide input into reviews of resources, training and competency needs. Current input is typically ad-hoc and reactive.	The organisation is in the process ensuring that outputs of risk assessment are included in developing requirements for resources and training. The implementation is incomplete and there are gaps and inconsistencies.	Outputs from risk assessments are consistently and systematically used as inputs to develop resources, training and competency requirements. Examples and evidence is available.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
82	Legal and other requirements	What procedure does the organisation have to identify and provide access to its legal, regulatory, statutory and other asset management requirements, and how is requirements incorporated into the asset management system?	The organisation has not considered the need to identify its legal, regulatory, statutory and other asset management requirements.	The organisation identifies some its legal, regulatory, statutory and other asset management requirements, but this is done in an ad-hoc manner in the absence of a procedure.	The organisation has procedure(s) to identify its legal, regulatory, statutory and other asset management requirements, but the information is not kept up to date, inadequate or inconsistently managed.	Evidence exists to demonstrate that the organisation's legal, regulatory, statutory and other asset management requirements are identified and kept up to date. Systematic mechanisms for identifying relevant legal and statutory requirements.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
88	Life Cycle Activities	How does the organisation establish implement and maintain process(es) for the implementation of its asset management plan(s) and control of activities across the creation, acquisition or enhancement of assets. This includes design, modification, procurement, construction and commissioning activities?	The organisation does not have process(es) in place to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning.	The organisation is aware of the need to have process(es) and procedure(s) in place to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning but currently do not have these in place (note: procedure(s) may exist but they are inconsistent/incomplete).	The organisation is in the process of putting in place process(es) and procedure(s) to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning. Gaps and inconsistencies are being addressed.	Effective process(es) and procedure(s) are in place to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	Why	Who	Record/documented Information
91	Life Cycle Activities	How does the organisation ensure that process(es) and/or procedure(s) for the implementation of asset management plan(s) and control of activities during maintenance (and inspection) of assets are sufficient to ensure activities are carried out under specified conditions, are consistent with asset management strategy and control cost, risk and performance?	3	First Gas has documented review processes in place for all critical documentation. The review process includes the auditing of the documents and processes by an internal auditor to ensure that the processes work. Action derived from these audits are incorporated into the asset information system for completion by a document owner.	Having documented process(es) which ensure the asset management plan(s) are implemented in accordance with any specified conditions, in a manner consistent with the asset management policy, strategy and objectives and in such a way that cost, risk and asset system performance are appropriately controlled is critical. They are an essential part of turning intention into action (eg, as required by PAS 55 s 4.5.1).	Asset managers, operations managers, maintenance managers and project managers from other impacted areas of the business	Documented procedure for review. Documented procedure for audit of process delivery. Records of previous audits, improvement actions and documented confirmation that actions have been carried out.
95	Performance and condition monitoring	How does the organisation measure the performance and condition of its assets?	2	First Gas has set performance indicators to monitor and measure the performance of the asset management system. These indicators are described and reported in the asset management plan on an annual basis and monitored by First Gas management monthly. These are currently being reviewed following the transition to First Gas.	Widely used AM standards require that organisations establish implement and maintain procedure(s) to monitor and measure the performance and/or condition of assets and asset systems. They further set out requirements in some detail for reactive and proactive monitoring, and leading/lagging performance indicators together with the monitoring or results to provide input to corrective actions and continual improvement. There is an expectation that performance and condition monitoring will provide input to improving asset management strategy, objectives and plan(s).	A broad cross-section of the people involved in the organisation's asset-related activities from data input to decision-makers, i.e. an end-to end assessment. This should include contactors and other relevant third parties as appropriate.	Functional policy and/or strategy documents for performance or condition monitoring and measurement. The organisation's performance monitoring frameworks, balanced scorecards etc. Evidence of the reviews of any appropriate performance indicators and the action lists resulting from these reviews. Reports and trend analysis using performance and condition information. Evidence of the use of performance and condition information shaping improvements and supporting asset management strategy, objectives and plan(s).
99	Investigation of asset-related failures, incidents and nonconformities	How does the organisation ensure responsibility and the authority for the handling, investigation and mitigation of asset-related failures, incidents and emergency situations and non conformances is clear, unambiguous, understood and communicated?	3	First Gas has fully developed processes for handling and investigating asset related failures, incident and emergency situations. This is documented in the position descriptions for those leading these processes. Mitigation strategies developed from investigations are assigned to owners and included in the asset information system for action. These processes have been audited during the Certificate of Fitness Audit.	Widely used AM standards require that the organisation establishes implements and maintains process(es) for the handling and investigation of failures incidents and non-conformities for assets and sets down a number of expectations. Specifically this question examines the requirement to define clearly responsibilities and authorities for these activities, and communicate these unambiguously to relevant people including external stakeholders if appropriate.	The organisation's safety and environment management team. The team with overall responsibility for the management of the assets. People who have appointed roles within the asset-related investigation procedure, from those who carry out the investigations to senior management who review the recommendations. Operational controllers responsible for managing the asset base under fault conditions and maintaining services to consumers. Contractors and other third parties as appropriate.	Process(es) and procedure(s) for the handling, investigation and mitigation of asset-related failures, incidents and emergency situations and non conformances. Documentation of assigned responsibilities and authority to employees. Job Descriptions, Audit reports. Common communication systems i.e. all Job Descriptions on Internet etc.
105	Audit	What has the organisation done to establish procedure(s) for the audit of its asset management system (process(es))?	3	First Gas is required to undertake an external audit of the Asset Management System every five years to maintain a Certificate of Fitness of the transmission system. This is performed and documented by Lloyd's Register. First Gas employs an internal auditor for the sole purpose of ensure internal processes associated with the asset management system are met and any deficiencies identified and remediated.	This question seeks to explore what the organisation has done to comply with the standard practice AM audit requirements (eg, the associated requirements of PAS 55 s 4.6.4 and its linkages to s 4.7).	The management team responsible for its asset management procedure(s). The team with overall responsibility for the management of the assets. Audit teams, together with key staff responsible for asset management. For example, Asset Management Director, Engineering Director. People with responsibility for carrying out risk assessments	The organisation's asset-related audit procedure(s). The organisation's methodology(s) by which it determined the scope and frequency of the audits and the criteria by which it identified the appropriate audit personnel. Audit schedules, reports etc. Evidence of the procedure(s) by which the audit results are presented, together with any subsequent communications. The risk assessment schedule or risk registers.

Company Name	**First Gas Limited**
AMP Planning Period	**1 October 2018 – 30 September 2028**
Asset Management Standard Applied	**PAS55000-Transitioning to ISO55000 Standard**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
91	Life Cycle Activities	How does the organisation ensure that process(es) and/or procedure(s) for the implementation of asset management plan(s) and control of activities during maintenance (and inspection) of assets are sufficient to ensure activities are carried out under specified conditions, are consistent with asset management strategy and control cost, risk and performance?	The organisation does not have process(es)/procedure(s) in place to control or manage the implementation of asset management plan(s) during this life cycle phase.	The organisation is aware of the need to have process(es) and procedure(s) in place to manage and control the implementation of asset management plan(s) during this life cycle phase but currently do not have these in place and/or there is no mechanism for confirming they are effective and where needed modifying them.	The organisation is in the process of putting in place process(es) and procedure(s) to manage and control the implementation of asset management plan(s) during this life cycle phase. They include a process for confirming the process(es)/procedure(s) are effective and if necessary carrying out modifications.	The organisation has in place process(es) and procedure(s) to manage and control the implementation of asset management plan(s) during this life cycle phase. They include a process, which is itself regularly reviewed to ensure it is effective, for confirming the process(es)/ procedure(s) are effective and if necessary carrying out modifications.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
95	Performance and condition monitoring	How does the organisation measure the performance and condition of its assets?	The organisation has not considered how to monitor the performance and condition of its assets.	The organisation recognises the need for monitoring asset performance but has not developed a coherent approach. Measures are incomplete, predominantly reactive and lagging. There is no linkage to asset management objectives.	The organisation is developing coherent asset performance monitoring linked to asset management objectives. Reactive and proactive measures are in place. Use is being made of leading indicators and analysis. Gaps and inconsistencies remain.	Consistent asset performance monitoring linked to asset management objectives is in place and universally used including reactive and proactive measures. Data quality management and review process are appropriate. Evidence of leading indicators and analysis.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
99	Investigation of asset-related failures, incidents and nonconformities	How does the organisation ensure responsibility and the authority for the handling, investigation and mitigation of asset-related failures, incidents and emergency situations and non conformances is clear, unambiguous, understood and communicated?	The organisation has not considered the need to define the appropriate responsibilities and the authorities.	The organisation understands the requirements and is in the process of determining how to define them.	The organisation are in the process of defining the responsibilities and authorities with evidence. Alternatively there are some gaps or inconsistencies in the identified responsibilities/authorities.	The organisation have defined the appropriate responsibilities and authorities and evidence is available to show that these are applied across the business and kept up to date.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
105	Audit	What has the organisation done to establish procedure(s) for the audit of its asset management system (process(es))?	The organisation has not recognised the need to establish procedure(s) for the audit of its asset management system.	The organisation understands the need for audit procedure(s) and is determining the appropriate scope, frequency and methodology(s).	The organisation is establishing its audit procedure(s) but they do not yet cover all the appropriate asset-related activities.	The organisation can demonstrate that its audit procedure(s) cover all the appropriate asset-related activities and the associated reporting of audit results. Audits are to an appropriate level of detail and consistently managed.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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AMP Planning Period	**1 October 2018 – 30 September 2028**
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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	Why	Who	Record/documented Information
109	Corrective & Preventative action	How does the organisation instigate appropriate corrective and/or preventive actions to eliminate or prevent the causes of identified poor performance and non conformance?	3	Where poor performance or an non conformance is identified, an investigator is assigned to perform an investigation of the issue. The aim of the investigation is to determine the root cause and develop actions to remediate the poor performance. The issue is assigned an owner who is responsible to ensure the actions are implemented. An audit is carried out on completed investigations by the internal auditor to ensure that the actions have been adequately closed out.	Having investigated asset related failures, incidents and non-conformances, and taken action to mitigate their consequences, an organisation is required to implement preventative and corrective actions to address root causes. Incident and failure investigations are only useful if appropriate actions are taken as a result to assess changes to a businesses risk profile and ensure that appropriate arrangements are in place should a recurrence of the incident happen. Widely used AM standards also require that necessary changes arising from preventive or corrective action are made to the asset management system.	The management team responsible for its asset management procedure(s). The team with overall responsibility for the management of the assets. Audit and incident investigation teams. Staff responsible for planning and managing corrective and preventive actions.	Analysis records, meeting notes and minutes, modification records. Asset management plan(s), investigation reports, audit reports, improvement programmes and projects. Recorded changes to asset management procedure(s) and process(es). Condition and performance reviews. Maintenance reviews
113	Continual Improvement	How does the organisation achieve continual improvement in the optimal combination of costs, asset related risks and the performance and condition of assets and asset systems across the whole life cycle?	2	Continuous improvement is applied across most of the asset lifecycle. Some systems are in place to improve the condition, reliability and performance of the assets based on asset condition, commercial drivers and perceived risk to security and reliability. Capital and Operational budget allocations for renewal are assigned and approved by management.	Widely used AM standards have requirements to establish, implement and maintain process(es)/procedure(s) for identifying, assessing, prioritising and implementing actions to achieve continual improvement. Specifically there is a requirement to demonstrate continual improvement in optimisation of cost risk and performance/condition of assets across the life cycle. This question explores an organisation's capabilities in this area—looking for systematic improvement mechanisms rather that reviews and audit (which are separately examined).	The top management of the organisation. The manager/team responsible for managing the organisation's asset management system, including its continual improvement. Managers responsible for policy development and implementation.	Records showing systematic exploration of improvement. Evidence of new techniques being explored and implemented. Changes in procedure(s) and process(es) reflecting improved use of optimisation tools/techniques and available information. Evidence of working parties and research.
115	Continual Improvement	How does the organisation seek and acquire knowledge about new asset management related technology and practices, and evaluate their potential benefit to the organisation?	3	First Gas actively promotes engagement with stakeholders and industry groups to share information on technology practices. Where improvements are identifed they are reviewed at a concept level and if they provide a benefit they are implemented as appropriate. First Gas is a member of APGA Pipeline Operators Group and Energy Pipelines CRC.	One important aspect of continual improvement is where an organisation looks beyond its existing boundaries and knowledge base to look at what 'new things are on the market'. These new things can include equipment, process(es), tools, etc. An organisation which does this (eg, by the PAS 55 s 4.6 standards) will be able to demonstrate that it continually seeks to expand its knowledge of all things affecting its asset management approach and capabilities. The organisation will be able to demonstrate that it identifies any such opportunities to improve, evaluates them for suitability to its own organisation and implements them as appropriate. This question explores an organisation's approach to this activity.	The top management of the organisation. The manager/team responsible for managing the organisation's asset management system, including its continual improvement. People who monitor the various items that require monitoring for 'change'. People that implement changes to the organisation's policy, strategy, etc. People within an organisation with responsibility for investigating, evaluating, recommending and implementing new tools and techniques, etc.	Research and development projects and records, benchmarking and participation knowledge exchange professional forums. Evidence of correspondence relating to knowledge acquisition. Examples of change implementation and evaluation of new tools, and techniques linked to asset management strategy and objectives.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
109	Corrective & Preventative action	How does the organisation instigate appropriate corrective and/or preventive actions to eliminate or prevent the causes of identified poor performance and non conformance?	The organisation does not recognise the need to have systematic approaches to instigating corrective or preventive actions.	The organisation recognises the need to have systematic approaches to instigating corrective or preventive actions. There is ad-hoc implementation for corrective actions to address failures of assets but not the asset management system.	The need is recognized for systematic instigation of preventive and corrective actions to address root causes of non compliance or incidents identified by investigations, compliance evaluation or audit. It is only partially or inconsistently in place.	Mechanisms are consistently in place and effective for the systematic instigation of preventive and corrective actions to address root causes of non compliance or incidents identified by investigations, compliance evaluation or audit.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
113	Continual Improvement	How does the organisation achieve continual improvement in the optimal combination of costs, asset related risks and the performance and condition of assets and asset systems across the whole life cycle?	The organisation does not consider continual improvement of these factors to be a requirement, or has not considered the issue.	A Continual Improvement ethos is recognised as beneficial, however it has just been started, and or covers partially the asset drivers.	Continuous improvement process(es) are set out and include consideration of cost risk, performance and condition for assets managed across the whole life cycle but it is not yet being systematically applied.	There is evidence to show that continuous improvement process(es) which include consideration of cost risk, performance and condition for assets managed across the whole life cycle are being systematically applied.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
115	Continual Improvement	How does the organisation seek and acquire knowledge about new asset management related technology and practices, and evaluate their potential benefit to the organisation?	The organisation makes no attempt to seek knowledge about new asset management related technology or practices.	The organisation is inward looking, however it recognises that asset management is not sector specific and other sectors have developed good practice and new ideas that could apply. Ad-hoc approach.	The organisation has initiated asset management communication within sector to share and, or identify 'new' to sector asset management practices and seeks to evaluate them.	The organisation actively engages internally and externally with other asset management practitioners, professional bodies and relevant conferences. Actively investigates and evaluates new practices and evolves its asset management activities using appropriate developments.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

B.7: Schedule 14a – Commentary on Escalation

We explain our approach to forecast escalation in Appendix J of the AMP. This provides an explanation for differences between nominal and constant price capital expenditure forecasts (Schedule 11a) and operational expenditure (Schedule 11b).

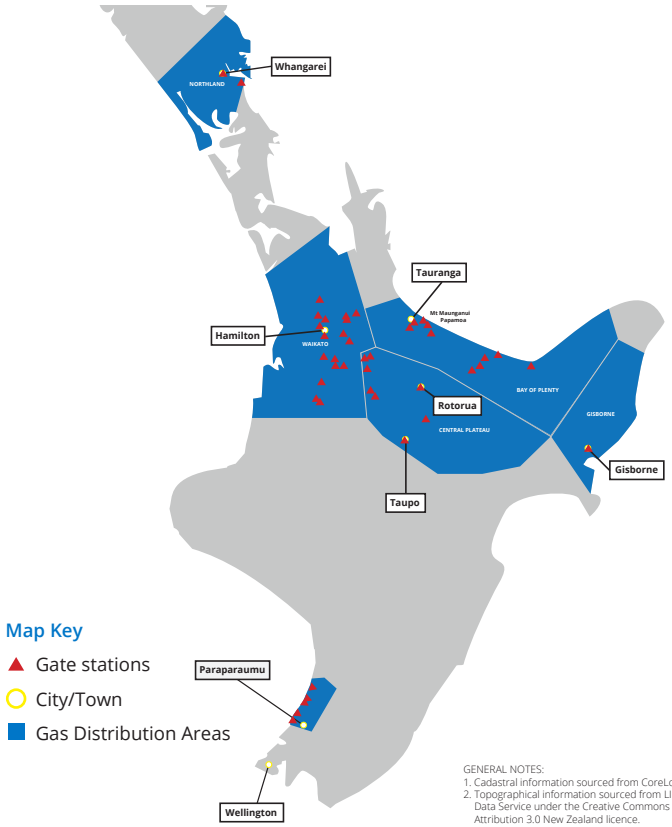
APPENDIX C: NETWORK OVERVIEW

This chapter provides an overview of our gas distribution network, including its load characteristics and configuration. It includes descriptions of its main asset types.

C.1 OUR GAS DISTRIBUTION AREAS

Figure 14 below shows the areas of the North Island where our gas distribution assets are located.

Figure 14: Our Gas Distribution Areas



C.1.1 Network Overview

Our network provides gas distribution services to retailers who sell gas to over 60,000 residential, commercial and industrial customers throughout the North Island. We are the third largest gas distributor in New Zealand and supply one in five of the country's gas customers.

Our distribution network covers the regions of Northland, Waikato, Central Plateau, Bay of Plenty, Gisborne and Kapiti. Each of these regions has their own unique capacity and demand requirements and are connected to the gas transmission system through the First Gas transmission network.[1]

Some key characteristics of these regions and their consumers are:

- **Northland:** predominantly services Whangarei residential consumers, with around 16% commercial/industrial consumers (e g. hospitals, bakeries). One major industrial consumer is located at Marsden Point.
- **Waikato:** majority of the Waikato network services the residential population within Hamilton, servicing approximately 27,000 consumers. Also, within the region are several large commercial/industrial consumers, including dairies and poultry farms, along with several smaller residential settlements.
- **Central Plateau:** predominantly services consumers in Rotorua with 4,000 connection points (ICP), Taupo (2,000 ICP) and Tokoroa (1,000 ICP). The network also services multiple rural centres and multiple medium to large industrial consumers.
- **Bay of Plenty:** predominantly serves residential customers in the Tauranga (4,500 ICP) and Mt Maunganui (4,300 ICP) areas along with other smaller centres and medium to large industrial users. Mt Maunganui has been identified as a potential growth area with major industrial, commercial and urban development expected in the area.
- **Gisborne:** serving the greater Gisborne area, connecting 3,400 consumers. Approximately 10% of these are commercial/industrial gas users.
- **Kapiti:** services approximately 5,300 consumers in the Paraparaumu and Waikanae regions as well as multiple smaller centres further north along the coast.

1. Our transmission assets are separately disclosed in our Gas Transmission AMP.

C.2. KEY STATISTICS

Table 3 below sets out key statistics for our gas distribution network (as at 30 June 2018).

Table 3: Key statistics for the distribution network

STATISTIC	VALUE
Consumers connected	62,991
System length (km)	4,673
Consumer density (consumer/km)	13.5
District regulating stations (DRS)	126
DRS density (system km/DRS)	37.1
DRS utilisation (consumers/DRS)	499.9
Peak loads[2] (scm/h)	53,460
Gas conveyed (PJ per annum)	9.04

C.3. DEMAND ON OUR NETWORK

The capacity of our network is determined by the operating pressure, the size of the pipe and the allowable pressure loss between inlet and outlet. Meshed distribution networks are sized on the same principle, the difference being that pipes are interconnected at several points and can be fed to multiple points rather than running from point to point.

As our distribution network expands and demand grows, the pressure in downstream parts of the network can drop significantly. This has the potential to limit our network capacity, and consequently the delivery of gas to downstream consumers.

Under normal network operating conditions, our quality of supply standard stipulates that the pressure at any point on the network shall be no less than 50% of its nominal pressure. Further details of these standards can be found in Appendix F.

In order to prevent any excursions from these standards we undertake pressure monitoring surveys and carry out network analysis to identify any areas that are at risk of not meeting our supply standards. This allows us to proactively reinforce networks and ensure operating pressures do not become insufficient.

We break down our distribution network into discrete pressure systems. We position regulating stations strategically around the network to control the pressure of gas entering each discrete pressure system (i.e. intermediate pressure, medium pressure, low pressure systems).

The demand, and subsequent pressure drops, on each of these systems needs to be considered independently. This is due to the meshed nature of the network, and the mix of residential, commercial and industrial consumers.

Demand on our network comes from a combination of consumer types, each with their own requirements and demand profiles:

- **Residential:** consumers typically have peak demand in the morning and evening, bookending the standard work day where consumption is low. Residential consumers typically use gas for hot water, heating or cooking, and use around 20 – 30 GJ of gas per year.
- **Commercial and industrial:** loads are typically consistent for the whole day. These users can range from small restaurants and office buildings, to large scale industries, such as dairy processing. These users can consume anywhere from 30GJ to over 50TJ per year.

Within our network we are able to achieve a measure of load levelling, with commercial and industrial customers providing a consistent load demand in between the residential peaks. We use pressure data collected as part of the monitoring program to identify the load characteristics of our networks. This allows us to model the load profile for different consumer types.

C.3.1 Peak Demand and Gas Conveyed

Historical trends show long-term gas demand is mainly influenced by local economic activity, the price and availability of substitute fuels (e.g. electricity, fuel oil etc.), population and household growth, and investment decisions made by large industrial and commercial consumers.

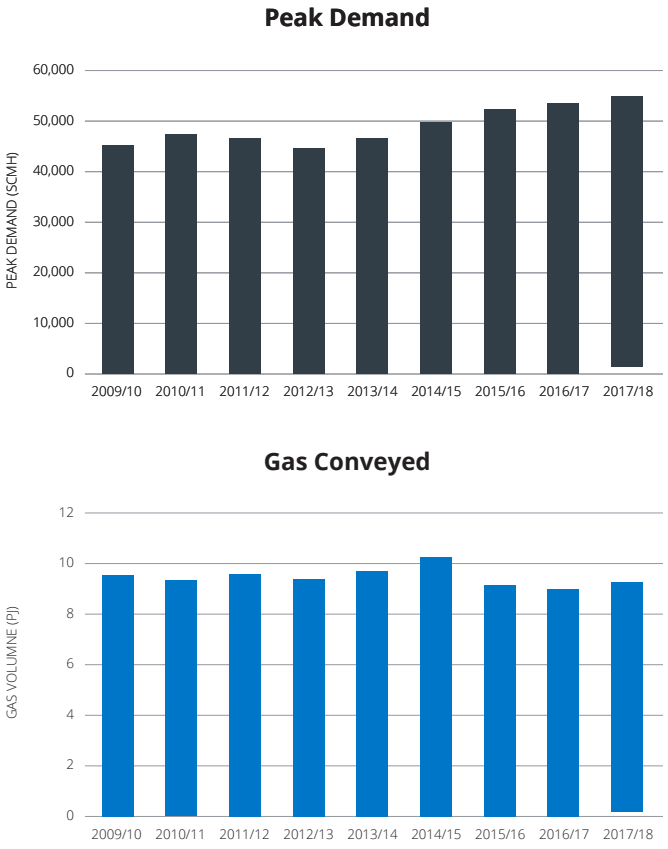
In the short-term, demand is very sensitive to climate. A cold snap, for example, can drive up the demand for gas significantly. Conversely, a warm winter can result in a considerably lower demand.

Historical data, after normalising for year-on-year variances, shows a reasonably steady demand trend. Any unusually high peak demands that occur due to extreme weather conditions ordinarily represent only a small percentage of hours in a year.

The peak demand[3] on our gas distribution network, and the quantity of gas conveyed for the past six years is shown below. This data shows the coincidental peak demands of all gate stations delivering supply to our gas distribution networks. Individual demand forecasts for each of the gate stations on our network are detailed in Appendix I.

2. Calculated by adding the coincident load of each system for a calendar year. Measured as standard cubic metres per hour (scmh).
3. The peak demand is calculated by adding the peak load of each network system for a calendar year. Where a network system includes more than one gate station, or a gate station supplies more than one network system, the coincident peak load is used.

Figure 15: Peak Demand and Gas Conveyed



The reasons for the variability between the gas conveyed and the peak hour demand trends are complex. Changes in weather patterns or the timing of gas usage of large industrial consumers has a considerable influence on overall peak gas demand, which partially explains the inconsistent relationship between the annual energy delivered and the total peak hour demand.

Our distribution network supplies gas to a number of high demand commercial and industrial consumers that have a significant impact on network operations and asset management. The locations of consumers with a significant individual energy demand (above 20TJ) are provided in Appendix D.

C.4. DISTRIBUTION SYSTEM DESIGN

In general, our gas distribution network assets are relatively young, with the majority of assets being built from the late 1980s onwards, and predominantly constructed of steel and polyethylene materials.[4]

Our distribution network is made up of a number of legacy systems developed independently by various network developers and now owned and operated by First Gas. Each of these networks was designed and operated to the standards applied by each of the developers. As a result, the defined standard operating pressures of similar sections of the network are not always consistent.

Any such design and operating conditions that do not conform to our standards are defined in our quality of supply standard. Over time, we intend to rationalise and standardise the design and operating pressure ranges in order to simplify network operations.

C.5. NETWORK CONFIGURATION

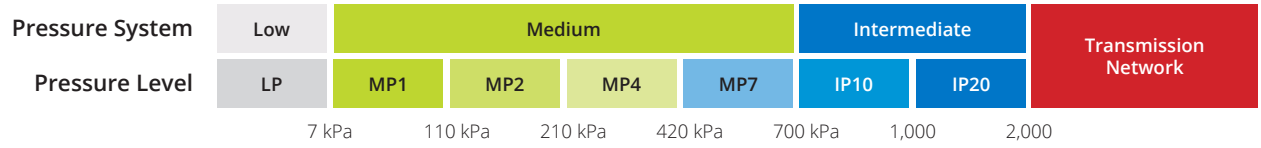
Our gas distribution network begins from the outlet valve of the transmission system and terminates at the inlet valve on a consumers' gas measurement system, or gas meter. Our gas distribution networks broadly contain the following six main categories of assets:

- Distribution pipes
- Pressure stations
- Valves
- Corrosion protection equipment
- Monitoring systems
- Special crossings

The distribution network operates at pressures up to 2,000kPa, and is categorised into low, medium and intermediate pressure systems as defined by NZS 5258:2003. We further categorise these operating pressures into seven discrete pressure levels as shown in Figure 16 on the following page.

4. Further information on the age profiles of our distribution assets are found in Appendix E.

Figure 16: Distribution Pressure Systems

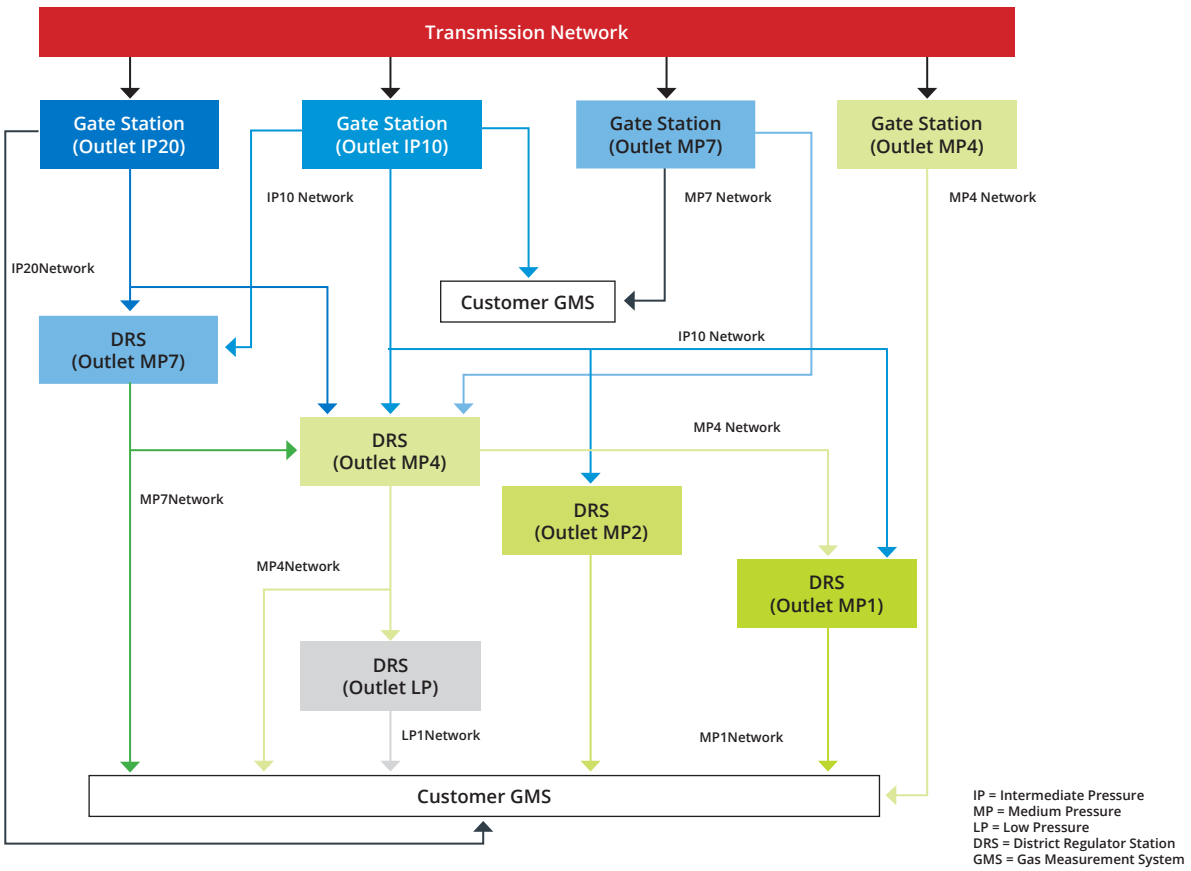


Our distribution network receives bulk gas supply from our high-pressure transmission system operating across the North Island. The transmission system delivers gas, typically to our intermediate pressure (IP) and medium pressure (MP) distribution networks, via gate stations.

These IP and higher-pressure MP systems tend to be radial in design, whereas the design of the majority of MP and low pressure (LP) systems tends to be mesh-based, providing back-feed security to large numbers of residential and commercial loads. MP and LP systems are often supplied from multiple District Regulating Stations (DRSs) thereby further increasing the security of supply.

A simplified depiction of our distribution network (Figure 17) is presented below showing the interconnection between various pressure levels.

Figure 17: Schematic of our Distribution Network



C.5.1 Mains And Service Pipes

Gas distribution pipes are categorised into the two asset types:

1. **Mains:** generally larger and higher-pressure pipe used to transport gas through the network for further distribution and use.
2. **Service:** smaller pipes used to transport gas from a main to a GMS typically installed on the consumer's property.

Mains

Table 4 below shows the seven pressure levels used in our mains distribution pipes, along with the make-up of the network.

Table 4: Pressure Levels and Corresponding Pipe Lengths (30 June 2018)

PRESSURE LEVEL	RANGE	LENGTH (KM)	% OF NETWORK
Intermediate Pressure 20 (IP20)	1,000-2,000kPa	91	0%
Intermediate Pressure 10 (IP10)	700-1,000kPa	85	0%
Medium Pressure 7 (MP7)	420-700kPa	36	70%
Medium Pressure 4 (MP4)	210-420kPa	4,308	4%
Medium Pressure 2 (MP2)	110-210kPa	28	20%
Medium Pressure 1 (MP1)	7-110kPa	53	0%
Low Pressure (LP)	2 -7kPa	71	0%

The IP systems generally form the 'backbone' of the distribution networks with laterals diverging from pipes to supply adjacent areas. These pipes are operated in the IP range of 700 to 2,000kPa. The selection of these pressures has, in the majority of cases, been based on balancing gas volumes, transmission distances, and delivery pressures. The IP systems are all constructed to a high technical standard of welded steel. They are also all protected against corrosion by CP, using either a system of sacrificial anodes or an impressed current installation to aid in the prevention of corrosion.

The MP system makes up the majority of our distribution assets. The pipes in the MP system generally form the greater mesh network and are used to directly supply gas consumers. These mains are constructed mostly of polyethylene and as such require no corrosion protection.

LP systems typically represent the oldest parts of the distribution system, supplying residential and small commercial loads. LP systems typically consist of polyethylene mains pipes.

Figure 18: Typical PE mains pipe installation

Service Connections

Service connections provide the link between the gas mains in the street and the customer's gas meter. They comprise a service pipe, riser and a riser valve. The outlet connection of the riser valve designates the end of our distribution system. A service regulator is normally fitted downstream of the riser valve to regulate the gas pressure to the consumer meter-set and to downstream appliances. In these cases, the regulator is owned by retailers or GMS owners.

C.5.2 Pressure Reduction

Pressure reduction stations are those parts of a gas network that link two pressure levels through pressure regulators. They are the points where gas enters a lower pressure network and are used to maintain a consistent inlet pressure to each system. We have three categories of pressure stations on our distribution network:

- **Gate Stations:** where the pressure station is the link between the gas transmission system and a gas distribution network, it is known as a gate station.[5] In these locations, high pressure gas equipment (i.e. pressure regulating equipment and custody transfer metering) within the gate station is operated by our transmission business and is not considered part of the distribution network. Equipment downstream of the pressure regulation (i.e. associated valves and pipework) within the gate station is operated as part of our gas distribution networks.
- **District Regulating Stations:** where the pressure station is the link between two differing pressure level systems it is known as a district regulating station (DRS). DRSs are used to reduce and regulate the operating pressure from higher operating pressure systems to systems with lower operating pressures.

Figure 19: A standard DRS installation

DRSs are strategically located within the distribution network so that a continuous and safe gas supply is delivered to the maximum number of customers. They are primarily used to reduce the higher pressures associated with high-volume mains, (i.e. MP7 and above), down to more economical distribution pressure levels between 200kPa and 420kPa on the MP2 and MP4 systems.

They are also used to provide a controlled pressure into the LP networks from either an IP or MP system.

The lower operating pressures provided by the DRS assets allow modern technology and materials, such as polyethylene pipes, to be used to provide a safe, assured and cost-effective gas supply to customers.

As they are the source of supply to a significant number of consumers, they are critical component in the gas distribution network. Because of this importance, DRS installations are often duplicated in order to ensure a reasonable level of security of supply. This redundancy also enables maintenance to take place without a loss of supply to customers.

- **Service Regulators:** service regulators are used to normalise the flow and pressure of gas supplied to individual premises, based on the consumer's supply requirements. Where, for practical reasons, a regulator is unable to be installed immediately adjacent the consumers gas meter (i.e. as part of the GMS) it is installed at a location upstream from the GMS and may be owned and maintained by First Gas.

C.5.3 Line Valves

Line valves are manually operated valves used in our distribution system. They fall into the following two categories:

- **In line mains and service valves:** strategically located to isolate the flow of gas within the system when required.
- **Blow down valves:** designed to vent/depressurise sections of the system in the event of an emergency.

The majority of manually operated valves used in our distribution system are ball valves, plug valves or gate valves.

5. An alternative name for a gate station is delivery point.

C.5.4 Corrosion Protection Systems

Steel or metallic pipes and equipment installed in the distribution system (either above or below ground) are susceptible to corrosion. Various measures are employed to ensure the integrity of the asset is maintained.

Above ground pipe and equipment is protected against corrosion by the provision of paint or other suitable protective coatings e.g. wrapping. Periodic inspections are carried out to monitor the condition of these coatings.

Below ground steel pipes and equipment is protected against corrosion by the provision of protective coatings (e.g. high-density polyethylene or epoxy coating) and the application of impressed current or sacrificial anode CP systems. Protective coatings are inspected whenever underground pipe or equipment is exposed. CP test points are provided at regular intervals on the system. They are monitored on a periodic basis and maintained to ensure that the levels of protection being provided to the underground plant are kept within prescribed maximum and minimum levels.

C.5.5 Monitoring Systems

At various strategic locations throughout our distribution network, monitoring systems are installed to observe and record network data. Generally located at gate stations and DRSs, these systems provide monitoring and alarming of critical inlet/outlet pressures, temperatures and flow rates, and corrected and uncorrected metering data.

The systems we use to monitor our gas distribution networks are a combination of Cello and VDS3000 data loggers and correctors. The data gathered by the monitoring systems is accessed through an archiving histogram called Wonderware. This information is then used in network modelling and forecasting to inform future network design and to ensure gas security standards are met.

C.5.6 Special Crossings

Special crossings are locations where a section of pipe is installed either above or below ground in order to cross over a roadway, river, railway or any area of interest with a differing risk profile from a standard installation.

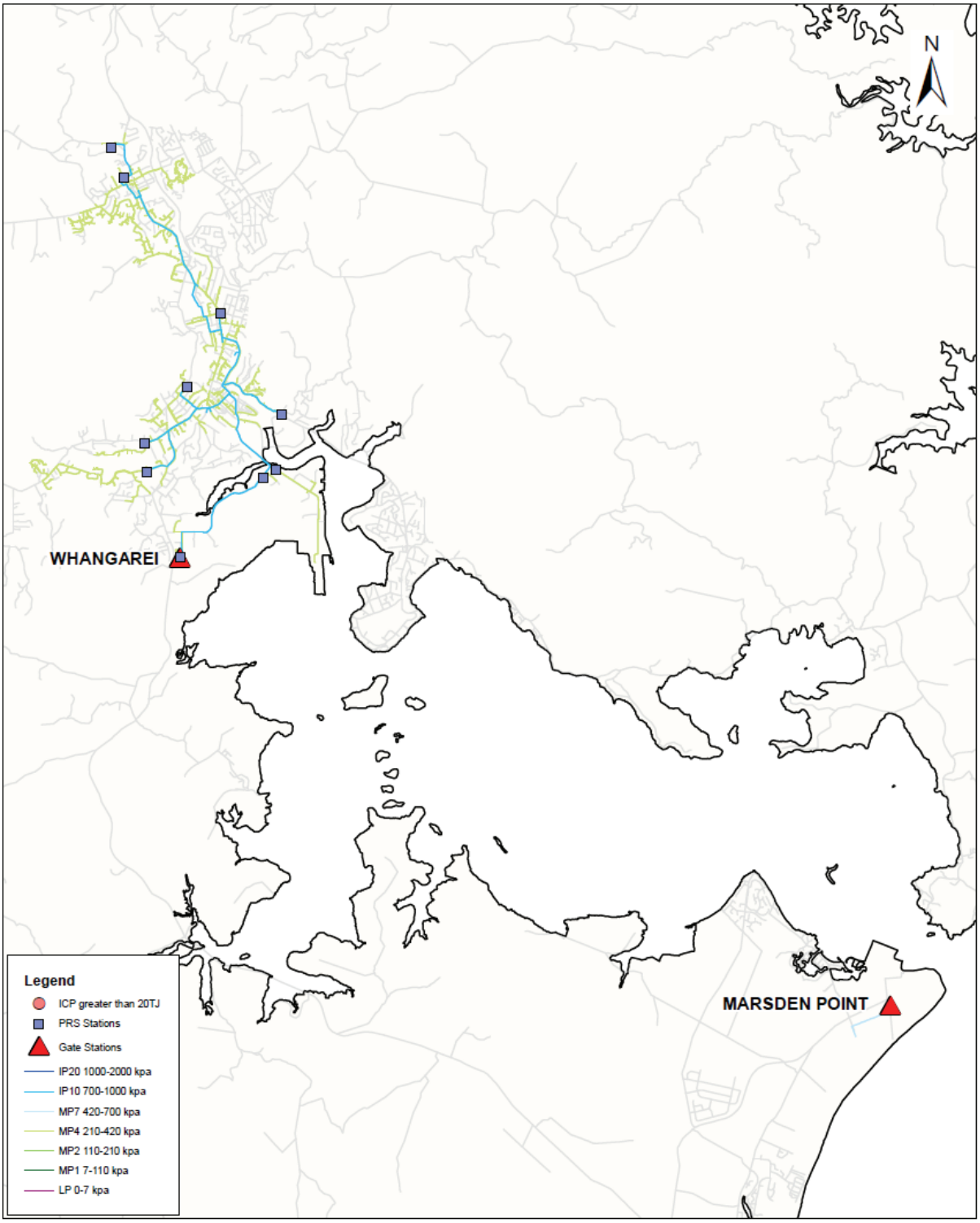
In certain instances, an above ground crossing (e.g. over a bridge) enables the gas distribution pipe route to negotiate obstacles where a below ground crossing is not practical.

C.5.7 Critical Spares and Equipment

An appropriate stock of critical spares and equipment allows us to ensure any maintenance or repairs to the network are not hindered by the lack of equipment or parts availability. Our critical spares and equipment holdings include spare pipe and pipe fittings, repair equipment, spare DRSs, and other items that have been determined critical based on lead time, turnover, risk, or other drivers. These items are held at various locations throughout the network to allow for fast repairs.

APPENDIX D: NETWORK MAPS

This appendix provides outlines of our distribution network, including location of mains pipes, gate and pressure regulation stations. The maps also show ICPs with an individual energy demand above 20TJ, and hence have a significant impact on network operations and asset management.



GAS DISTRIBUTION MAPS
NORTHLAND REGION

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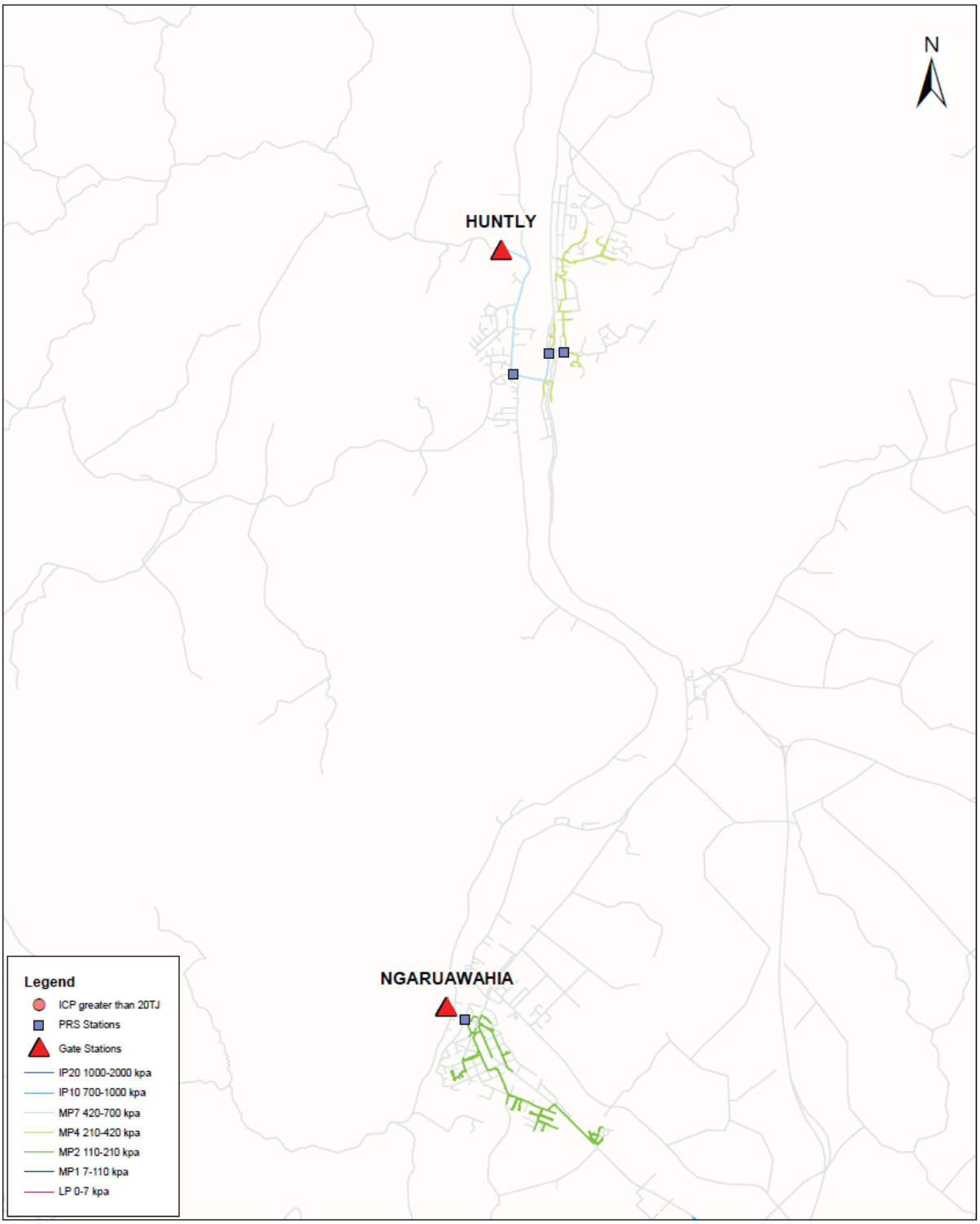
Firstgas

Drawing Reference: GIS-G0215-002-01-C



GAS DISTRIBUTION MAPS
WAIKATO REGION

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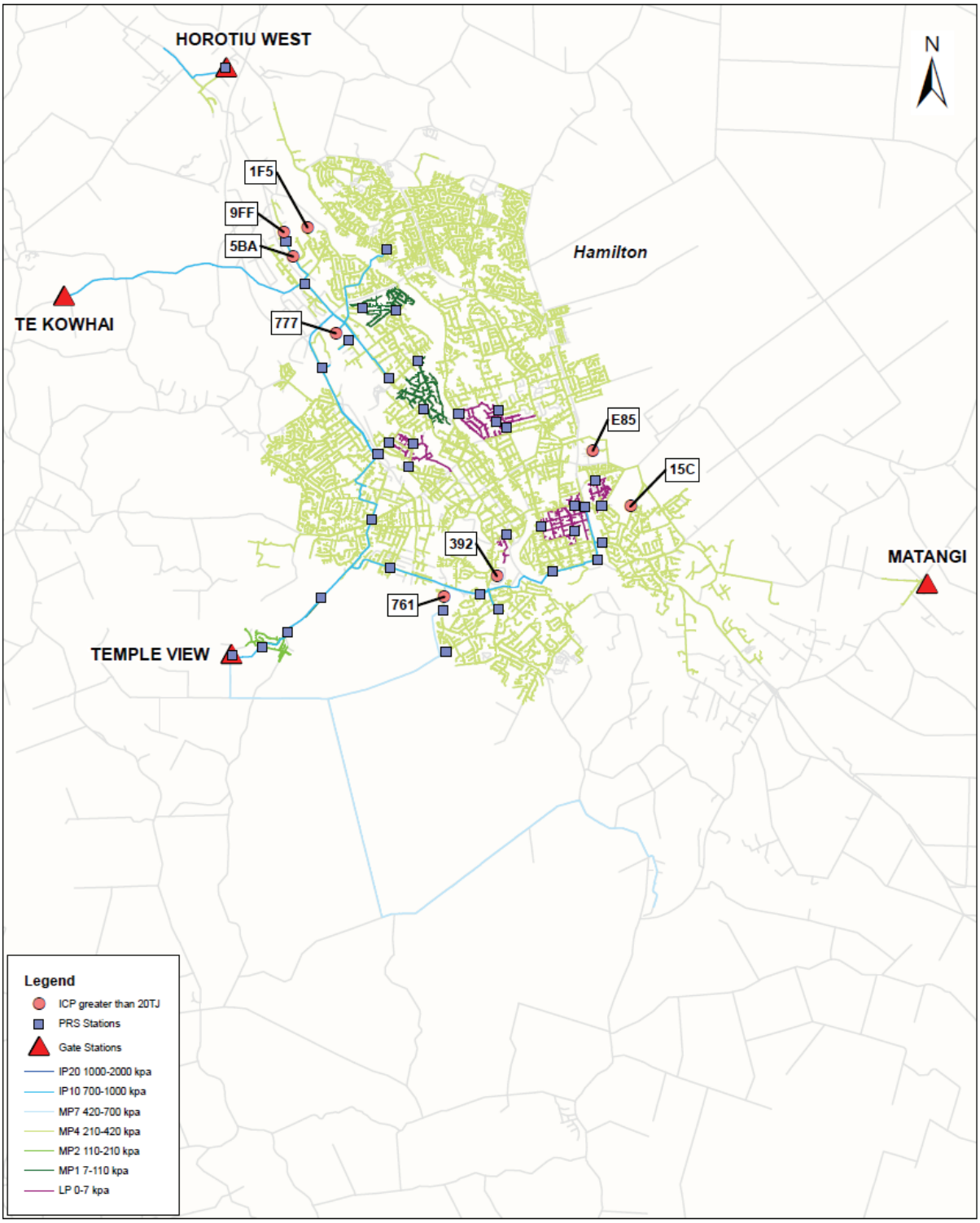

GAS DISTRIBUTION MAPS
WAIKATO REGION

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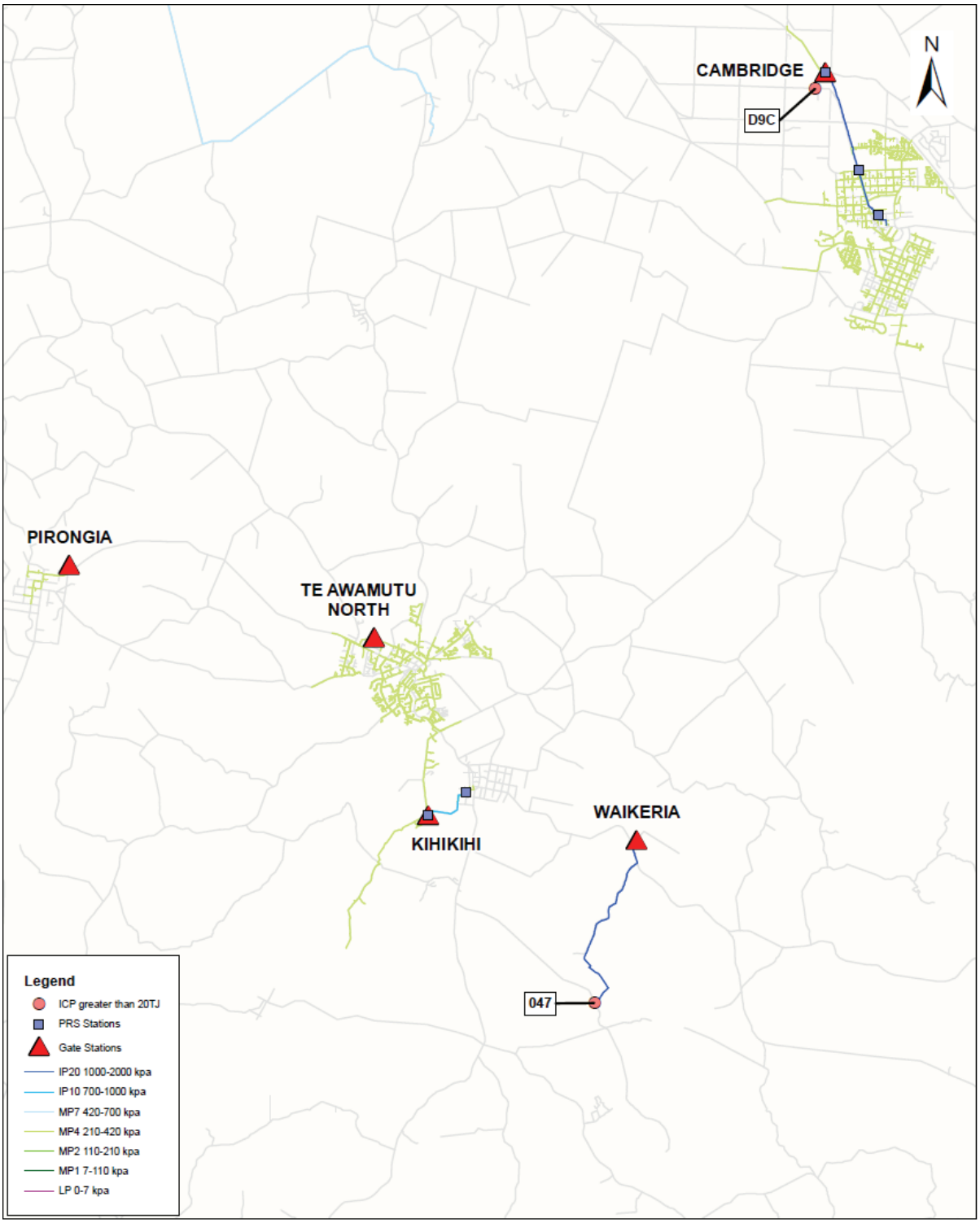

GAS DISTRIBUTION MAPS
WAIKATO REGION

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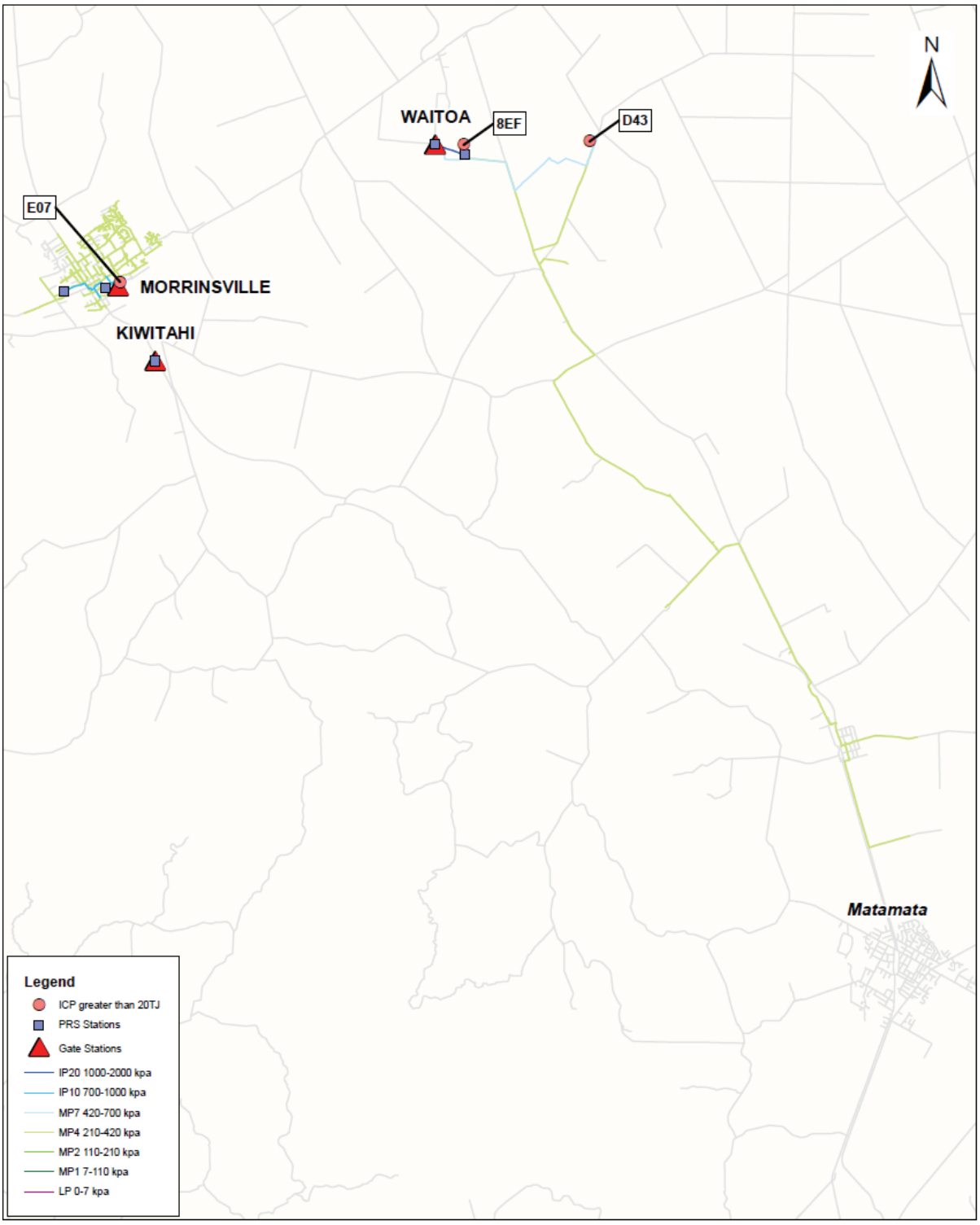

GAS DISTRIBUTION MAPS
WAIKATO REGION

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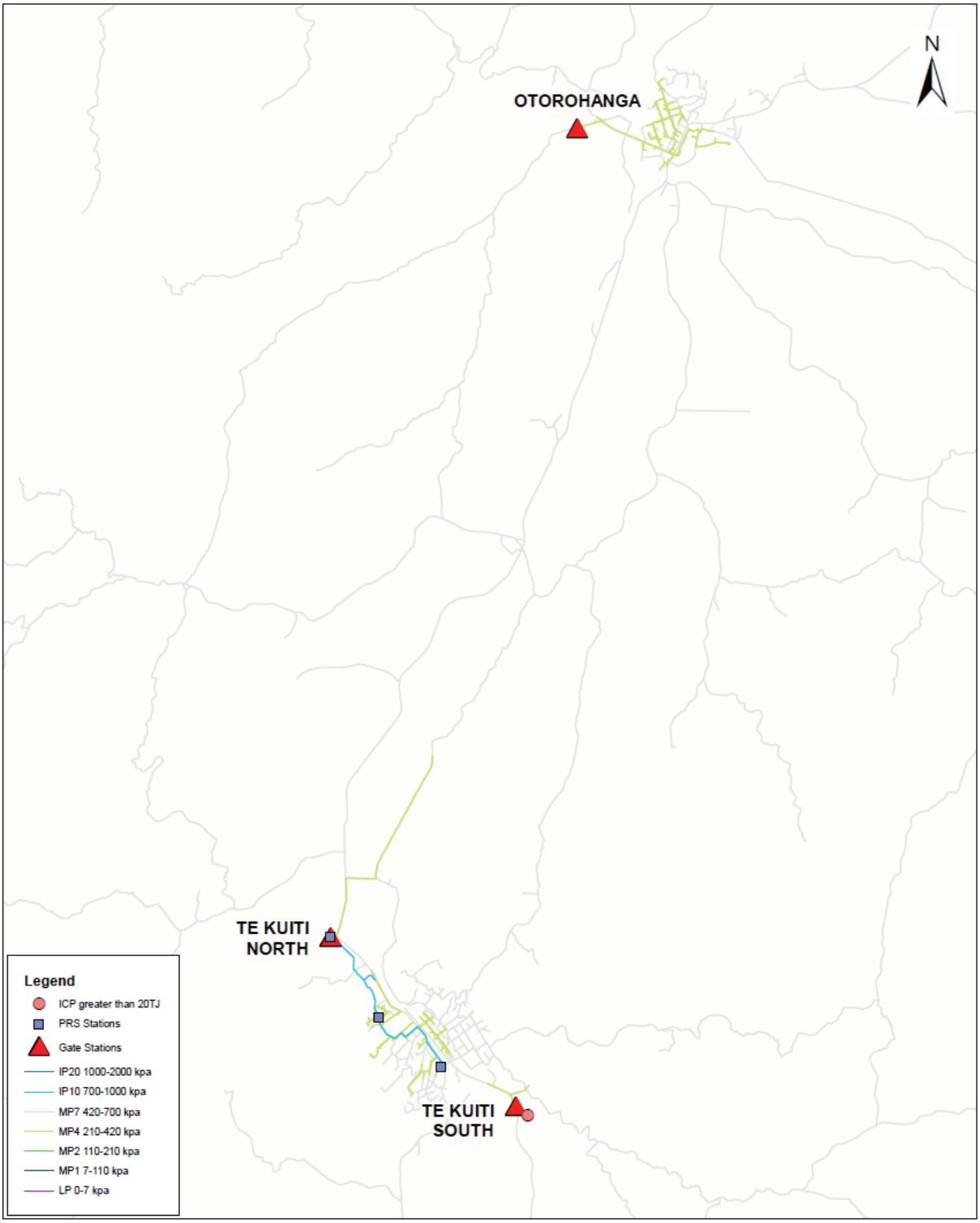

GAS DISTRIBUTION MAPS
WAIKATO REGION

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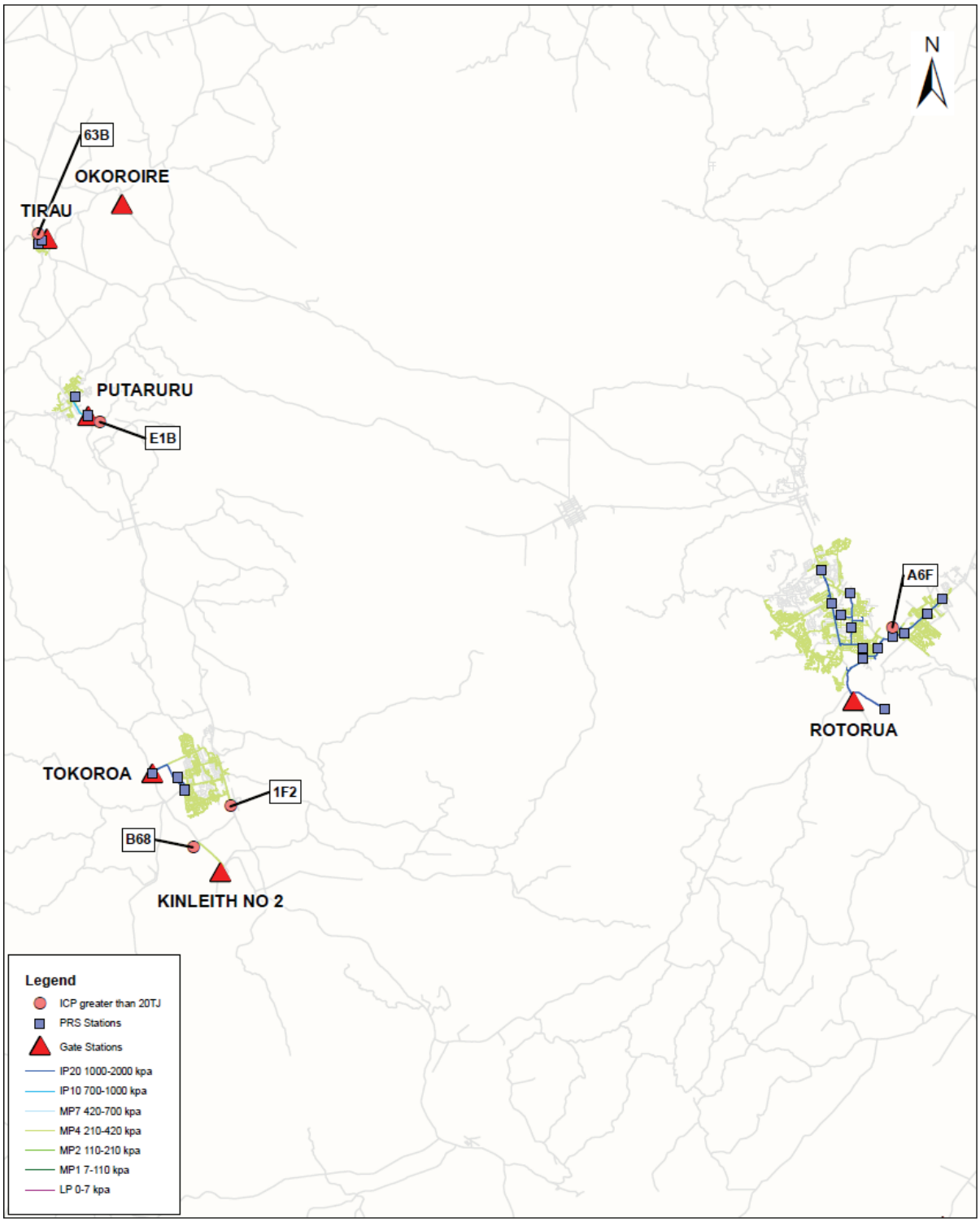

GAS DISTRIBUTION MAPS
CENTRAL PLATEAU REGION

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Firstgas

Drawing Reference: GIS-G0215-004-01-B

GAS DISTRIBUTION MAPS
CENTRAL PLATEAU REGION

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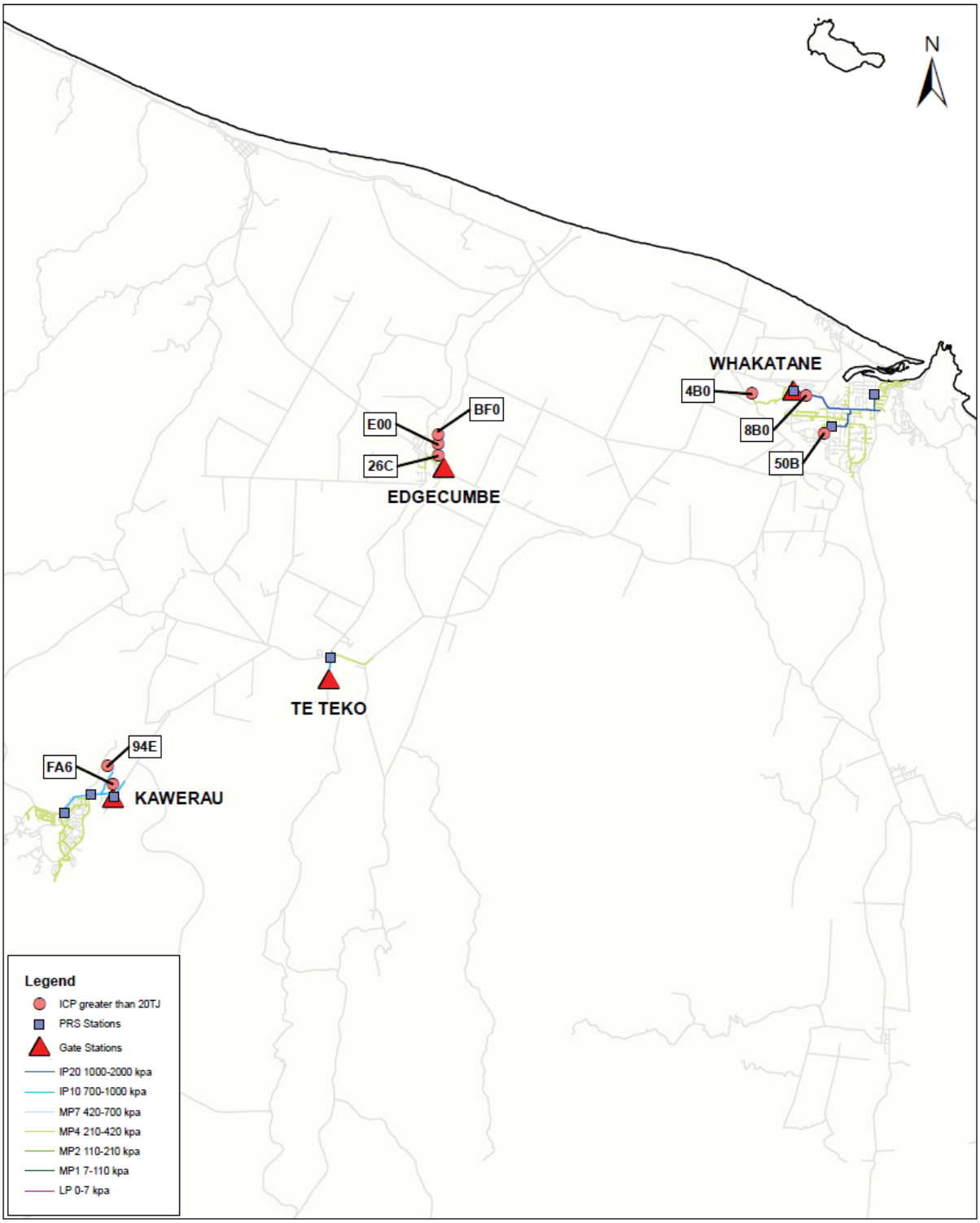
Drawing Reference: GIS-G0215-004-02-B



GAS DISTRIBUTION MAPS
BAY OF PLENTY REGION

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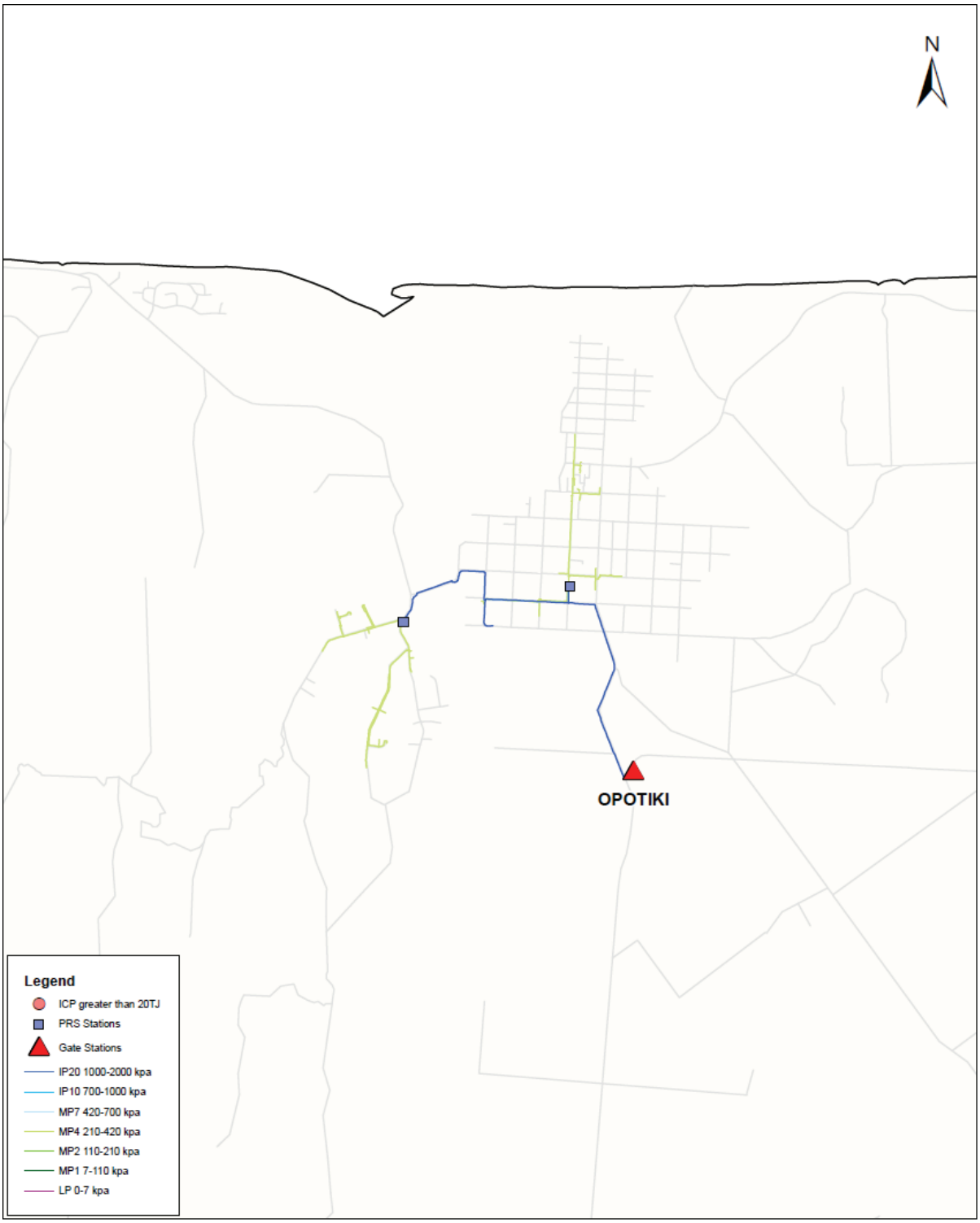
Firstgas

Drawing Reference: GIS-G0215-005-01-B



GAS DISTRIBUTION MAPS
BAY OF PLENTY REGION

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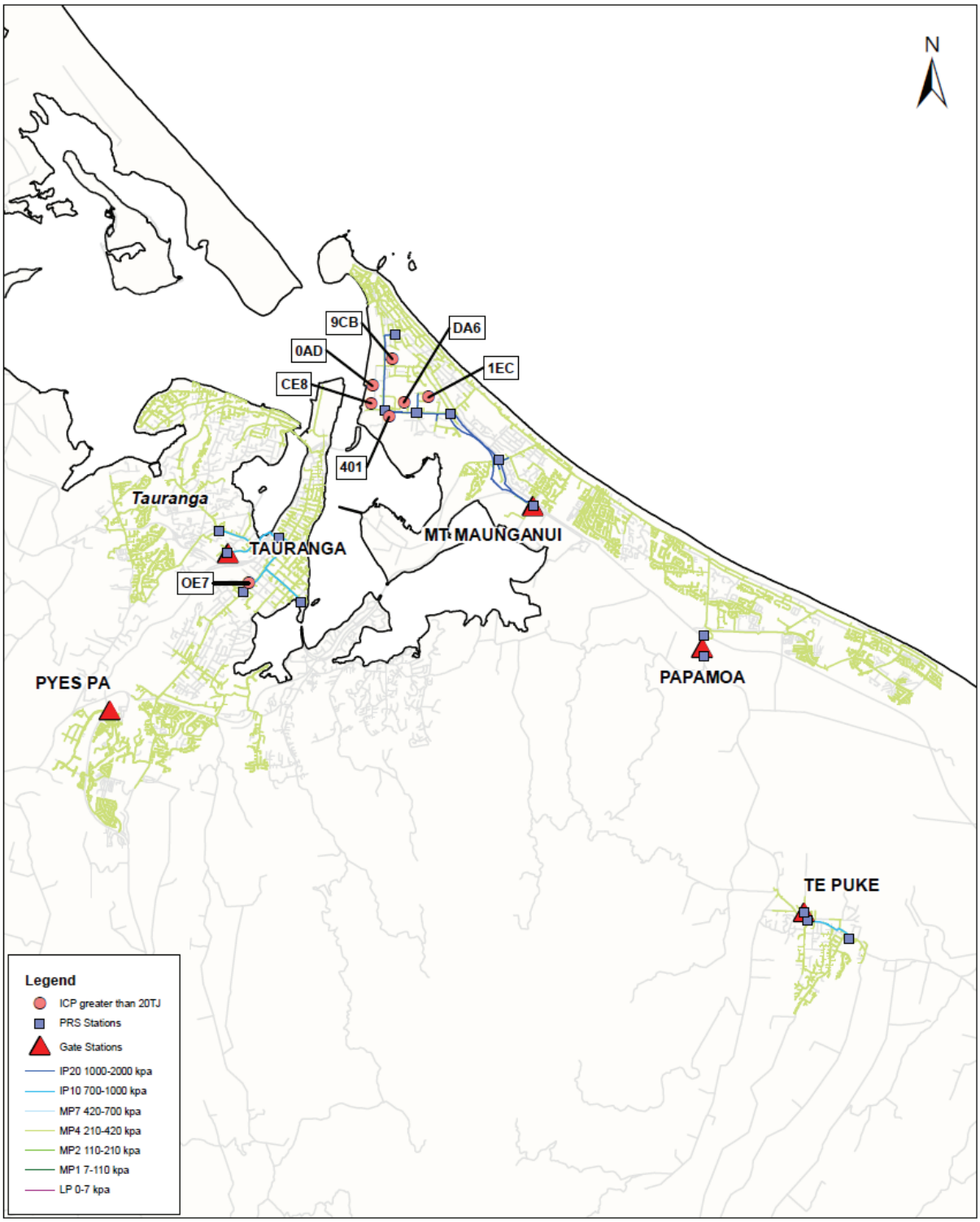
5. Aerial Imagery sourced from CoreLogic.

Drawing Reference: GIS-G0215-005-02-B



GAS DISTRIBUTION MAPS
BAY OF PLENTY REGION

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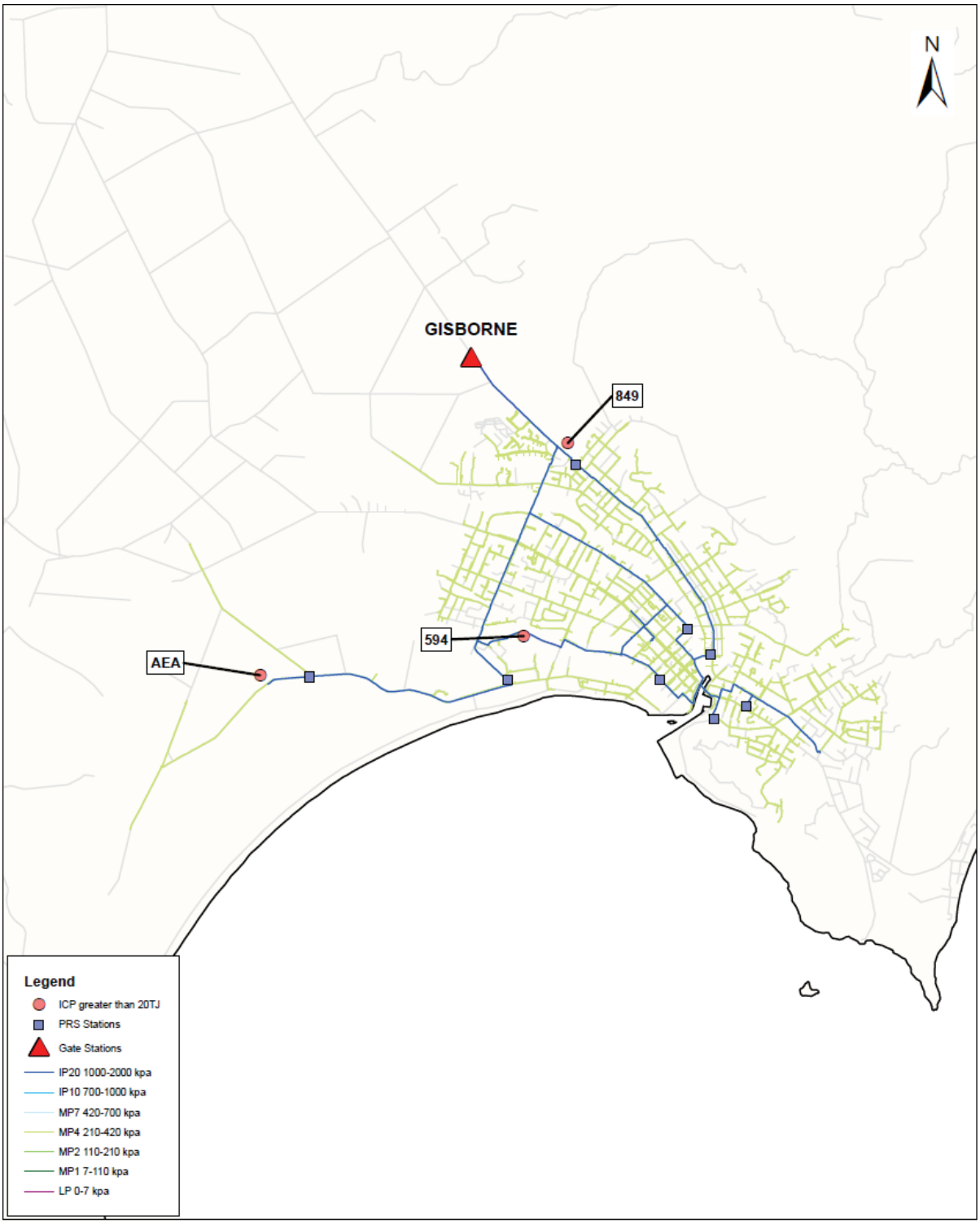

GAS DISTRIBUTION MAPS
GISBORNE REGION

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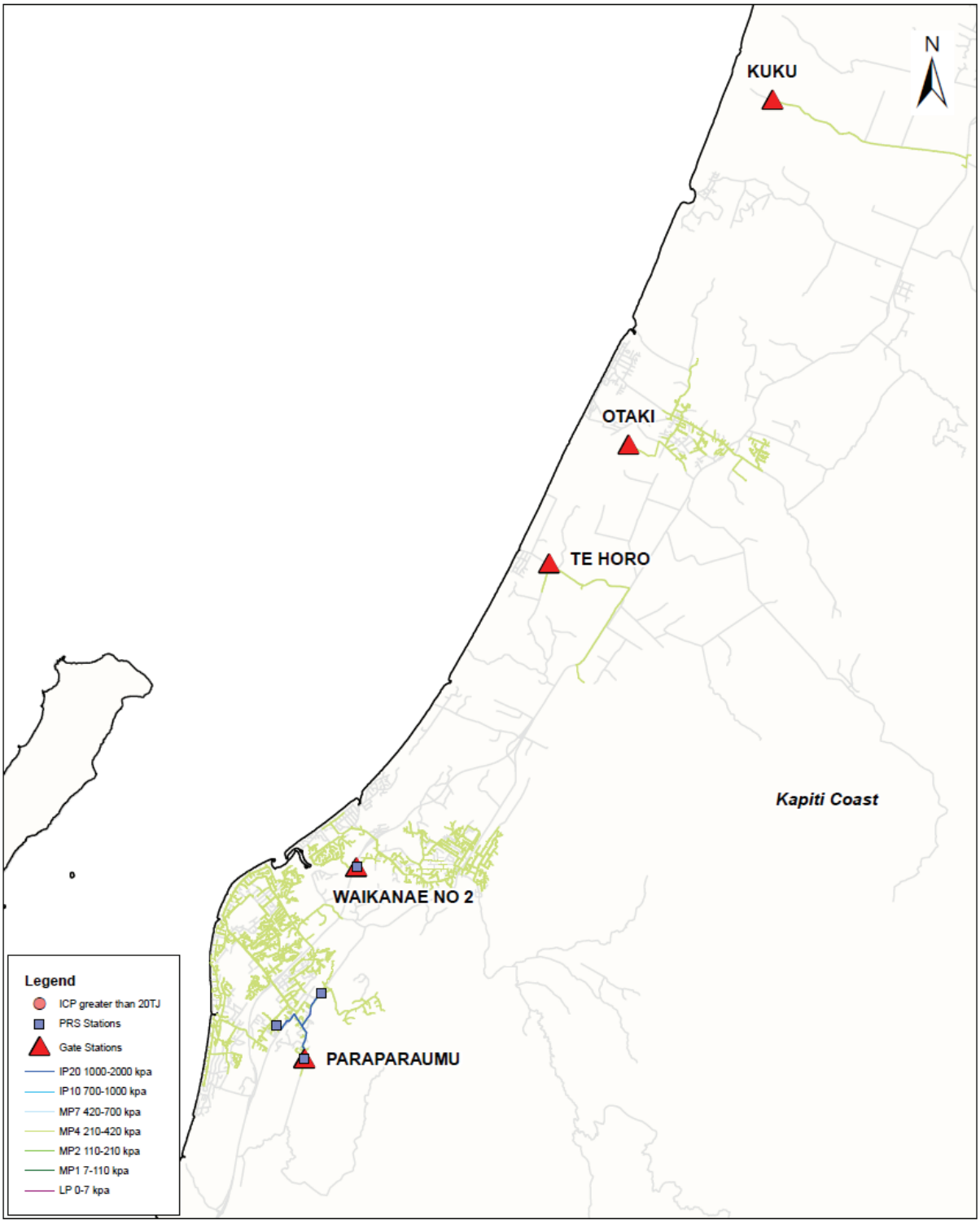
4. Date of Issue: 24/05/2018.
5. Aerial Imagery sourced from CoreLogic.

Firstgas

Drawing Reference: GIS-G0215-006-01-B



GAS DISTRIBUTION MAPS
KAPITI REGION

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3. Coordinates are in terms of New Zealand Transverse Mercator 2000 projection.
4. Date of Issue: 24/05/2018.
5. Aerial Imagery sourced from CoreLogic.

Firstgas

Drawing Reference: GIS-G0215-007-01-B

APPENDIX E: ASSET FLEETS

The definitions of asset categories and asset classes used in the AMP are largely aligned with those defined by Information Disclosure and hence those reported in Schedule 12a – Report on Asset Condition included in Appendix B. However, some categories don't map directly (e.g. sub-components) and as such, some of the asset grades recorded in Schedule 12a reflect the overall condition of the asset class or asset category and not the asset grade of the sub-components.

The following sections provide more detail on the individual asset fleets that form our distribution network. This includes describing their characteristics, discussing risks and asset management issues, and providing background information on our key investments over the planning period. It covers the following asset types.

- Mains and service pipes
- Pressure reducing stations
- Line valves
- Cathodic protection
- Monitoring systems
- Special crossings
- Critical spares and equipment.

Mains and Service Pipes

Gas distribution pipes are categorised into the two asset types:

- **Mains:** generally larger and higher-pressure pipe used to transport gas through the network for further distribution and use.
- **Services:** smaller pipes used to transport gas from a main to a GMS typically installed on the consumer's property.

Fleet Overview

The composition of our gas distribution network is set out in Table 5 below.

Table 5: Fleet Overview (30 June 2018)

STATISTIC	STATISTIC	STATISTIC	STATISTIC
Mains	PE	2970	91
Mains	Steel	310	9
Service	PE	1375	99
Service	Steel	16	1

The age profiles for our mains and service pipes are shown in Figures 20 and 21 below.

Figure 20: Mains pipes age profile

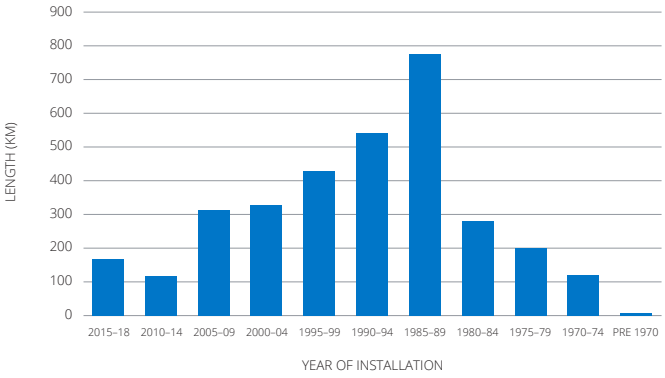
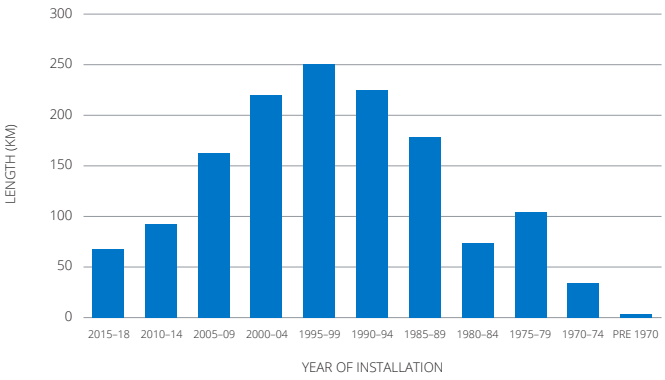


Figure 21: Service pipes age profile



The majority of our mains and service pipes, both steel and PE, have been installed from the late 1980s onwards as the network experiences further growth and the availability of gas increased. The PE network predominantly consists of PE80 material, with PE100 pipes being installed from the late 1990s onwards.

Condition

Steel Pipes

During recent years, our network has undergone a program to ensure steel pipe systems have adequate CP in accordance with the requirements of NZS 5258 and AS/NZS 4645.

The average age of the steel pipe assets is approximately 37 years. The standard design life for steel pipes operating

on a MP network is 60 years, and for those on an IP network 70 years. Based on condition monitoring, the overall condition of the pipes is good. No programmed replacement of these pipes is envisaged within the standard life of the asset.

The replacement of underground steel pipes is expected to continue to be of a corrective nature, targeting specific locations and addressing localised issues rather than a large-scale replacement program.

PE Pipes

The average age of PE pipe assets is approximately 22 years. The standard design life of PE pipes manufactured prior to 1985 is 40 years, and the standard design life for modern PE (post 1985) is 60 years.

PE pipes were first used in our distribution network in the 1970s. Early PE materials (i.e. pre-1985) have been known to exhibit premature brittle-like issues. Based on this, we have commenced a heightened monitoring program and risk assessment process. Further information on this issue, and our approach to the mitigation of this risk, can be found below. However, this issue was resolved in PE materials manufactured post 1985, and pipes produced from this material have been found to be very durable.

Isolated problems have been found with certain PE butt and saddle tee joints, due to poor quality control and jointing techniques used in earlier PE systems.

Risks and Issues

Steel Pipe – Mechanical Coupling Joints on Hamilton MP4 Steel Network

Mechanical coupler joints (e.g. gibault joints) have been encountered on a regular basis on some parts of the Hamilton MP4 steel network. The use of this type of joint (i.e. instead of welded connections) was prevalent on the Hamilton network in the 1970s and early 1980s when the majority of the MP4 steel pipes were installed, but the practice has long since been discontinued. Couplers are a potential cause of leakage due to corrosion (i.e. of the fitting and/or pipe) or movement of the pipe within the coupler. In addition, the presence of couplers can inhibit the level of CP protection available to adjacent sections of steel pipe.

To mitigate the risks associated with mechanical couplers installed on the Hamilton MP4 steel network, an ongoing programme to identify and remove mechanical couplers on this network has been initiated. Historical fault records and construction records are being researched to identify sections of steel pipe that have a higher concentration of mechanical coupling joints. The replacement of these sections of pipe will be prioritised based on Pipeline Reported Escapes (PRE)-levels and condition.

Steel Pipes – Small Diameter Steel Pipes

The Hamilton MP4 distribution system includes approximately 11km of steel mains pipe with a nominal diameter of 25mm or less.

As conventional stoppling equipment is not available (either locally or internationally) for 25mm diameter pipe or less, the isolation of sections of small diameter steel pipe can only be achieved via the use of isolation valves already installed on these pipes, or by the operation of isolation valves (and/or the installation of stopples) on the larger diameter upstream pipes.

The small diameter steel mains pipe in Hamilton is comprised of pipe sections that range in length from a few metres, supplying a handful of customers, to several hundred metres in length, supplying 20 to 30 customers. As many of the small diameter mains sections do not have isolation valves fitted, in the event that a section needed to be isolated it is likely the isolation could only be achieved by operating isolation valves on the larger diameter upstream system and/or carrying out a stopple operation on the upstream system.

This situation inevitably increases the risk of delays in isolating the supply in emergency situations and could significantly increase the number of service connections affected by an outage. In order to mitigate the risk, an ongoing pipe replacement programme to replace Hamilton MP4 small diameter steel mains with PE has been initiated.

Steel Pipes – Electrical Hazards on Metallic Pipes

The close proximity of high voltage power networks and buried pipes can result in hazardous voltages on the pipe. The primary mechanisms involved in the transfer of electrical energy to a buried pipe include earth potential rise and low frequency induction. AS/NZS 4853 (Electrical hazards on metallic pipes) requires pipe owners/operators to reduce the risk to personnel and equipment from identified electrical hazards (including lightning) to an acceptable or tolerable level. AS/NZS 4853 also requires the electrical hazards and their controls be documented in an Electrical Hazard Management Plan (EHMP).

AS/NZS 4853 requires the assessment of electrical hazards and associated risks to be carried out over two levels - i.e. level 1 is a conservative assessment and determines if an electrical hazard exists and, if so, whether the risk level is negligible; level 2/3 is a detailed risk assessment of locations that are not accepted as low risk by the level 1 assessment. Because of the nature of the analysis required, it is typically carried out by external consultants who are specialists in this field.

The plan is to develop an EHMP for the gas distribution network. It is expected that an interim EHMP (including prioritisation of detailed electrical hazard studies on at-risk sections, and standard mitigation designs) will be completed by the end of

FY2019 to FY2020, and the final EHMP implemented (including implementation of mitigation measures) by the end of FY2021.

PE Pipes Pre-1985

Our distribution network includes approximately 410km of pre-1985 PE mains and of which 368km (89%) operate at MP4 and the balance at LP and MP1. The majority of these mains are located in the Waikato region in the Hamilton distribution system. Additionally, our network contains approximately 116km of pre-1985 service pipe with the majority located within Hamilton.

PE pipe manufactured up to the mid-1980s is known to be susceptible to premature brittle-like fracture issues due to the resin type that was in use at the time of manufacture. The issues occur as a result of stress intensification brought on by the PE pipe being exposed to excessive shear and/or bending forces while in service.

The US National Transportation Safety Board published a Special Investigation Report (SIR-98/01) in 1998 titled 'Brittle-like cracking in plastic pipe for gas service'.[1] The report was produced following the investigation of a number of pipe accidents involving plastic piping cracking in a brittle-like manner.

The report is recognised internationally. It concluded that much of the plastic pipe manufactured and used from the 1960s through to the early 1980s may be susceptible to premature brittle-like incidents when subjected to stress intensification.

One of the key recommendations made in the report was for gas operators to closely monitor the performance of older plastic piping and to identify and replace in a timely manner any of the piping that indicates poor performance. In the USA the risks associated with pre-85 PE failure have been covered off by a 2009 amendment to the US Federal Pipe Safety Regulations which requires all US gas distribution pipe operators to develop and implement integrity management programmes.

Key factors behind stress intensification within PE pipes are:

- Occluded particles contacting the pipes surface
- Pipe squeeze off
- Connections to PE or steel fittings (including butt welding)
- Severe pipe bending

The most recent analysis of faults relating to pre-1985 PE pipes on our distribution network was completed in late 2015 and covered the July 2013 to April 2015 period. The results of the analysis highlighted the following key points:

- The PRE rates for our pre-1985 PE systems were significantly higher than the average PRE rate for the whole of our distribution network.
- The PRE rate for MP4 pre-1985 PE systems was significantly higher than the PRE rates for LP, MP1 and MP2 pre-1985 PE systems.
- The Waikato region (i.e. the Hamilton system) had the highest rate of PRE.
- Squeeze off failures accounted for over 40% of the pre-1985 PE PRE for the 2013 to 2015 period and this was a slight percentage increase on the 2012 to 2013 period.
- The pre-1985 PE PRE rate for the 2013 to 2015 period was slightly higher than the rate for the 2012 to 2013 period.

The output from the analysis confirms that the strategy adopted during FY2015 to implement an ongoing pre-1985 PE pipe replacement programme targeting the replacement of higher risk (i.e. based on operating pressure, failure consequence etc.) sections of the pre-1985 PE system is still appropriate.

Further assessment of the risk associated with this issue is currently being undertaken to determine the extent within our network. This assessment will consider the prioritisation of pipe replacement in areas where squeeze offs and other activities likely to contribute to stress intensifications as well as other risk mitigation techniques.

PE Pipes – Butt Fusion Joints

Butt fusion jointing of PE pipes was the standard method of jointing PE pipe when PE pipe was first introduced on our network in the early 1970s. This jointing technique continued until the introduction of electrofusion (EF) jointing in the mid to late 1980s – although butt fusion jointing is still considered viable (using electronic controlled processes) for larger diameter pipes, due to the cost benefits it can provide.

Poor quality control and jointing techniques used in the early 1970s and 1980s has resulted in some butt fusion joint issues. This legacy issue has resulted in a higher risk for PE butt joints.

It is estimated that our network includes approximately 368km of MP4 and 42km of LP/MP1 older PE mains that utilise butt joints.

Our risk mitigation controls include scheduled leakage survey. PE butt joints are currently replaced on an as required basis and no proactive replacement programme is anticipated unless there is a marked change in butt joint incidents.

1. http://pstrust.org/docs/ntsb_doc30.pdf

Key Projects

Pre-1985 PE Replacement Program

Our distribution network contains approximately 410km of pre-1985 PE mains pipe. Pipe of this vintage has been known to be susceptible to premature brittle failure. We are currently implementing an ongoing program to target the replacement of affected pipes in high risk (i.e. based on operating pressure, failure consequence etc.) areas within the pre-1985 system.

Concurrently, we are conducting a detailed risk assessment on the issue to ascertain the mitigation techniques, program schedule, prioritisation and expenditure required moving forward.

MP4 Steel Replacement Due to Mechanical Coupling Joints (Hamilton)

Legacy mechanical coupling joints on the Hamilton MP4 network are a potential cause of leakage due to corrosion (i.e. of the fitting and/or pipe) or movement of the pipe within the coupling. In addition, the presence of couplings can inhibit the level of CP protection available to adjacent sections of steel pipe. We are conducting an ongoing programme to identify and remove mechanical couplings on our distribution network.

Replacement of Small Diameter Steel Mains (Hamilton)

The Hamilton distribution system includes approximately 11km of MP4, MP1 and LP steel mains pipe with a nominal diameter of 25mm or less which is difficult to sectionalise in the event of an emergency where supply needs to be isolated. We are conducting an ongoing pipe replacement programme to replace all Hamilton MP4 small diameter steel mains with PE.

Inspection of Small Sections of Stranded Steel Pipe (Hamilton)

Field inspections of small sections of stranded steel pipe located within the wider Hamilton MP4 PE network will be undertaken over FY2019 and FY2020 to determine if addition CP protection is required at these locations.

Unspecified

Periodically sections of mains and service pipe will be identified that need to be replaced (on an as required basis) due to safety or compliance issues. Examples include pipes located under buildings, or pipes of non-compliant material specification. The expenditure forecast for this item is based on historical expenditure.

Pressure Reduction

Pressure reducing stations are those parts of a gas system that link two pressure levels in gas networks, through pressure regulators. They are the points of input to a pressure level and comprise the following three types:

- Gate stations
- District regulating stations
- Service regulators

Pressure stations linking the gas transmission system and a gas distribution network are known as gate stations. High pressure equipment (pressure regulating equipment, custody transfer metering etc.) within the gate station is operated and maintained by First Gas Transmission, whereas distribution system equipment (i.e. check-metering where installed, and associated valves and pipework etc.) within the gate station is operated and maintained as part of our distribution networks.

Where a pressure station links two gas distribution pressure networks, it is known as a district regulating station (DRS). These are operated and maintained as part of our distribution network.

The purpose of DRS and gate stations is to automatically control the pressure in the downstream mains, and meet the following service and performance standards:

- Have the capacity to supply the forecast load based on minimum design inlet pressure and design outlet pressure and current load projections.
- Be twin stream with each stream meeting the forecast load capacity.
- Have adequate over-pressure protection - preferably two safety protection devices including an automatic shut off (ASO) device.
- Be accessible at all times and be able to be isolated external to the enclosure.
- Have a 35-year minimum life.
- Pilot loaded regulator DRSs should maintain delivery pressure at ±5% of set point.
- Spring loaded 'direct acting' regulator DRSs should maintain delivery pressure at ±10% of set point.
- Normal operation shall maintain delivery pressure at or below Maximum Allowable Operating Pressure (MAOP) at all times.
- Under fault conditions, delivery pressure should be maintained at or below 8 kPa for Hamilton LP systems, and at or below 110% MAOP for MP and IP systems.

- Each DRS is to have an inlet and outlet isolation valve located at least 5m away from the enclosure.
- DRSs must comply with our standards and legislative requirements.

A service regulator is used to control the supply pressure to large industrial/commercial consumers. A service regulator is typically comprised of a small-capacity pressure regulator along with upstream and downstream isolation valves. These units are installed upstream of the customer GMS and may be owned and maintained by us.

Fleet Overview

Our DRS installations comprise the following elements:

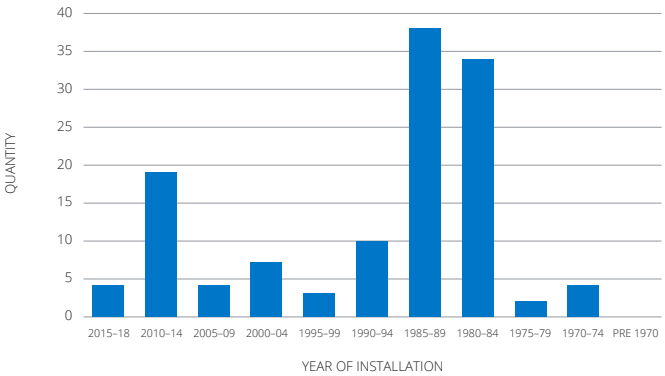
- Remote (fire stop) inlet and outlet isolation valves (in most sites)
- Inlet and outlet valves
- Filters
- Regulators
- Over-protection control – monitor regulators and/or slam-shut mechanism and/or relief valves
- Metering (in some sites)
- Telemetry (in some sites)
- Enclosure – varies from wire mesh to solid timber/concrete block building

The average age of the DRS population is 24 years. The standard life for DRS is 35 years. DRSs are generally installed above ground, but a growing number of factory-built underground DRSs are being installed.

Only two service regulators are in service on our distribution network, both of which are in good condition. One of the service regulators is installed in small pit below ground, and the other is installed above ground.

The age profile for all stations on our network is shown in Figure 22. The majority of the pressure reduction facilities were installed in the 1980s alongside the growth in the network observed in the pipeline network age. Many of these facilities have been renewed or upgraded with newer sub-components that are not represented in the below data.

Figure 22: Stations Age Profile



Condition

An initial field audit of all DRSs was undertaken during FY2010 to provide a baseline against which ongoing condition assessments could be measured and DRS upgrade priorities could be determined.

The audit assessed the condition and status of each DRS and covered the following general areas:

- Enclosure dimensions, amount below ground, enclosure type and ventilation provided.
- Confirmation the reliefs valves vented to a safe location.
- Inlet and outlet fire valves present and accessible.
- The condition of the enclosure and ease of access/egress.
- The condition of DRS equipment – i.e. regulators, pipework, filter, relief valve, meter and corrector.

A condition assessment rating was assigned for each of the DRS components based on the audit results. The assessment rating was based on a seven-point scale where one is very poor condition and seven is good condition. Since the original audit was undertaken, a DRS integrity register has been updated on an ongoing basis as DRS upgrades are completed. Currently there are three DRS (i.e. 3% of total DRS) that have an average condition assessment rating of four (there are no DRS with a rating of less than four); DRS with an average condition assessment rating of four or less are considered to be high priority for replacement or renewal, however in this case the three DRSs are candidates for removal pending the results of network modelling.

The relative priority of individual DRS for replacement or renewal has been further assessed by considering the relative number of low condition assessment ratings (i.e. pipework rating, enclosure rating etc.) assigned to each DRS. DRSs that have a relatively high number of compliance issues are considered to have the highest priority for replacement or renewal.

The ongoing condition assessments form the basis of our DRSs upgrade programme to address the integrity issues identified. The average integrity score for all stations has shown a steady improvement over the period, and the count of low condition assessment ratings has shown a significant decrease (improvement) over the period.

The two service regulators installed on our distribution network perform adequately.

In terms of DRS performance, one DRS site has insufficient ventilation to meet our design standards – i.e. there is insufficient ventilation, and/or the ventilation openings are not adequately distributed on the walls of the DRS enclosure. This site has been assessed and prioritised for upgrading. The upgrade of this site will be completed during FY2018.

Due to legacy practices, there is one DRS site where the relief valves are not piped or where the vent pipe ends within one metre of a building. This site is scheduled for decommissioning pending the results of network modelling analysis.

A risk assessment has been carried out on those sites that do not have both an inlet and outlet fire valve. The high-risk sites will be programmed to have the valves installed. Replacement of the lower risk sites will be programmed with another site works.

There are eight sites where the DRS enclosure is located within one metre of another building. Some of these sites are scheduled to be rebuilt (and relocated) or decommissioned over FY2017 and FY2018. The remaining sites are being evaluated to determine if there are any openings into the building within one metre (or directly above) the enclosure, or to determine where the hazardous zones are. If there is a hazardous zone within one metre of an opening, then options to alter or restrict the hazardous zone are to be considered and implemented.

Risks and Issues

Obsolete Regulators

There are three known DRSs that have obsolete regulators. Spare parts for these regulators are no longer available and thus they cannot be easily maintained. Modelling has determined one site to be upgraded in FY2018/2019. The other two sites, DRS008 and 165, will be decommissioned once DRS002 has been rebuilt.

Inadequate Pressure Relief Capacity

Over-pressure protection in our network is often provided by installing full capacity relief valves. With the increase in capacity caused by installing larger regulator orifices/ports, coupled with installing vent pipes on relief valves, some sites may no longer have full capacity relief. Currently there are approximately 12 DRS sites with inadequate relief capacity; one site will be upgraded and the two will decommissioned once the above site (i.e. DRS002) is upgraded. For the balance of the sites the issue relates to bypass streams with inadequate relief capacity. The bypass streams are valve off at all times except for maintenance.

Over-pressure Protection

Our standard DRS design for new DRS installations employs two over-pressure safety devices - i.e. a monitor regulator and a slam-shut ASO device. In certain circumstances the DRS design standard allows a single over-pressure safety device to be used – i.e. where the inlet pressure is IP10 or lower, the outlet pressure is MP4 or lower, and the system demand is less than 500 scmh. This standard was adopted after reviewing the DRS over-pressure protection requirements of relevant industry codes and exceeds the over-pressure protection requirements of AS/NZS 4645.

There are approximately 34 existing DRS sites that have a single over-pressure safety device only, and do not meet our DRS design criteria. Six of these sites are currently scheduled to be upgraded by the end of FY2019. Although the balance of these sites is compliant with the over-pressure protection requirements of AS/NZS 4645 (i.e. with regard to the number of over-pressure safety devices), a risk assessment will be carried on these sites to determine if the current level of over-pressure protection is adequate. For those sites which are assessed as high risk, the installations will be bought up to current standard (for new installations).

Pressure Reducing Stations with Standby Streams

There are 11 known DRS sites that are twin stream but where the streams are not similar in terms of performance or quality of supply. Generally, one stream has monitor/active pilot loaded 50 NB regulators while the second stream has a single spring loaded 25 NB regulator. The second stream is a standby stream and is meant to be valve off at all times except when maintaining the other stream. An audit and assessment of these type of sites has been carried out to determine if this action (i.e. valving off the second stream) compromises the ability to supply, and the relief capacity if the main stream malfunctions.

Currently nine sites have the bypass valve off; of the balance, one site is to be replaced by the end of FY2019.

Equipotential Bonding and Earthing

We are currently in the process of amending the DRS design standard to require the installation of equipotential bonding on all DRS pipework, the earthing of riser pipework and DRS kiosks (including concrete pad reinforcing and the enclosure structure where appropriate), and the installation of surge diverters (where required) for all new DRS. The amendments to the DRS design standard are being developed in conjunction with the development of an electrical hazard management plan (EHMP) as required by AS/NZS4853.

In order to mitigate electrical hazards that could be present at the outstanding 30 DRS installations, a three-year programme to retrofit equipotential bonding, earthing and surge diverters (where required) to all existing DRS is planned for FY2019 to FY2021.

Key Projects

DRS and gate station maintenance is carried out in accordance with our technical standard GNS-0012 Maintenance of gate and district pressure reducing stations.

All underground sites are inspected quarterly, and all above ground sites are inspected six-monthly. The integrity of the site and enclosure is reviewed, and all defects recorded. Operation of equipment is checked and variations outside normal conditions are remedied. Remedial actions are recorded.

In addition, on an annual basis the set points of all equipment are checked and confirmed as within operating parameters. Any variations outside normal conditions are remedied. Remedial actions are recorded, and all valves are actuated.

Maintenance records are reviewed on an annual basis. Trends are used to confirm the appropriateness of maintenance cycles and drive replacement programmes.

Replacement Programme

The replacement of gate station, DRS and service regulator assets is based on an assessment of the following criteria:

- **Condition:** physical deterioration is excessive i.e. beyond economic maintenance. This includes the enclosure.
- **Functional changes:** obsolete equipment - spare parts no longer available and equipment is not operating correctly; equipment malfunction leads to replacement; third party interference; inadequate/poor design.
- **Site changes:** fire stop valves in the carriageway; new/altered surrounding buildings compromising egress, ventilation and access to fire stop valves; vent pipes too close to new/altered buildings; risk consequence/frequency for DRS increased; flooding.
- **Code/standard changes:** legacy plant layout etc. does not meet current codes of practice/First Gas standards.

A DRS replacement/renewal programme has been implemented based on the criteria described above and the results of ongoing condition assessments. The programme prioritises sites according to condition and risk. Specific projects have been scheduled over FY2017 and FY2018. The programme targets the replacement or renewal of approximately six DRSs on our network. The programme includes those DRSs that have been assigned an average condition assessment rating of four or less or which have a relatively high number of technical or regulatory compliance issues.

Where a DRS replacement or renewal candidate is scheduled for removal as a result of a system rationalisation study or is scheduled to be relocated as part of a relocation project, the replacement or renewal of that DRS is deferred.

The condition assessment rating was based on the following key assessments:

Compliance assessment:

- Fire valve rating
- Relief valve rating
- Relief venting rating
- Ventilation rating

Condition assessment:

- Regulator obsolescence rating
- First Gas technical standards rating
- Condition of fittings, equipment and enclosure

Priority is also given to those DRSs where the design capacity will be exceeded and to those DRSs which contain obsolete equipment. The scope of individual upgrades range from the complete rebuilding of a DRS to the replacement of individual DRS components, as determined by the latest condition assessment.

There is no planned service regulator replacement programme. Service regulators will be replaced on a reactive basis.

Line Valves

Distribution system valves are comprised of inline mains and service valves (to control the flow of gas within the system) and blow down valves (to depressurise sections of the system in the event of an emergency).

Valve types currently in use include ball valves, plug valves and gate valves. Due to their design, ball valves are relatively maintenance free whereas the other types require some measure of periodic maintenance to prevent issues and to ensure they remain operable.

Valves are expected to achieve the following level of service and performance standards:

- Mains are to have sufficient valves to isolate consumers in blocks of 500 to 1,000.
- Installation at every 2,000m in PE systems with MAOP greater than 420 kPa.
- All IP services are to be fitted with an isolation valve.
- All services that enter a building at other than the GMS location, pass through a space where gas could accumulate, cross private property to supply another property, or is one

of several extending to different floors of a building, are to be fitted with isolation valves.

- Each service shall end with an isolation valve(s) and shall be upstream of the GMS.
- Valves are to be installed to isolate high-risk areas, such as CBD areas, bridges and rail crossings (note that these valves may be automatic shut-off valves).
- Valves are easily accessible, operable and leak free.
- Valves comply with our standards and legislative requirements.

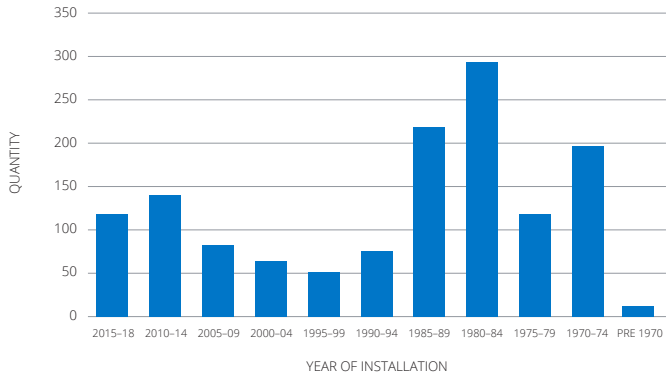
Fleet Overview

Information on valve types (i.e. ball, plug etc.) installed on our networks is not currently available as it was not historically held in either the GIS or asset management systems. The quantity of plug valves installed on our network is unknown. The use of plug valves ceased around the mid-1980s. Plug valves require a higher level of maintenance, because of their design, which includes regular greasing to prevent the valve seizing and/or leaking.

The age profile for line valves on our network is shown below. Ball valves have been used since the mid-1980s and are considered to be reliable and relatively maintenance free.

Mains and service valves are typically installed below ground. The majority are direct-buried and access to the valve is provided via a valve sleeve. In some cases, (e.g. on larger diameter mains) valves are installed in pits or above ground. Below ground valves are generally operated by a purpose-made valve key, whereas above ground valves are typically operated by a hand wheel and gearbox mechanism. Note references to mains valves excludes valves that are installed above ground at gate stations and DRSs; these are operated and maintained as part of station equipment.

Figure 23: Line Valve Age Profile



Condition

Ball valves are typically in good condition and operate adequately. Plug valves represent a significant operational and maintenance problem due to:

- The need for continual greasing to overcome seizing problems
- The grease drying out
- Wads of grease contaminating downstream facilities

Some valve sites are susceptible to the access sleeve filling up with debris. This has to be cleaned out before the valve can be maintained.

In some cases, older valves are no longer able to be located. This is typically due to road alterations or re-sealing which result in obscured valve locations. This is an ongoing problem and in order to mitigate the risk, the deployment of electronic locator balls is being trialled.

Risks and Issues

Under Pressure Shut-off Valves

In the past, road controlling authorities have sometimes stipulated (as part of their consent to attach a gas main to a bridge) that an under-pressure shut-off (UPSO) valve be installed in the pipe on the upstream side (i.e. the supply side) of the bridge. Where UPSO valves were fitted, in some cases they were installed without an appropriate means of periodic testing/tripping of the valve. All known UPSO valves without testing/tripping facilities have now been removed and replaced with ball valves.

Two remaining UPSO valves are known to be in service on our network. Although these valves have the required testing/tripping facilities to allow periodic maintenance to be carried out, they do not have a full bypass installed to allow the valve to be taken out of service if required. The current maintenance standard GNS-0013 Valve maintenance is currently being amended to include provision for the testing of UPSO valves.

Valve Activation

The maintenance programme for ball valves requires valves to be partially operated to confirm that the valve is operable, whereas the maintenance programme for plug valves requires only valves that are “designated emergency valves” to be partially operated.

The reason for different maintenance practices for ball and plug valves is that plug valves can be prone to seizing and by limiting the partial movement operation to critical valves only, the risk of a plug valve seizing in a partially closed position is reduced. However, this approach does increase the risk of a plug valve that is not subject to a periodic partial movement operation seizing during an emergency operation. International practice is being researched to determine an appropriate maintenance strategy for plug valves.

Blow Down Valves

It is an AS/NZS 4645 requirement that section blow down valves be installed on gas distribution networks where shown to be necessary by risk assessment. Due to legacy practices, blow down valves have never been considered for our network. Risk assessments will be carried out on a system by system basis as part of a long-term network isolation study to determine if additional blow down valves are necessary.

Riser Plug Valves

Prior to the introduction of ball valves in the early 1990s, a plug type riser valve was used for residential and small commercial connections. Because of its mechanical design, this type of valve is prone to seizing and gas escapes.

In order to mitigate the risks associated with riser plug valves, annual audits of approximately 1000 riser valves are undertaken. The audits target areas known to have relatively high populations of plug type riser valves and are carried out in accordance with the our technical standard GNS-0013 Valve maintenance.

Sectional Isolation Valves

It is an AS/NZS 4645 requirement that sectional isolation valves be installed to facilitate the safe operation of the gas distribution network.

A long-term network isolation study of high-risk areas (such as CBD areas) is underway to determine if there are sufficient isolation valves to ensure the safe operation under normal or emergency conditions.

Unknown Valve Types

Information on valve types has historically not been captured in the GIS or SAP-PM systems. This impacts on preventive maintenance scheduling as different valve types (e.g. ball or plug etc.) require different types of maintenance activity. The quantity of plug valves installed on our network is unknown. A review of available valve data will be undertaken and uploaded into Maximo where possible. This will be carried out as part of a larger programme to upload asset data into Maximo.

Key Projects

Valve Replacement

In general, valves are expected to last the lifetime of the network system to which they are connected. However, valves will be replaced on an as required basis where:

- The valve cannot be practically actuated.
- Excessive gas escapes are evident.
- In the case of plug valves, the amount of lubricant being installed is compromising the operation of the downstream network.
- The cost of maintenance outweighs the cost of replacing/ relocating the valve.

Network Isolation

The ongoing network isolation study has identified the need for additional valves on key pipe systems to ensure their safe operation under normal or emergency conditions. The installation of additional isolation valves (including DRS fire valves) on our network is planned for the FY2017 and FY2018 periods.

Riser Valve Replacement

In order to mitigate the risks associated with riser plug valves, an annual expenditure provision has been made for the audit of approximately 1,000 to 2,000 riser valves per year.

Corrosion Protection Systems

Apart from certain sections of the Hamilton MP4 systems that require CP restoration or installation the age profiles for our mains and service pipes are shown in the charts below.

All steel pipes on our network now have functional CP systems by the provision of a protective coating (e.g. high-density polythene) and the application of either an impressed current or sacrificial anode CP system. CP systems are intended to meet the following level of service and performance standards:

- Provide an instant off potential of more negative than 850 mV.
- Provide an instant off potential less negative than 1,200 mV when measured with a copper/copper sulphate reference electrode.
- Comply with First Gas standards and legislative requirements.

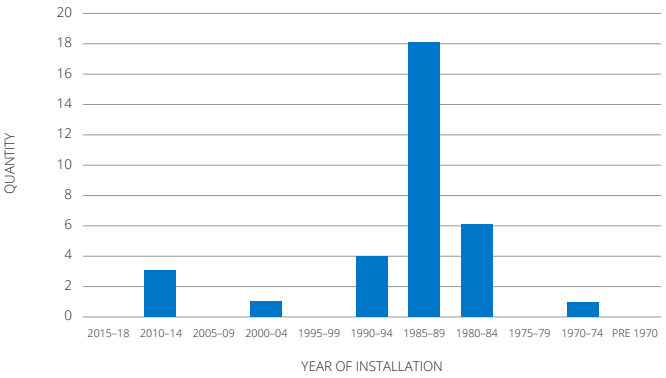
Fleet Overview

The CP systems in our networks comprise of the following:

- 5 Impressed Current CP (IC) systems.
- A further 2 IC systems that are operated and maintained by First Gas Transmission, but which also provide CP protection to our distribution network.
- Approximately 27 sacrificial anode CP systems.
- A number of other small sacrificial anode systems protecting pockets of steel pipe and bridge crossings.

As can be seen in the following age profile, the majority of these systems were installed in the 1980s along with the IP and MP steel mains networks.

Figure 24: Cathodic protection age profile



Condition

Apart from the exceptions noted below, the condition of the overall CP system is considered adequate.

Some CP systems still have inadequate test points to meet the test point spacing requirements of AS2832.1; further upgrade work is planned to install additional test points on these CP systems to meet the requirements of AS2832.1.

Following the completion of the Hamilton MP4 CP system upgrade programme, we identified a problem with the electrical continuity of some steel service connections within the upgraded areas. Subsequent investigations confirmed that not all MP4 steel service lines within the upgraded areas are electrically connected to the steel mains that they are supplied from and therefore have limited or no CP. A five-year programme (FY2015 to FY2019) to restore CP to the remainder of the Hamilton MP4 steel service pipes has been initiated.

Risks and Issues

Third Party Issues

Short circuits are an ongoing problem in a number of areas in Hamilton, particularly the CBD. They are generally caused by faulty insulation joints or to the steel pipes touching other utility assets. Due to the nature of the problem and their location, they can be difficult and time consuming to identify and expensive to remedy. These short circuits can take months/years to locate and can cause excessive current drain, which may contribute to early failure of the CP systems.

When GMSs are replaced on steel services, the insulation joints are occasionally improperly reinstated. These can also cause excessive current drain and contribute to early failure of the CP systems. To address this risk a CP insulating joint tag has been developed. The tag is designed to be installed on GMS risers to warn anyone working on the GMS or the riser that an insulating joint is required on the outlet of the riser valve. The requirement to use the tag will be included in the next revision of First Gas' technical standard GNS-0059 Construction of below ground corrosion protection systems.

Incomplete Inspection

The configuration of a small number of sacrificial anode CP systems within our network has prevented instant-off measurements being taken due to the inability to synchronously interrupt the CP system. Although "on" readings are being taken and these give an indication of CP protection, they do not meet the requirements of AS/NZS 4645. The majority of these sacrificial anode systems have now been upgraded by means of installing CP coupons which allow instant-off testing to be carried out.

Test Point Spacing

An analysis of the network CP test point spacing has shown that on some sections of our network the spacing may not meet the requirements of AS2832.1 Cathodic protection of metals. A six-year programme (FY2013 to FY2018) to install additional CP test points on our network to meet the requirements of AS2832.1 is complete.

Cased Crossings

There are several cased crossings of steel pipes on our network. Cased crossings are typically installed on steel pipes which cross under railway lines or major roads etc. and consist of a larger diameter steel duct through which the steel carrier pipe has been installed. Rail and road operators sometimes insist on the installation of cased crossings on the basis that the casing will vent gas away from the rail or road crossing in the event of a fault on the steel carrier pipe.

Cased crossings are generally avoided as the casing can shield the pipe from its CP. If water, or another electrically conducting medium, enters the casing, the steel pipe may be exposed to risk of corrosion. In some cases, the actual casings do not have CP, thus over time they will corrode which may lead to problems with water or other liquids entering the casing.

The current checks made to cased crossings are to confirm that the CP voltage readings are different from the pipe readings, and that their readings do not alter while an instant on/off potential survey is carried out. This confirms that the casing and the steel pipe are not touching. A review has confirmed that all known cased sites are being monitored, however further research is being carried out to identify any unrecorded cased sites.

Key Projects

Ongoing Maintenance

CP maintenance is carried out in accordance with our technical standard GNS-0015 Maintenance of Below Ground Corrosion Protection Systems.

- All impressed current installations are inspected every two months. The output current and voltage are recorded.
- All drainage bonds are inspected every two months. Electrical connections are inspected to ensure satisfactory operation.
- All galvanic installations are inspected to ensure satisfactory operation: three-monthly, six-monthly and annually in major urban, urban and rural areas respectively.
- All test points are tested three-monthly, six-monthly and annually in major urban, urban and rural areas respectively. The on and instant off pipe to soil potential measurements with respect to a copper/copper sulphate reference electrode is recorded.
- All test points are tested three-monthly and six-monthly in urban and rural areas respectively. The on pipe to soil potential measurements with respect to a copper/copper sulphate reference electrode is recorded.
- Electrical isolation points are tested three-monthly, six-monthly and annually in major urban, urban and rural areas respectively. Any electrical isolation between buried or submerged pipes and other underground metallic structure are tested to ensure they are electrically isolated from each other.
- Interference test points are tested every five years. The on and instant-off pipe to soil potential measurements with respect to a copper/copper sulphate reference electrode is recorded. The testing is carried out in conjunction with the foreign-structure owner with each system being interrupted in turn.

Replacement Programme

In general, impressed current systems are expected to last the lifetime of the network system to which they are attached. However, they will be replaced where the cost of maintenance outweighs the cost of replacing them.

Sacrificial anode systems will be replaced when the anodes have been consumed, or when the CP current requirement exceeds the capacity of the anode system. This may be due to coating deterioration (it is usually more cost effective to increase current to protect coating defects than repair coating defects) or an increase in network size which is beyond the capacity of a sacrificial anode system.

The replacement programmes for our network include an annual provision for the replacement of CP assets as required e.g. installation of surge diverters, installation of new ground beds, upgrade of existing ground beds, replacement of expired sacrificial anodes, relocation of at-risk test points.

A six-year programme (FY2013 to FY2018) to install additional CP test points were completed and have met the test point spacing requirements of AS2832.1 for "suburban and high-rise" areas.

The final project of the Hamilton MP4 steel mains CP upgrade programme was scheduled. This project (i.e. the upgrade of various small standalone steel systems) was re-scheduled due to delays in an associated project to restore CP to steel service pipes. It is anticipated that it will be completed over FY2019 and FY2020.

Following the completion of the initial stages of the Hamilton MP4 CP system upgrade programme, a problem with the electrical continuity of some steel service connections within the upgraded areas was identified. Following investigations into the cause of the electrical continuity problems, a programme needs to be developed to restore CP to the remainder of the Hamilton MP4 steel service pipes. It is anticipated that it will be implemented in FY2020.

In order to further improve the level of CP protection available to the Hamilton MP4 steel network, the installation of a third IC system is being investigated; It is anticipated that the additional IC system will be installed and commissioned during FY2019.

Monitoring Systems

The primary system we use to monitor our gas distribution networks is the Cello system. We deploy Cello systems at permanent monitoring sites around our network and install temporary Cello units for winter gauging, or to obtain customer load profile. The Cello telemetry system monitors pressure data at DRS sites and locations where low pressures are anticipated through modelling.

The Cello system has capability to provide additional functionality that we are not currently using to monitor our network. Investigation is being carried out on areas of expanded functionality where net benefits may be gained. Examples of areas where this functionality could be expanded include:

- Monitoring of a DRS slam-shut sensor (this is being evaluated currently).
- Monitoring of unauthorised entry to DRS station.
- Detection of gas escapes at DRS stations.
- Remote monitoring of CP sites.

Fleet Overview

Permanent Cello data logger installations currently provide pressure monitoring at approximately 45 DRS and other locations.

The Cello system is comprised of GSM remote data loggers that use SMS messages for communication, and a receiving PC located at our New Plymouth Bell Block office. The Cello unit itself is an intrinsically safe unit that can monitor flow and pressure and initiate alarms. Data collected from Cello sites is accessible via a Wonderware data historian.

In addition to the Cello units, approximately 30 further units are used as portable data loggers for winter gauging or performance analysis purposes.

Condition

The average age of Cello units installed at permanent monitoring locations throughout our network is approximately four years. The standard life for the batteries within these units is five years. The Cello system performs reliably and adequately, and all equipment is in good working order.

Risks and Issues

Currently there are no significant risks associated with the Cello telemetry system.

Special Crossings

Special crossings are locations where a section of pipe is installed either above or below ground in order to cross over a roadway, river, railway or any area of interest with a differing risk profile from a standard installation.

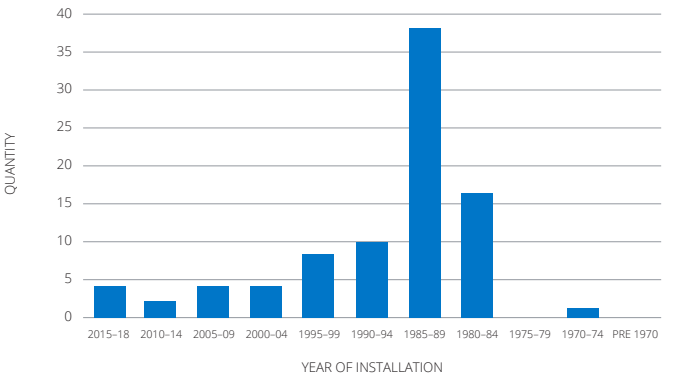
Fleet Overview

Special crossings are typically attached to road or rail bridge structures, although in a few cases they are attached to dedicated pipe bridge structures. These crossings are comprised of either a PE or a steel carrier pipe. Where the carrier pipe is PE it is encased in a steel or PVC duct in order to provide physical and ultraviolet protection to the carrier pipe. The duct is typically attached to the bridge structure by means of galvanised or stainless-steel fittings. Where the carrier pipe is steel it is typically either painted or wrapped (to provide corrosion protection) and attached directly to the bridge structure by means of galvanised or stainless-steel fittings and rollers.

Ensuring adequate access to the special crossing to carry out maintenance inspections is an ongoing challenge at some special crossing sites. This can be due to the physical design of the bridge structure (e.g. the carrier pipe is encased within the structure), or the need to obtain approval (i.e. from the structure owner or operator) to gain access to the bridge structure.

Our distribution network currently has 87 special crossings, the majority of which were installed from the late 1980s onwards. Figure 25 below shows the age profile of the special crossings in our distribution network.

Figure 25: Special Crossings Age Profile



Condition

We have completed detailed condition assessments for the majority of the special crossings on our distribution network that indicate that approximately 60% of special crossings are in good or reasonable condition. The remainder of our special crossing sites require various levels of upgrade work over the coming planning period. Additional budget allowances have therefore been included in the capital and operating expenditure forecasts to cover a range of upgrade work including the replacement of damaged or loose bracket fixings and damaged or poorly designed pipe support brackets, and corrective maintenance work to repair pipe coating damage and ground to air interfaces.

Risks and Issues

Environmental Exposure

Special crossings installed over waterways (particularly estuaries) and high-volume roads (e.g. motorways) are exposed to a harsh physical environment which can compromise the integrity of pipe coatings and support brackets. Where above ground crossings are attached to bridges, additional risks are present due to the potential impact on the general public in the event of a pipe incident or due to corrective maintenance activities. Targeted maintenance inspections are carried out to mitigate the risks associated with these crossings.

Seismic Resilience

In 2012, a seismic review of critical gas distribution infrastructure was commissioned to assess certain assets for compliance with the seismic provisions of NZS 1170. The review included two bridge crossings – one each in Hamilton and Whakatane.

The subsequent report included recommendations to improve the seismic resilience of both bridge crossings.

A detailed design to improve seismic resilience of the bridge crossing located in Hamilton was obtained from a specialist consultant and the recommended upgrade work was completed during FY2016.

Key Projects

The following special crossing projects are planned for the forecast period:

- Upgrade work is planned for the FY2017 to FY2021 period to address specific asset condition issues identified by the recent detailed condition assessments and includes the replacement of damaged or loose bracket fixings and damaged or poorly designed pipe support brackets. The programme has progressed well, and we are ahead of schedule with the works planned to be completed in FY2019.
- A continued small annual expenditure provision has been made to allow for the replacement of pipe brackets and supports as required due to integrity issues.

Critical Spares and Equipment

A stock of critical spares and equipment is maintained so the repair of a network fault is not hindered by the lack of availability of required parts or equipment. Critical spares and equipment items for our networks are owned by us and held our behalf by our Field Service Provider (FSP). When new equipment is introduced to the network an evaluation is made of the necessary critical spares and equipment items required to be retained to support the repair of any equipment.

The majority of the critical spares and equipment items are held in our FSP's main depot in Hamilton, with small inventories also being held at regional depots in Whangarei, Mt Maunganui, Rotorua, Taupo, Gisborne and Kapiti.

Additional lists of critical spares and equipment are maintained for each of the FSP's emergency depots. These lists have been developed over a period of time and are the result of collaboration between us and our FSP. When new critical spares and equipment items are required they are typically sourced via our FSP. Where the scale of a proposed purchase warrants it (e.g. the purchase of a major equipment item), direct purchase by First Gas would take place.

Fleet Overview

The critical spares and equipment lists include items that are low volume (turnover) or high cost, or have long lead times for purchase, or are no longer produced (obsolete) or where the level of risk associated with not holding a spare is considered high.

The list includes fittings and equipment related to steel pipes (e.g. TD Williamson drilling and stoppling equipment, repair clamps, valves), DRS spares (e.g. Cocon cartridges, regulators), regulator overhaul kits and PE fittings. The need for the wide range of items is due to the relatively long lead times to obtain replacement parts from key suppliers and the geographic spread of our network.

Condition

The general condition of the critical spares and equipment is adequate. Some of the equipment (e.g. TD Williamson drilling equipment used for hot tap operations on live steel gas mains) is at least 25 years old, and its current condition reflects the relatively high level of service. The standard life for critical spares (i.e. excluding critical equipment) is 50 years.

An appropriate range of critical spares and equipment is held within our FSP network. The performance of the critical equipment items is adequate, although in some cases the type of drilling equipment currently held limits the range of specialised fittings that can be used e.g. completion plugs. The compatibility of equipment with the range of specialised fittings currently available will be considered when planning the replacement of existing, or the acquisition of additional, items of critical equipment.

Risks and Issues

A replacement programme for critical spares and equipment has not been formalised. An audit of critical spares and equipment was completed during FY2016 to confirm stock holdings.

The management of the critical spares and equipment inventory and associated preventive maintenance inspections is carried out within our FSP's data-warehouse system. We have access to the critical spares and equipment inventory data via a web-based Citrix report, however preventive maintenance inspection records are not currently included in the report. Options to provide further visibility to preventive maintenance records will be explored following the network transition.

Key Projects

The development of a replacement/renewal programme for critical spares and equipment is expected to be completed in FY2018 A nominal annual expenditure provision has been made for the replacement of unspecified critical spares and equipment on an as required basis.

APPENDIX F: SYSTEM DEVELOPMENT

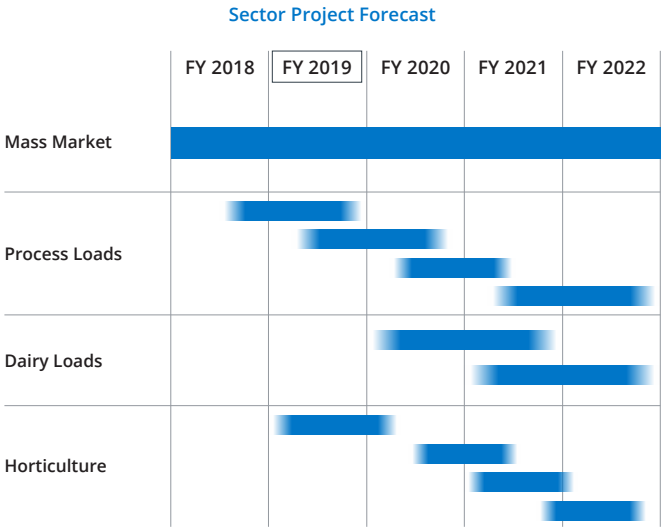
This appendix introduces our approach to developing our gas distribution network. It explains what we mean by system development and our approach to planning these investments. It describes our capacity modelling and demand forecasting approaches. It sets out our development plans for each system.

1.1. SYSTEM DEVELOPMENT PLANNING

We use the term 'system development' to describe capital investments that increase the capacity, functionality, or the size of our network. These include the following main types of investments.

- **Growth:** investments are those which change the capacity and/or configuration of our network to ensure we meet demand at appropriate supply security levels. Typically, these investments extend the network to developing areas, or increase capacity or supply levels to cater for general demand growth.
- **Customer connections:** expenditure to facilitate the connection of new customers to our network that may be, at least partly, funded by the connecting third party.

Figure 26: Depicting First Gas sector growth forecast



1.1.1 Planning Objectives

Our primary objectives in system development planning are to identify and prevent foreseeable network related security,[1] capacity and quality (system pressure) problems in a safe, prudent and cost-effective manner. The planning process involves the consideration of:

- The design and operation of the network and any potential safety risk to staff, contractors or the public.
- Supply quality, security or capacity issues that may prevent us from delivering to our target service levels.
- Adequacy of supply to new developments or areas requiring gas connections.
- Customers' reasonable gas supply requirements, inclusive of a prudent capacity margin to cater for foreseeable medium-term load growth.
- Statutory requirements imposed on the network design, including acceptable pressure levels.
- Potential supply quality problems identified from sources such as network measurement and monitoring (system pressure), gas flow modelling and customer complaint databases.

1.1.2 Investment Drivers

System development planning is concerned with delivering performance based on the availability of reserve capacity in the network to a level acceptable to the business, or as agreed with our customers. We have a number of key policies, standards and guidelines underpinning our system development planning approach.

- **Quality of supply:** our quality of supply standard specifies the minimum levels of network pressure (including levels of redundancy) to ensure an appropriate level of supply service.
- **Network parameters:** including acceptable operating pressure levels, pipe sizes, flow rates providing an appropriate operating framework for the network. These will generally be aligned with industry norms.
- **Service levels:** established as part of the use of network agreements with retailers and customers.
- **Technical standards:** ensure optimum asset life and performance is achieved. These ensure that capital cost, asset ratings, maintenance costs and expected life are optimised to achieve lowest overall cost. Standardisation also reduces design costs and minimises spare equipment holding costs, leading to lower overall project costs.

1. Security as used in a planning context means the security of the gas supply – i.e. the likelihood that supply may be lost.

Quality of Supply

We recognise the importance of supply quality to our customers. Our networks are designed to a quality level that ensures most modern gas-driven equipment can operate effectively. Strategies have been adopted to monitor and manage the impact of quality on the network. These include installation of pressure and flow monitoring equipment at gate stations, district pressure stations and customer sites and the application of modelling software and tools to predict the impact of supply quality on customers.

The capacity of an individual pipeline is determined by the operating pressure, the diameter of the pipe and the allowable pressure difference between inlet and outlet. Meshed distribution systems work under the same basic principle. As the network expands and demand grows, certain parts can become constrained resulting in lower downstream pressures. We therefore prepare regular system pressure monitoring surveys and modelling to identify constraints and implement upgrades before pressures become insufficient.

We have considered several factors in determining the quality of supply applicable to our gas distribution network. These include the degree of redundancy under different circumstances and supply pressure criteria which, when combined, build the overarching quality of supply criteria.

- Under normal network operating conditions, our standard stipulates that the pressure at any point on the network shall be no less than 50% of its nominal pressure (NOP), and no higher than its maximum allowable operating pressure.
- In some cases, non-standard minimum network pressures (MinOP) are used as a result of network configuration or special agreements with customers.

Additionally, our standard defines the minimum network pressures to be maintained using contingency provisions upon loss of a critical element in the supply chain.

- Intermediate pressure (IP) networks shall be operating at no less than 40% of NOP.
- Medium pressure (MP) networks shall be operating at no less than 30% of NOP.
- Low pressure (LP) networks shall be operating at no less than 2kPa.

During contingency conditions, network pressures may drop below those experienced during standard and non-standard operating conditions.[2] In these situations, maintaining network pressure depends on the type of fault and the network configuration. Contingency provisions such as customer load shedding are used to maintain network pressure to the end users.

1.1.3 Managing Uncertainty

Several precautions are taken to mitigate the risks of making long-term investments in an uncertain environment. Apart from normal risk avoidance measures, specific actions taken to mitigate the risks associated with network investments include:

- **Act prudently:** prioritise small incremental investments and defer large investments for as long as reasonably practicable. The small investments must, however, conform to the long-term investment plan for a region and not lead to future asset stranding.[3]
- **Optimise with replacement projects:** for large network assets, rather than replace existing end-of-life assets with the modern equivalent, a review is carried out to confirm the continued need for the assets, as well as the optimal size and network configuration that will meet our needs for the next asset lifecycle.

Planning Timeframes

We produce plans based on near, medium and long-term views. This helps to address the differing levels of uncertainty that apply over different time periods.

- **Near term plan:** is the most accurate and generally captures load growth for the next three years. This timeframe identifies short-term growth patterns, mainly leveraging off historical trends. It generally allows sufficient time for planning, approval and network construction to be implemented ahead of changing network demand.
- **Medium-term plan:** covers the next 10 years, and anticipates regional development trends such as land rezoning, new transport routes and larger infrastructure projects. The medium-term plan also captures behavioural changes such as the adoption of new technologies or global trends (e.g. impact of climate change on consumer behaviour).
- **Long-term plan:** looks at growth patterns within the region at the end of the current asset lifecycle, around 40 years out. A top-down approach is used to predict probable network loads within the region, from which the requirement for pressure system upgrades or new gate stations and DRSs are identified. The objective of this is less about developing accurate load forecasts and more about providing a long-term development plan, identifying likely future network requirements.

2. Under contingency situations, networks are isolated to maintain safety to customers and the general public.
3. A stranded asset is a financial term that describes something that has become obsolete or nonperforming well ahead of its useful life and must be recorded on a company's balance sheet as a loss.

1.1.4 Planning Methodology

Planning for growth investments requires anticipated shortfalls in capacity under forecast demand conditions. We plan for efficient and timely investment in additional capacity and security before reliability is adversely affected.

We use demand forecasts and network modelling to provide an accurate picture of future demand growth (or decline) so investment decisions can be made with confidence. When used in conjunction with equipment ratings, it is possible to plan for the required quality of supply margins within the network relative to our quality of supply standard and required service levels.

These developments need to fit within the context of our wider asset management activities (e.g. renewal plans), such that investments are optimised across all business objectives and constraints. We manage our assets using an asset lifecycle approach, which helps ensure these activities are integrated.

Our development planning process involves the following steps:

1. Needs Identification
2. Options Analysis
3. Solution Definition
4. Project Prioritisation

Needs Identification

The need for a growth investment may arise following the identification of any of the following:

- Upcoming supply quality, security or capacity issues that may prevent us from delivering target service levels.
- Adequacy of supply to new developments or areas requiring gas connections.

In all cases, effective design requires consideration of the forecast planning demand, the capacity of network[4] and the impact of the environment in which the equipment will operate.

Using this information, we are able to monitor the network capacity relative to our quality of supply Standards and thus identify any potential shortfalls between available capacity and expected demand. If these capacity breaches are deemed to require an investment solution or modification to the network, a project will be initiated.

Options Analysis

Once a modification to the network has been identified as necessary, a project is scoped, and a number of possible options are developed that meet the modification's objectives.

These options may be asset or non-asset based, and the optimal solution may not necessarily result in system augmentation. Additionally, there are significant efficiencies that can result from a solution that allows conventional network investment to be deferred without compromising capacity or supply pressure.

In developing options, consideration is given to the following factors to ensure the investment decision is prudent and efficient.

- Currency and accuracy of network capacity rating.
- Validated models by collecting actual system pressure data through pressure data loggers.
- Load diversity opportunities (e.g. transfer to alternative pipelines or DRSs).
- Leverage of other projects to gain synergies, e.g. asset replacement, road re-alignment or new construction activities.
- Use of risk assessment criteria to ascertain risk tolerance, and to test that:
  - the solution cost is not disproportionate to the benefits obtained.
  - that recommended solutions are commercially sustainable.
  - loss of supply to customers is minimised.

The options considered are summarised in a business case that is submitted for project solution evaluation.

Solution Evaluation

Once developed, the project options are evaluated (both financially and on a risk basis) to identify the optimum investment decision that meets both the project requirements and maintains the current service level to existing consumers.

System development improvements, or non-asset solutions, are preferred over deferring system expenditures. If asset solutions are inevitable, smaller projects are prioritised over larger projects to reduce the risk of stranded assets. Early investment is avoided unless there are good reasons to do otherwise (for example, to take advantage of the synergy of implementing in conjunction with other projects).

Project Prioritisation

Once we have identified the preferred project solution, we compile a list of development projects including other areas of network investment (e.g. asset replacement), along with their proposed schedule and initial budgets, and commence project prioritisation. Projects are prioritised based on corporate investment drivers, as per the investment prioritisation procedure outlined in Appendix H.

4. Including the capacity of all installed equipment. Refer Section 5.2.

1.2. NETWORK AND ASSET CAPACITY

To enable the capacity of the delivery points (and subsequent pressure systems) to be assessed, it is necessary to have a reliable assessment of the capacities of the major components within the network. The major components within our distribution network include:

- Pipelines
- Gate stations
- District regulating stations (DRS)

Determining the capacities of these network components requires a detailed assessment of each sub-component. For example, in assessing the capacity of a DRS, we need to assess the performance ratings of the filter, meter, regulator and other accessories to ensure the sub-component with the lowest rating is identified. Therefore, the minimum rated sub-component determines the overall asset rating.

The following subsections describe how the capacities of our major network components are assessed. In all cases, we use maximum operating capabilities to determine the asset capacities.

1.2.1 Pipelines

Due to the various pipeline types, network configurations, and varying consumer loads the analysis of pipeline capacity is quite complex. We determine pipeline capacity by examining the relationship between system pressures, pipe diameter and the allowable minimum operating pressure (MinOP). This is achieved using a network modelling tool called 'Synergi Gas'[5], that is capable of determining minimum pressures a pipeline system can sustain under load condition.

We also utilise Synergi Gas for our distribution network modelling.

1.2.2 Gate Stations

Our gas distribution network takes supply from the transmission system via gate stations, which are also operated and maintained by First Gas.

The capacity of these gate stations is designed to meet the 10-year forecast load requirements at that point in the network. We base this load on minimum design inlet and outlet pressures, and current load projections on the overall network.

From a gas distribution perspective, it is necessary that we to obtain an ongoing understanding of the design capacity of many of the gate stations upstream of our network. Any capacity constraints imposed at a gate station may impact on distribution investment decisions. Subsequently, by obtaining an improved knowledge of these gate station capacities and constraints, we are able to make improved development decision by offering a wider range of investment options.

1.2.3 District Regulating Stations

The purpose of a DRS is to control the pressure in the downstream mains pipeline to which it is connected. Similar to gate stations, we design a DRS with sufficient capacity to supply the 10-year forecast load. Again, based on minimum design inlet and outlet pressures, and current load projections for heavy utilised pipelines in the network region such as Kapiti and Waikato where the pressure system is ranging between MP4 to IP20.

These design pressures are based on our quality of supply Standards to ensure adequate supply pressure and capacity across the network.

1.3. DEMAND FORECASTING

This section describes our approach to forecasting gas demand on our distribution network.

1.3.1 Demand Forecast Methodology

We use a specially developed model to forecast gas demand on our distribution network. Using this model, we can project the winter (annual peak) forecasts at each gate station for the next 10 years based on historical trends by taking the followings steps.

- We use historical monthly flow data to determine a maximum flow for each quarter. Where multiple meters are present at a gate station, we either sum or average the readings based on the station configuration. Zero, anomalous and incomplete data is excluded from analysis so as to not pollute the results. In some cases, where meter data is not available we utilise system pressure monitoring programmes to assess the network demand. Where a gas network is supplied from two (or more) gate stations, the timing of the network peak gas flow may not coincide with either of the gates stations' peak flows.[6]

5. SynerGi Gas is a proprietary gas network modelling software package developed by DNV.
6. In such cases, we calculate a coincidence factor which we apply to the growth trend. This is expressed as the maximum peak flow into the network divided by the sum of the individual peak flows of the two gate stations. Similarly, a coincident factor is also applied where two network systems are supplied by one gate station. The coincident and non-coincident demand is the same for gas distribution networks with a single gate station supply.

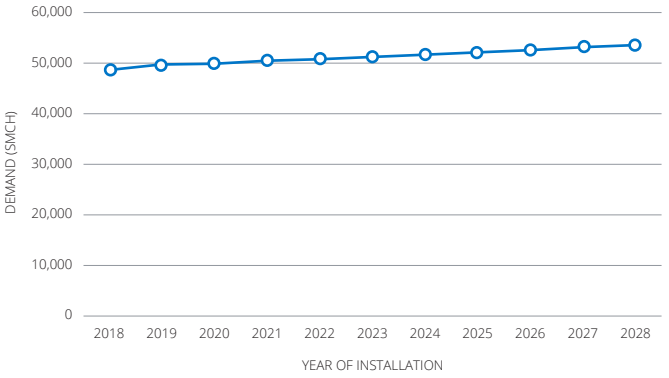
- We then analyse the quarterly maximum flow values for several factors: long-term trend, business cycle effects, seasonality and any unexplainable, random variation. As it is usually very difficult to isolate the business cycle effects in networks with a mix of consumers, we assume the trend component comprises both long-term average and cyclical effects. The process of analysing this data comprises two stages.
  - **Decomposition:** applies moving averages to eliminate the irregular and seasonal variation in the data to identify the long-run growth trend within the time-series.
  - **Adjustment:** secondly, historical flow data is seasonally adjusted, and the trend is then extrapolated[7] and multiplied by an appropriate seasonal index to obtain the baseline long-term demand at each gate station.
- Any confirmed future connections that are anticipated to have a significant impact on demand are manually added to the demand forecast. The resultant data gives us the long-term demand at each gate station and ultimately drives the expected future network configuration.

1.3.2 Demand Forecast

Figure 27 below shows the load forecast for our network based on the modelling methodology described above. The load forecast shows a consistent growth on the network of approximately 1% over 10 years consistent with expected connection forecast.

This growth is not expected to be uniform across the entire network, with certain regions identified as having a high growth potential, and others with little or no expected growth. The growth for individual gate stations within the network are further detailed in Appendix E.

Figure 27: Demand forecast for the next 10 years



1.4. NETWORK MONITORING

Pressures throughout the network are monitored as part of ongoing surveys routinely undertaken on the network. These programmes are designed to provide the necessary system performance data that facilitates network modelling.

We employ multiple methods to collect the required network performance data, including:

- Manually downloaded or remotely downloaded portable electronic data loggers (e.g. Cello).
- Gas consumer time-of-use data obtained directly or indirectly from retailer measurement systems or meters.
- Gas transmission Supervisory Control and Data Acquisition (SCADA) system data.
- Isolated readings obtained during peak loading conditions.

Appendix H provides functional and physical descriptions of these systems.

7. The extrapolation uses a linear trend except where the trend results in negative values. In these cases, zero growth is applied.

1.4. NETWORK MODELLING

To model our distribution network, we use a computer modelling tool called Synergi Gas. Synergi Gas is designed to model gas network flow, pressure profiles and capacity margins. We use this software for the following functions.

- To determine the minimum pressure a pipe system can sustain under load conditions.
- For scenario analysis when considering development options and assessing forecast demand.
- To assess the impact of changes to network operating parameters (such as increasing or reducing operating pressure in parts of the network) and to assess network risk.

The majority of our network planning models have been developed from data extracted from our GIS and billing systems and adapted for use using the network modelling software.

Our network models are validated by comparing the model performance to the actual performance of the gas distribution network that is recorded as part of network monitoring. Where the model and actual network performance differ, the model is updated to reflect actual conditions.

The total system flow for each network model is then scaled to align with the actual peak flow. This alignment is applied evenly across the network by adjusting the existing loads in the model. This becomes the base model for the network or pressure system.

Our network models on high growth areas are updated on a three-yearly cycle.

1.6. CUSTOMER CONNECTIONS

In our view increased gas availability is good for consumers, providing the power to choose their ideal energy mix at home and at work. We believe that having more gas users, with more diverse needs, will make our business more resilient and will ultimately lead to more competitive prices for our customers. In order to achieve this, we must deliver gas to the consumer cost effectively, securely and ensure connection to our network is as simple as possible.

We aim to work closely, and openly with consumers of all sizes in order to ensure confidence in our quality of supply and viability as a supplier of alternative energy.

1.6.1 Connecting to our Network

Residential

Gas delivers a clean, efficient, and economical source of energy. Providing endless hot water, precise cooking control, heating or to enhance outdoor entertaining, gas is the ideal energy choice.

Consumers interested in making a connection to our network or wishing to check our network coverage should:

- call the First Gas connections number 0800 NEW GAS (0800 639 427), or
- visit the First Gas website (www.firstgas.co.nz) to make an online enquiry, or
- email connections@firstgas.co.nz.

The connection process takes around four-six weeks from an acceptance letter from the customer to connection. We obtain all the necessary plans and approvals from council and utility companies and liaise with the chosen retailer and metering company to deliver the connection. Once we have these, we schedule a connection time dependent on customers' demand, as well as weather and schedule restrictions. All connection fees are fully disclosed and depend on the distance from the meter position to the property boundary, as well as the load being installed. Free connections are available for those who meet our free connection criteria, where less than 20 metres of service is required, gas hot water or central heating is being installed, and the connection is straightforward - not requiring traffic management or specialised reinstatement. A quote is sent – whether the connection is free or has a charge – before we commit to completing the connection.

Business and Commercial

Most enquiries we receive for subdivision reticulation come via a consultant.

Developers wishing to enquire directly about inclusion of gas reticulation into their developments, or to check our distribution coverage can:

- call us on 0800 NEW GAS (0800 639 427)
- email connections@firstgas.co.nz, or
- visit the First Gas website (www.firstgas.co.nz) to make an online enquiry.

We work with developers to find the most cost-effective way to get natural gas reticulated into their subdivision, and to promote natural gas to end consumers.

Our industrial and commercial customers appreciate our ability to offer a gas supply that meets all their needs. We are proud to provide a reliable, economic, clean energy source to some of New Zealand's most significant commercial and industrial operations that form the lifeblood of this country's economy.

Larger customers that are considering switching or including gas in their energy needs can contact our Commercial Team on 0800 NEW GAS (0800 639 427), by emailing us at connections@firstgas.co.nz, or by applying online. Energy retailers and consultants are also a great source of information on the benefits of natural gas, and can facilitate the connections process, so may be worth engaging with them early in the process.

Check before you dig!

Parties planning an excavation or renovations on land where underground services may be present (e.g. gas pipes, electricity or other services), need to ensure safety is maintained while work is being carried out.

They should contact BeforeUDig by phoning 0800 248 344 or submit an enquiry form at www.beforeudig.co.nz before carrying out any activities that may disturb underground services. Here they will also find network maps, close approach consents and permits to work.

1.6.2 Forecasting Customer Connections

The ICP connections forecast, combined with known and forecast subdivision, commercial and industrial connections, informs our forecast Capex spend on customer connections.

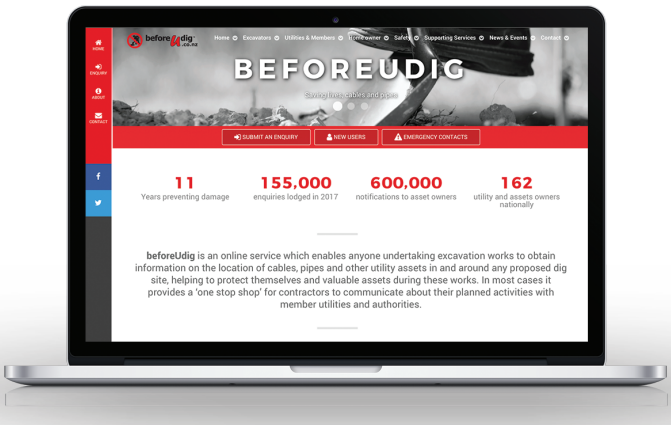
Larger commercial and industrial consumer connection rates are more difficult to predict than residential and subdivisions. As such, we use a more reactive approach to forecasting these loads, incorporating significant connections into the forecast models as requests arise.

Commercial Connections

An example of the difficulty to predict commercial connections is illustrated with the Open Country Dairy new gas supply.

First gas received a request late 2017, for a new Gas Demand to supply a dairy in Horotui, with a supply date of May 2018.

The scope of the work involves the extension of the IP20 network, with a staged increase in gas demand over three years.



APPENDIX G: NETWORK DEVELOPMENT PROGRAMME

This appendix sets out our long-term development plans for our larger gas distribution systems.

G.1 WHANGAREI NETWORK SYSTEM

The Whangarei system is supplied from the gas transmission system at one gate station, located in South Whangarei. The Whangarei network system consists of one IP pressure system, five MP4 pressure system and 11 DRSs. About 1,200 consumers are connected to the Whangarei network system, most of whom are residential customers. Around 16% are commercial/industrial gas users, e.g. a hospital and bakeries.

SYSTEM	PLANNED DEVELOPMENT
Whangarei IP10	Nil
Union East Street MP4	Nil
Pipiwai Road MP4	Nil
Whangarei MP4	Nil
Dyer Street MP4	Nil
Port Whangarei MP4	Nil

G.2 MARSDEN POINT NETWORK SYSTEM

The Marsden Point network system is supplied from the transmission system at one gate station, located in Mair Road. This network system consists of one MP7 pressure system and is supplying gas to one industrial consumer. No DRSs are installed in the Marsden Point network system.

SYSTEM	PLANNED DEVELOPMENT
Marsden Point MP7	Nil

G.3 HUNTLY NETWORK SYSTEM

The Huntly network system is supplied from the transmission system at one gate station located in Hetherington Road. This network system comprises one MP7 pressure system, three MP4 pressure systems and three DRSs. About 110 consumers are connected to the Huntly network system, 69% of whom are residential consumers; the remainder being commercial and industrial users.

SYSTEM	PLANNED DEVELOPMENT
Huntly MP7	Nil
Huntly East MP4	Nil
Huntly Central MP4	Nil
Harris St MP4	Nil

G.4 NGARUAWAHIA NETWORK SYSTEM

The Ngaruawahia network system is supplied from the transmission system from one gate station located in Brownlee Avenue. This network system comprises one MP7 pressure system, one MP2 pressure system and one DRS.

The Ngaruawahia MP7 pressure system is designed to operate at IP20 (MAOP 1,820kPa) but is currently operating at a lower pressure of 450kPa. The purpose of the lower operating pressure is to improve the accuracy of the transmission gate station meter and to minimise the effects of odorant fade in this network system.

About 160 consumers are connected to the Ngaruawahia network system. The consumers are predominately residential consumers; only around 4% are commercial/industrial gas users.

SYSTEM	PLANNED DEVELOPMENT
Ngaruawahia MP7	Nil
Ngaruawahia MP2	Nil

G.5 HOROTIU NETWORK SYSTEM

The Horotiu network system is supplied from the transmission system at one gate station located in Horotiu Bridge Road. This network system comprises one IP10 pressure system, one MP4 pressure system and one DRS. A total of six gas consumers are connected to the Horotiu network system. They comprise four large commercial/industrial consumers and two residential consumers.

SYSTEM	PLANNED DEVELOPMENT
Horotiu IP10	Nil
Huntly East MP4	No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, to support potential industrial and business growth in Horotiu, notably the development of Northgate Business Park, the following projects are planned in FY2022 - FY2023: – Extend approximately 350 metres of 100mm PE MP4 from the new DRS to the junction of Horotiu Bridge Road and SH1. – Construct approximately 560 metres of 100mm PE MP4 along Horotiu Bridge Road between Washer Road and SH1.

G.6 HAMILTON NETWORK SYSTEM

The Hamilton network system is supplied from the transmission system at two gate stations, located at Te Kowhai in the North West and Temple View in the South West of Hamilton. The Hamilton network system comprises one IP10 pressure system, one MP7 pressure system, three MP4 pressure systems, one MP2 pressure system, three MP1 pressure systems, five LP pressure systems and 38 DRSs.

Approximately 28,000 consumers are connected to the Hamilton network system. They are predominantly residential consumers; only around 4% are commercial/industrial gas users.

SYSTEM	PLANNED DEVELOPMENT
Hamilton IP10	Constraints have been identified, the system pressure has fallen below the MinOP criteria in the past. However, to enhance network security the following reinforcement are planned: – Upgrading the existing IP pipeline from Te Kowhai gate station to Avalon Drive from 1,200kPa to 1,900kPa. Includes: • Uprating of pipeline is planned in FY2019 • New IP20/IP10 DRS is planned in FY2019 – Construct a new pipeline from DRS139 in Te Rapa to DRS100 in Hamilton East as part of the long-term development plan.
Hamilton MP7	Nil
Hamilton West MP4	No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, to enhance network security the following reinforcements are planned in FY2020: – Install approximately 150 metres of 50mm PE MP4 in Avalon Drive from #27 Avalon Drive to #1 Livingstone Avenue. – Install approximately 100 metres of 50mm PE MP4 from #23 Roy Street to #26 Livingstone Avenue. – Install a new IP10/MP4 DRS at a location in Te Kowhai Road between Exelby Road and Ruffell Road. Note that DR-80123-HM supplies more than 60% of the total load. If DR-80123-HM failed, suburbs south of Grandview Road and north of Killarney Road / Tuhikaramea Road would fall below the minimum pressure criteria. Note that Hamilton West MP4and Pukete MP4 networks have been meshed in FY2018, providing increased security of supply
Pukete MP4	No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, to enhance network security the following reinforcements are planned: – Construct approximately 650 metres of 80mm PE MP4 pipeline loop in Te Rapa Road from DR-80139-HM to Mahana Road; and FY2019. – Construct approximately 180 metres of 50mm PE MP4 in Te Papa Road from Bryant Road to #558 Te Rapa Road. FY2019. Contingency scenario analysis of the MP4 Pukete system suggests that if DR-80133-HM failed, supply south of Mears Road (apart from the connections in Te Papa Road) would be lost. Whilst DR-80129-HM provides significant load in the area, if it failed, DR-80130-HM would be able to supply adequate back up pressure. The only customer impacted is the Hamilton Waste Water Treatment Plant where metering pressure would drop below the specific minimum design pressure of 300kPa. However, the reduction in metering pressure is not anticipated to impact the operation of the treatment plant.

SYSTEM	PLANNED DEVELOPMENT
Hamilton MP4	No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, industrial and residential growth is expected to occur north of the network system which is solely supplied by DR-80145-HM. To address this, the following reinforcements have been completed or are planned to complete by FY2021: – Construct approximately 400 metres of 100mm PE MP4 in Cambridge Road from the outlet of DR-80101-HM to Hillcrest Road and tie into the existing 80mm steel. (Complete) – Construct approximately 50 metres of 50mm PE MP4 at the intersection of Boundary Road and Heaphy Terrace and tie into the existing gas mains. (complete) – Construct approximately 2,100 metres of 80mm PE MP4 in Gordonton Road between Wairere Drive and Thomas Road. (FY2021) Contingency scenario analysis of the Hamilton MP4 pressure system suggests that DR-80145-HM is the only DRS at present supplying Hamilton North. Failure of this DRS would result in a significant loss of supply in the area. A reinforcement proposal to construct approximately 2,500 metres of 100mm PE MP4 to link DR-80130-HM to River Road (river crossing) is being considered.
Temple View MP2	Nil
Tuhikaramea Road MP1	Nil
Hamilton North MP1	Nil
Hamilton South MP1	Nil
Fairfield LP	Nil
Frankton LP	Nil
Hamilton West LP	Nil
Hamilton East LP	Nil
Cameron Rd LP	Nil

G.7 MATANGI NETWORK SYSTEM

The Matangi network system is supplied from the transmission system from one gate station located in Tauwhare Road. This network system comprises one MP4 pressure system.

The Matangi network system supplies 37 residential consumers. Flow data for the Matangi gate station is not currently available. As the system is considered low risk of breaching quality of supply, we do not intend to collect this information at this point in time. No DRS is installed in the Matangi network system.

SYSTEM	PLANNED DEVELOPMENT
Matangi MP4	Nil

G.8 MORRINSVILLE NETWORK SYSTEM

The Morrinsville network system is supplied from the transmission system from one gate station located in the south of Morrinsville. This network system consists of one IP10 pressure system, one MP4 pressure system and two DRSs. About 700 consumers are connected to the Morrinsville network system. They are predominately residential consumers; only around 7% are commercial consumers and there is one industrial gas user.

SYSTEM	PLANNED DEVELOPMENT
Morrinsville IP10	Nil
Morrinsville MP4	Nil

G.9 KIWITAHI NETWORK SYSTEM

The Kiwitahi network system is supplied from the transmission system from one gate station located in Morrinsville-Walton Road. This network system comprises one MP4 pressure system. The Kiwitahi network system supplies one large commercial consumer and one large industrial gas user.

SYSTEM	PLANNED DEVELOPMENT
Kiwitahi MP4	Nil

G.10 WAITOA NETWORK SYSTEM

The Waitoa network system is supplied from the transmission system from one gate station located in Wood Road. This network system consists of one IP20 pressure system, one MP7 pressure system, one MP4 pressure system and two DRSs.

A total of 46 consumers are connected to the Waitoa network system comprising 30 residential consumers and 14 commercial/industrial gas users. At system peak, the total gas demand from five major gas users takes 95% of the system total flow rate.

SYSTEM	PLANNED DEVELOPMENT
Waitoa IP20	The forecast demand during the planning period is expected to result in the MinOP falling below the system pressure criteria. To address this issue, the following reinforcement project is planned: – Construct 800 metres of steel pipe and link into the existing 50mm steel. Note: Project subject for review.
Waitoa MP7	Nil
Waitoa MP4	The forecast demand during the planning period is expected to result in the MinOP falling below the system pressure criteria. To address this issue, the following reinforcement projects are planned: – Install a DRS (MP7/MP4) at Ngarua Road, Waitoa in FY2018.

G.11 CAMBRIDGE NETWORK SYSTEM

The Cambridge network is supplied from the transmission system from one gate station and consists of one IP20 pressure system, two MP4 pressure systems and three DRSs. There are currently around 1,920 consumers connected to the Cambridge network system. They are predominantly residential consumers; only around 5% are commercial/industrial gas users, including two large industrial consumers.

SYSTEM	PLANNED DEVELOPMENT
Cambridge IP20	No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, recent requests from subdivision developers suggests that the gas demand in the area is expected to increase, resulting in the Cambridge IP20 network falling below the minimum pressure criteria during the planning period. To address this issue, the following reinforcement options are planned during the planning period: – Construct approximately 1,430 metres of 100NB IP20 steel pipeline from the South of the Waikato Expressway to Taylor St, near DRS245. This will provide up to 1,660 scm/h of capacity into the Cambridge network through the IP20 system.
Cambridge MP4	No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, to enhance network security the following reinforcements are planned: – Construct 1,100 metres of 100mm PE pipeline from DR-80244-CA Queen St to the bridge crossing in Queen Street in FY2018/2019. – Link 50mm PE pipes in Thompson Street in FY2018.
Bruntwood MP4	Nil

G.12 TE AWAMUTU NETWORK SYSTEM

The Te Awamutu network system is supplied from the transmission system from two gate stations, located at Te Awamutu and Kihikihi. The Te Awamutu network system consists of one IP10 pressure system, two MP4 pressure systems and two DRSs.

Te Awamutu network system supplies approximately 1,400 consumers, around 54% of whom are commercial/industrial gas users.

SYSTEM	PLANNED DEVELOwPMENT
Kihikihi IP10	Nil
Te Awamutu MP4	Nil
Kihikihi MP4	Nil

G.13 WAIKERIA NETWORK SYSTEM

The Waikeria network system is supplied from the transmission system from one gate station located in Higham Road. This network system comprises one IP20 pressure system currently supplying gas to one large customer at the end of the system.

SYSTEM	PLANNED DEVELOPMENT
Waikeria IP20	Nil

G.14 PIRONGIA NETWORK SYSTEM

The Pirongia network system is supplied from the transmission system from one gate station located in Pirongia Road. This network system comprises one MP4 pressure system. A total of 50 consumers are connected to the Pirongia network system comprising 47 residential consumers and 3 small commercial gas users.

SYSTEM	PLANNED DEVELOPMENT
Pirongia MP4	Nil

G.15 OTOROHANGA NETWORK SYSTEM

The Otorohanga network system is supplied from the transmission system from one gate station located in Waitomo Valley Road. This network system comprises one MP4 pressure system. About 180 consumers are connected to the Otorohanga network system. They are mainly residential consumers; around 21% are commercial/industrial gas users.

SYSTEM	PLANNED DEVELOPMENT
Otorohanga MP4	Nil

G.16 TE KUITI NORTH NETWORK SYSTEM

The Te Kuiti North network system is supplied from the transmission system from one gate station located in the northwest of Te Kuiti. This network system consists of one IP10 pressure system, three MP4 pressure systems and five DRSs.

Approximately 150 consumers are connected to the Te Kuiti North network system. They are mainly residential consumers; around 23% are commercial/industrial gas users.

SYSTEM	PLANNED DEVELOPMENT
Te Kuiti North IP10	Nil
Hangatiki East Road MP4	Nil
Te Kuiti MP4	Nil

G.17 TE KUITI SOUTH NETWORK SYSTEM

The Te Kuiti South network system is supplied from the transmission system from one gate station located in SH30 near Beros Road. This network system consists of one MP4 pressure system. A total of seven consumers are connected to the Te Kuiti South network system comprising two residential consumers and five commercial/industrial gas users.

There is an industrial consumer located adjacent to the Te Kuiti South gate station from which gas is directly fed to this factory. The gas flow into Te Kuiti South pressure system is the difference between the flows recorded at the gate station meter and the industrial consumer's GMS.

SYSTEM	PLANNED DEVELOPMENT
Te Kuiti South MP4	Nil

G.18 OKOROIRE NETWORK SYSTEM

The Okoroire network system is supplied from the transmission system from one gate station located in Somerville Road. This network system comprises one MP4 pressure system. The Okoroire network system supplies one residential consumer and one large commercial gas user. Flow data for the Okoroire gate station is not currently available. As the system is considered low risk of breaching quality of supply, we do not intend to collect this information at this point in time.

SYSTEM	PLANNED DEVELOPMENT
Okoroire MP4	Nil

G.19 TIRAU NETWORK SYSTEM

The Tirau network system is supplied from the transmission system from one gate station located in Okoroire Road. This network system consists of one IP10 pressure system, one MP4 pressure system and two DRSs. A total of approximately 80 consumers are connected to the Tirau network system, comprising around 60 residential consumers and the remainder commercial/industrial gas users.

SYSTEM	PLANNED DEVELOPMENT
Tirau IP10	Nil
Tirau MP4	Nil

G.20 PUTARURU NETWORK SYSTEM

The Putaruru network system is supplied from the transmission system from one gate station located in Bridge Street. This network system consists of one IP10 pressure system, one MP4 pressure system and two DRSs. There are 350 consumers connected to the Putaruru network system; with around 11% of commercial/industrial gas users.

SYSTEM	PLANNED DEVELOPMENT
Putaruru IP10	Nil
Putaruru MP4	Nil

G.21 KINLEITH NETWORK SYSTEM

The Kinleith network system is supplied from the transmission system from one gate station located near the junction of Old Taupo Road and Kinleith Road. The gate station supplying the Kinleith MP4 is located in the same site as the supply to Kinleith Mills. This network system consists of one MP4 pressure system. The Kinleith network system supplies five residential consumers and two large industrial gas users.

SYSTEM	PLANNED DEVELOPMENT
Kinleith MP4	Nil

G.22 TOKOROA NETWORK SYSTEM

The Tokoroa network system is supplied from the transmission system from one gate station located in Baird Road near Old Taupo Road. This network system consists of one IP20 pressure system, one MP4 pressure system and three DRSs.

Around 1,000 consumers are connected to the Tokoroa network system. They are mainly residential consumers; only 11% are commercial/industrial gas users.

SYSTEM	PLANNED DEVELOPMENT
Tokoroa IP20	Nil
Tokoroa MP4	Nil

G.23 ROTORUA NETWORK SYSTEM

The Rotorua network system is supplied from the transmission system from one gate station located in the south of Rotorua in SH5. This network system consists of one IP20 pressure system, four MP4 pressure systems and 14 DRSs.

About 3,968 consumers are connected to the Rotorua network system. They are predominately residential consumers; only around 10% are commercial/industrial gas users.

SYSTEM	PLANNED DEVELOPMENT
Rotorua IP20	Nil
Rotorua East MP4	Nil
FRI MP4	Nil
Rotorua MP4	Nil
Waipa MP4	Nil

G.24 REPOROA NETWORK SYSTEM

The Reporoa network system is supplied from the transmission system from one gate station located in Parekarangi. This network system consists of one IP20 pressure system, one MP4 pressure system and one DRS.

A total of 24 consumers are connected to the Reporoa network system comprising 16 residential consumers and eight commercial / industrial consumers, including one large industrial gas user. At system peak, the large industrial user demands more than 99% of the total network system flow.

The major industrial consumer is supplied directly from the Reporoa gate station, i.e. not connected to the IP20 network. For modelling accuracy, the load from the industrial user is deducted from the total gate station flow when modelling the Reporoa network system.

SYSTEM	PLANNED DEVELOPMENT
Reporoa IP20	Nil
Reporoa MP4	Nil

G.25 TAUPO NETWORK SYSTEM

The Taupo network system is supplied from the transmission system from one gate station located in Rakaunui Road. This network system consists of one IP20 pressure system, one MP4 pressure system and two DRSs.

About 2,137 consumers are connected to the Taupo network system. They are predominately residential consumers; only around 10% are commercial/industrial gas users.

The Taupo network system has two DRSs which supply gas to the Taupo MP4 pressure systems. As part of the reinforcement options, one of the DRSs will be set to provide an MP7 outlet for the proposed Taupo MP7 pressure system.

SYSTEM	PLANNED DEVELOPMENT
Taupo IP20	Nil
Taupo MP4	Nil

G.26 TAURANGA NETWORK SYSTEM

The Tauranga network system is supplied from the transmission system from two gate stations, located at Te Reti in the central Tauranga and Pyes Pa in the South West. The Tauranga network system consists of one IP20 pressure system, currently operating as an IP10 pressure system, one MP4 pressure system and five DRSs.

About 4,500 consumers are connected to the Tauranga network system. They are predominately residential consumers; with around 8% being commercial/industrial gas users.

The Tauranga network system has two gate stations (Tauranga and Pyes Pa). The gas distribution system takes an IP10 supply from Tauranga gate station at a NOP of 1,000kPa and an MP4 supply from Pyes Pa gate station at a NOP of 400kPa.

SYSTEM	PLANNED DEVELOPMENT
Tauranga IP10	Pressure up-rating of the Tauranga IP10 pressure system from 1,000kPa to 1,700kPa is scheduled for completion in FY2018, with the cost of modifications to be covered by First Gas Transmission. Alongside the uprating of the gate station, Flange Insulation Kits to enhance cathodic protection are planned to be installed on the distribution network connecting the gate station.
Tauranga MP4	No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. The following planned PE MP4 links will provide further network security and enhance supply capacity to meet new industrial and commercial demand growth over the planning period: – Construct approximately 700 metres of 100mm PE pipeline between Oropi Road and Windermere Drive, and overlay approximately 1,000 metres of 50mm PE pipeline to replace several sections of 10mm PE pipeline in Windermere Drive / College Place in order to reinforce the network in Ohauiti area in (FY2020). – Construct approximately 1,500 metres of 100mm PE pipeline between Bellevue and Bethlehem in FY2018/2019.

G.27 MT MAUNGANUI NETWORK SYSTEM

The Mt Maunganui network system is supplied from the transmission system from two gate stations, Mt Maunganui gate station and Papamoa gate station. The Maunganui network system consists of two IP20 pressure systems, two MP4 pressure systems and seven DRSs.

About 4,313 consumers are connected to the Mt Maunganui network system. They are predominately residential consumers; only around 5% are commercial/industrial gas users.

Major industrial and commercial activities are expected in the northern part of Mt Maunganui. Growth and change in gas demand will be very much dependent on the business development in this area.

The Papamoa East area provides an important opportunity for Tauranga City Council to provide green field urban development. The estimated population for Papamoa East is around 25,000 should development potential be fully realised. Urban development would occur over a period of 20-30 years, with initial stages catering for a population of around 9,200. Tauranga city council have developed an urban design structure plan for the Te Tumu/Wairakei area.[1] Wairakei (Part 1), sets out how low and medium density residential land, business land and open space land will be laid out. Services structure planning provides the main roading network for the Wairakei area and locations of necessary bulk infrastructure. Progress of the development will depend on landowner responses, influencing the ultimate resident population.

SYSTEM	PLANNED DEVELOPMENT
Mt Maunganui IP20	No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, to enhance network security the following reinforcement project is planned: – Create IP20 pipeline loops. Possible solution would be to construct approximately 2,400 metres of 80mm IP20 steel pipeline along Newton Street, Hull Road into Totara Road Mt Maunganui in FY2024. Up-rating of the IP20 pipeline from Mt Maunganui gate station to Hewletts Road (including the upgrade of Mt Maunganui gate station and installation of a new DRS near Hewletts Road) was considered as an alternate option to the above. The looping project was ultimately selected as the preferred option to most practically meet the security requirements and deliver the most cost-effective solution. As a result, the Mt Maunganui gate station to Hewletts road pipeline was deauthorised. The Mt Maunganui 806 gas transmission pipeline MAOP was reduced from 8,600kPa to 1,960kpa.
Papamoa IP20	No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, to enhance network security and support growth opportunities in Papamoa East, the development of a Papamoa MP7 network development is planned.
Papamoa Beach IP20	First Gas acquired the assets in FY2017. Network comprises 500m of 80mm Carbon steel pipe, including approx. 2km MP4 200nb PE.
Papamoa MP7 (new pressure system)	Nil
Mt Maunganui MP4	Nil
Tip Lane MP4	Nil

1. https://www.tauranga.govt.nz/our-future/projects/te-tumu/wairakei-te-tumu-town-centre.

G.28 TE PUKE NETWORK SYSTEM

The Te Puke network system is supplied from the transmission system from one gate station located in Washer Road. This network system consists of one IP10 pressure system, two MP4 pressure systems and three DRSs.

About 620 consumers are connected to the Te Puke network system. They are predominately residential consumers; only around 9% are commercial/industrial gas users.

SYSTEM	PLANNED DEVELOPMENT
Te Puke IP10	Nil
Te Puke MP4	Nil
Washer Road MP4	Nil

G.29 KAWERAU NETWORK SYSTEM

The Kawerau network system is supplied from the transmission system from one gate station located in East Bank Road. This network system consists of one IP10 pressure system, two MP4 pressure systems and three DRSs.

About 260 consumers are connected to the Kawerau network system. They are predominately residential consumers; only around 8% are commercial/industrial gas users.

The Kawerau IP10 pressure system operates at a NOP of 1,000kPa and is fed from the Kawerau gate station which comprises three steel pipeline laterals. One lateral distributes gas to the Paora St MP4 and Kawerau MP4, while the other two supply gas to two large industrial consumers.

SYSTEM	PLANNED DEVELOPMENT
Kawerau IP10	Nil
Kawerau IP10 (ex-Caxton)	Nil
Kawerau IP10 (ex-Tasman)	Nil
Paora St MP4	Nil
Kawerau MP4	Nil

G.30 TE TEKO NETWORK SYSTEM

The Te Teko network system is supplied from the transmission system from one gate station located in Tahuna Road. This network system consists of one IP10 pressure system, one MP4 pressure system and one DRS. The Te Teko network system supplies three residential consumers and four commercial gas users.

SYSTEM	PLANNED DEVELOPMENT
Te Teko IP10	Nil
Te Teko MP4	Nil

G.31 EDGECUMBE NETWORK SYSTEM

The Edgecumbe network system is supplied from the transmission system from one gate station located in Awakeri Road. This network system consists of one IP20 pressure system and one MP4 pressure system. The Edgecumbe IP20 and the Edgecumbe MP4 pressure systems are metered separately inside the gate station. The Edgecumbe network system supplies five residential consumers and five commercial/industrial gas users.

SYSTEM	PLANNED DEVELOPMENT
Edgecumbe IP20	Nil
Edgecumbe MP4	Nil

G.32 WHAKATANE NETWORK SYSTEM

The Whakatane network system is supplied from the transmission system by one gate station located in Mill Road. This network system comprises one IP20 pressure system, two MP4 pressure systems and three DRSs. About 450 consumers are connected to the Whakatane network system. They are predominately residential consumers; with commercial/industrial gas users accounting for around 20% of total demand.

SYSTEM	PLANNED DEVELOPMENT
Whakatane IP20	Nil
Whakatane MP4	Nil
Mill Road MP4	Nil

G.33 OPOTIKI NETWORK SYSTEM

The Opotiki network system is supplied from the transmission system by one gate station located in Factory Road. This network system consists of one IP10 pressure system, two MP4 pressure systems and two DRSs. There is an industrial consumer supplied directly from the Opotiki gate station, i.e. not connected to the IP20 network. For modelling accuracy, the load from the industrial consumer is deducted from the total gate station flow when modelling the Opotiki network system.

SYSTEM	PLANNED DEVELOPMENT
Opotiki IP20	Nil
Opotiki MP4	Nil
Hospital Hill MP4	Nil

G.34 GISBORNE NETWORK SYSTEM

The Gisborne network is supplied from the transmission system from one gate station and consists of one IP20 network and one MP4 network. About 3,400 consumers are connected to the Gisborne network system. They are predominately residential; only around 9% are commercial/industrial gas users.

SYSTEM	PLANNED DEVELOPMENT
Gisborne IP20	No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, recent requests for increased gas load from industrial customers may result in the system pressure falling below the minimum pressure criteria. To cater for this potential load growth, the following reinforcements are planned: – upgrade the metering and regulator equipment at the Gisborne gate station to allow an increase in the outlet pressure from 1,700kPa to 1,800kPa plus. – construct approximately 1,400 metres of 100mm IP20 steel pipeline in Lytton Road between Aberdeen Road and Manuka Street, Te Hapara in FY2020.
Gisborne MP4	Nil

G.35 KUKU NETWORK SYSTEM

The Kuku network system is supplied from the transmission system from one gate station located in Kuku Beach Road. This network system consists of one MP2 pressure system. A total of 31 consumers are connected to the Kuku network system comprising 28 residential consumers and 3 commercial gas users. Flow data for the Kuku gate station is not currently available. As the system is considered low risk of breaching quality of supply, we do not intend to collect this information at this point in time.

SYSTEM	PLANNED DEVELOPMENT
Kuku MP4	Nil

G.36 OTAKI NETWORK SYSTEM

The Otaki network system is supplied from the transmission system from one gate station located in the southwest of Otaki. This network system consists of one MP4 pressure system. About 400 consumers are connected to the Otaki network system. They are predominately residential consumers and only around 11% are commercial gas users.

SYSTEM	PLANNED DEVELOPMENT
Otaki MP4	Nil

G.37 TE HORO NETWORK SYSTEM

The Te Horo network system is supplied from the transmission system from one gate station located in Te Horo beach Road near Pukenamu Road. This network system consists of one MP4 pressure system. The Te Horo network system supplies 13 residential consumers and two commercial gas users. Flow data for the Te Horo gate station is not currently available. As the system is considered low risk of breaching quality of supply, we do not intend to collect this information at this point in time.

SYSTEM	PLANNED DEVELOPMENT
Te Horo MP4	Nil

G.38 WAIKANAE NETWORK SYSTEM

The Waikanae network system is supplied from the transmission system from one gate station located in the west of Waikanae. This network system consists of one MP4 pressure system. Approximately 1,500 consumers are connected to the Waikanae network system. They are predominately residential consumers; only around 3% are commercial gas users.

SYSTEM	PLANNED DEVELOPMENT
Waikanae MP4	No constraints have been identified and the system pressure is not forecast to fall below the MinOP criteria during the planning period. However, to enhance network security and support growth opportunities, the following network development projects are planned: – Construct approximately 600 metres of 50mm PE MP4 pipeline from Belvedere Avenue to David Street. Note: Not required at this stage. – Waikanae and Paraparaumu networks are planned to be meshed to provide enhanced security of supply to the Paraparaumu Network. This is planned to occur in FY2018-FY2020.

G.39 PARAPARAUMU NETWORK SYSTEM

The Paraparaumu network system is supplied from the transmission system from Paraparaumu gate station located in Valley Road. The Paraparaumu network system consists of one IP20 pressure system, one new MP7 pressure system, two MP4 pressure system and three DRSs. About 3,400 consumers are connected to the Paraparaumu network system. They are predominately residential consumers; only around 5% are commercial/industrial gas users.

SYSTEM	PLANNED DEVELOPMENT
Paraparaumu IP20	System pressure is forecast to fall below the minimum pressure criteria within the planning period. To address this issue, the following reinforcement projects are planned, along with reinforcement of the Paraparaumu MP4 and MP7 installation: – Up-rate the Paraparaumu IP20 pressure system from the current operating pressure of 1,350kPa to 1,800kPa (including the upgrade of the Paraparaumu gate station and DRS DR-80052-PR and DR-80081-PR upgrades). (Planned to be completed in FY2019)
Paraparaumu MP7	As a measure of reinforcement to the Paraparaumu network and to prevent the MinOP falling below minimum pressure criteria, the Waikanae to Otaihanga MP7 pipeline installed in FY2016 will be reinforced. This will connect the existing Waikanae IP20 and Paraparaumu MP4 networks, and include the following reinforcements during the planning periods below: – Installation of a new IP20/MP7 DRS adjacent to Waikanae gate station in FY2018/2019. – Installation of a new MP7/MP4 DRS in FY2019.

APPENDIX H: ASSET MANAGEMENT

This section describes First Gas Limited's (FGL's) approach to asset management and how this supports meeting our performance objectives and the expectations of our stakeholders. It is structured as follows.

- **Asset Management Framework:** describes our approach to ensuring alignment between our corporate objectives and our day-to-day asset management activities.
- **Asset Management System:** describes the components of our Asset Management System and provides an overview of the key elements.
- **Performance Measures:** sets out the overall asset management performance objectives.
- **AMMAT:** discusses the outcome of our Asset Management Maturity Assessment Tool (AMMAT) review and other benchmarking exercises.

H.1 ASSET MANAGEMENT FRAMEWORK

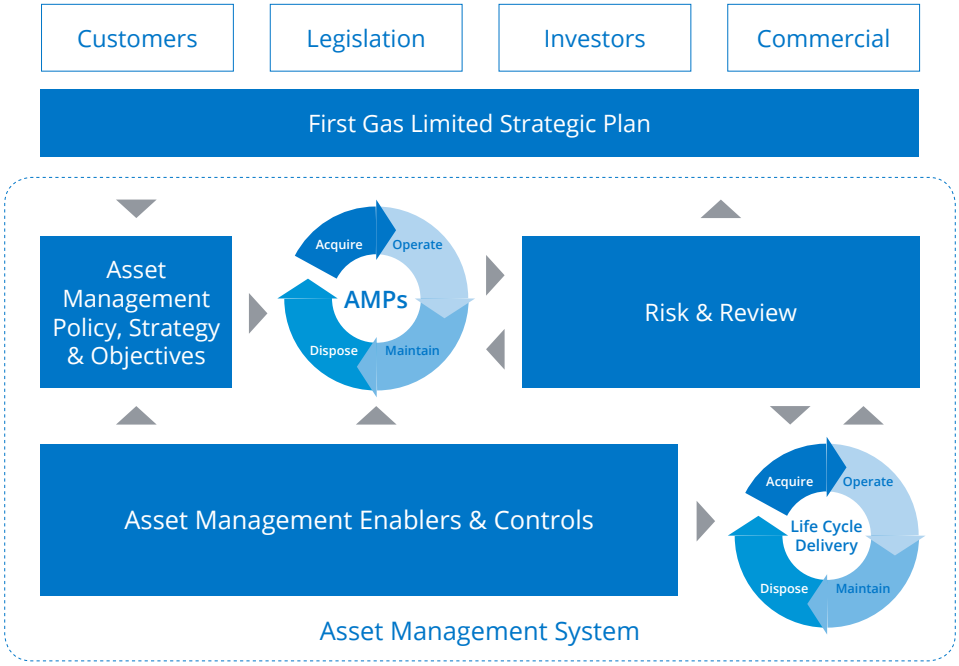
Our Asset Management Framework is primarily designed to support the delivery of our corporate objectives and stakeholder needs and demonstrates how they link with the components of the Asset Management System.

The Strategic Plan is the starting point for the development of the primary elements in the Asset Management system, the Asset Management (AM) Policy, Strategy, Objectives and Plans. These, in turn, direct the optimal combination of life cycle activities to be applied across the portfolio of asset systems and assets (based on their criticality, condition and performance).

This connective thread is a key feature of our Asset Management framework, providing clear "line of sight" from the organisational direction and goals down to the individual, day-to-day activities. Similarly, looking upwards, the monitoring of asset problems, experience and understanding, risks and opportunities should provide the factual basis for adjusting and refining Asset Management strategies and plans, through a process of continuous improvement and should inform stakeholders by way of adjustments to the Business Plan.

The interaction between our strategic plan and Asset Management system is shown below.

Figure 28: Interaction between Strategic Plan and Asset Management system



H.2 ASSET MANAGEMENT SYSTEM

In this section, we explain our asset management system. An important function of this system is linking our corporate objectives and stakeholder needs to specific asset management approaches through our asset management policy.

Our asset management system aligns with the requirements specified by ISO 55001 and seeks to reflect good practice. This system includes the following components:

- **Asset Management Policy, Strategy & Objectives:** aligns our asset management approach with our corporate objectives. Our asset management objectives reflect this policy by emphasising the need for safety, stakeholder needs and the importance of effective risk management.
- **Asset Management Plans:** reflects our asset lifecycle model and aligns our regular processes and activities with high-level objectives.
- **Asset Management Enablers and Controls:** influence and apply to all the other elements of the asset management system.
- **Risk & Review:** explains our approach to managing risk on our network, including how we identify and classify risk, and how we take appropriate actions to manage the risks that we identify.
- **Life Cycle Delivery:** provides an overview of our approach to managing our gas distribution asset.

H.2.1. Asset Management Policy, Strategy & Objectives

Asset Management Policy

The Asset Management Policy provides a high-level statement of our asset management direction, principles and guiding objectives. The policy provides direction for our asset management decisions and everything we do to manage our assets should map back to the policy.

The purpose of the policy is to reflect our corporate objectives and stakeholder needs in terms that can be translated into our asset management documentation.

The policy also sets out key asset management principles that flow through our processes and systems. This is important to ensure the necessary linkages between our objectives and what we are aiming to achieve through our asset management practices.

The policy is set out below and has been approved by the First Gas Board and communicated to all staff.

Asset Management Policy

First Gas' Asset Management Policy is to effectively manage the gas distribution and distribution assets across their entire lifecycle in a safe, efficient and environmentally appropriate way to serve the needs of our customers, stakeholders and end-users while optimising the long-term return of our shareholders.

Achieving Operational Excellence in asset management is key to delivering on First Gas' Mission:

To deliver stable and predictable financial performance through providing safe and reliable gas pipeline and network services.

To deliver on our Asset Management Policy First Gas will:

- Prioritise the integrity of our assets to ensure the safety of the people and places affected by our operations.
- Provide a reliable, resilient and secure service that meets customer needs.
- Preserve the environment by operating in a manner that mitigates environmental risks.
- Address and meet all legislative requirements.
- Communicate our investment plans to stakeholders, particularly the communities that host our assets.
- Operate in a manner that optimises the long-term financial outcomes for our shareholders.
- Balance the needs of competing objectives in a consistent and transparent manner.

To achieve and monitor this we will:

- Engage with our stakeholders in an open and transparent manner, integrating customers into our decision making.
- Provide efficient and effective systems for whole of life asset management processes.
- Regularly review our performance using relevant leading and lagging indicators.
- Grow the organisational competence and capability of First Gas in step with our asset management objectives.
- Ensure our Board and management are fully informed with accurate and timely data to support their responsibilities.
- Communicate with all our people and key stakeholders on all aspects of this policy.
- Continuously strive for improvement in all areas of asset management and work to align with ISO 55000.

Asset Management Policy continued

All our people are responsible for:

- Ensuring their own and others adherence to this policy.
- Escalating any issues that may put the aims of this policy at risk.

Asset Management Strategy

Our Asset Management Strategy or Strategic Asset Management Plan (SAMP) is incorporated across the AMP (reflected primarily in our discussions in the system development and lifecycle delivery sections) and other internal asset planning documents. It has a forward outlook of two years and is reviewed formally on an annual basis aimed at:

- Identifying our desired future performance.
- Identifying our current performance.
- Developing objectives and improvement actions to deliver the required performance.

The AMMAT gap analysis and other external and internal reviews demonstrate that while we have improved in a number of areas since the last AMMAT was completed in 2016, we still have opportunities for improvement. Our asset management improvement programme includes a number of initiatives aimed at achieving improvements in asset management and long-term performance of our assets. These include:

- Embed and evolve our asset management system. Key elements include:
  - Asset Management Plans
  - Capital expenditure
  - Maintenance optimisation
  - Asset risk
  - Planning and scheduling
  - Project management
- Further development of asset health indicators and criticality approaches.
- Development of technology to provide real time dashboards for asset health.
- Further development of Maximo, FGL's Enterprise Asset Management (EAM) system to support changes with elements in the asset management system.
- Use of technology to collect and provide insights into asset performance and condition.

Over the next few years these initiatives will result in further improvement of our asset management practices, supported by enhanced asset information systems.

Asset Management Objectives

Our Asset Management Policy provides a suite of asset management performance objectives against which we can measure our performance. These objectives are related to our performance measures discussed later in this appendix. The objectives are:

- **Safety:** prioritise the integrity of our assets to ensure the safety of the people and places affected by our operations.
- **Security and reliability:** provide a reliable, resilient and secure service that meets customer needs.
- **Environment:** preserve the environment by operating in a manner that mitigates environmental risks.
- **Compliance:** address and meet all legislative requirements.
- **Communication:** communicate our investment plans to stakeholders, particularly the communities that host our assets.
- **Value:** operate in a manner that optimises the long-term financial outcomes for our shareholders.
- **Decision making:** balance the needs of competing objectives in a consistent and transparent manner.

H.2.2. Asset Management Plan

Our AMP captures the key elements of our asset management document suite in a summarised form. It is an important means of explaining our asset management strategy and approach to managing our assets to internal and external stakeholders. It has also been developed to meet our Information Disclosure obligations under Part 4 of the Commerce Act 1986.

This AMP has been developed with oversight and input from our Commercial and Regulatory Team, which advises on the Information Disclosure and certification requirements.

Approval Process

Once the AMP and associated forecasts have been prepared, reviewed and challenged by FGL it is then reviewed by a Board sub-committee prior to an initial Board submission. When the feedback from the Board has been incorporated, the AMP is submitted to a special Board meeting for approval prior to publication.

Key Assumptions

This AMP is based on some fundamental assumptions that underpin our long-term strategic direction and operating environment. These key assumptions are:

- The present gas industry structure will broadly remain the same. For example, we have assumed that over the planning period gas will continue to flow from the Taranaki region to customers located in other parts of the North Island.
- Works will continue to be delivered through a mixture of insourced and outsourced activities. We make decisions on what work to outsource based on capability, cost and resource availability.
- There will be no major disruptive changes to the availability of service providers.
- Consumer demand and expectations will continue to follow long-term trends. While we aim to increase the use of our gas distribution network, we have adopted prudent growth forecasts that are tied to historic trends in the uptake and use of gas in New Zealand.
- There will be no major changes to the regulatory regime that governs our operational and investment decisions – for example, through structural changes to the regulatory institutions or the regulatory mechanisms currently in place that allow us to recover our efficient costs.

To the extent possible, all relevant assumptions made in developing this AMP have been quantified and described in the relevant sections. Where an assumption is based on information that is sourced from a third party, we have noted the source.

Financial Authority

Each project within our AMP is approved based on our delegated financial authority (DFA) policy. Any changes to project scope requiring additional expenditure triggers further review and a new approval process is required to agree any changes. DFAs set out the limits to which managers are allowed to authorise expenditure. This is reviewed annually.

Table 6: Delegated Financial Authority Levels

GOVERNANCE LEVEL	FINANCIAL AUTHORITY CAPEX	FINANCIAL AUTHORITY OPEX
CEO	$2,000k	Budget
COO	$500k	$500k
Engineering and Projects Manager	$400k	$400k
Distribution Manager	$250k	$250k

Challenge Processes

The material included within the AMP reflects our system development plans, life cycle delivery plans, customer connections forecast, and our maintenance strategies. These plans and associated forecasts are prepared in consultation with relevant staff members and engineers.

Reflecting its role as a key stakeholder document, the draft AMP is subjected to a thorough testing process prior to board approval. As part of this process, proposed network expenditure plans are scrutinised and challenged by FGL to ensure alignment with the asset management policy and that the plans reflect efficient and effective approaches. Non-network expenditure is also subject to the same process of testing.

Investment Principles

Apart from normal business risk avoidance measures, specific actions to mitigate the risks associated with investing in distribution systems include the following:

- **Act prudently:** where safety is not compromised make small incremental investments and defer large investments as long as reasonably practical (e.g. replace components rather than an entire asset). The small investments must, however, conform to the long-term investment plan for a region and not lead to future asset stranding.
- **Multiple planning timeframes:** produce plans based on near, medium and long-term views. The near term plan is the most accurate and generally captures load growth for the next three years. This timeframe identifies short-term growth patterns, mainly leveraging off historical trends. It allows sufficient time for planning, approval and network construction to be implemented ahead of new system demand.

- **The medium-term plan looks out 10 years:** capturing regional development trends such as land rezoning, new transport routes and larger infrastructure projects. It also captures changes such as the adoption of new technologies or behavioural trends (e.g. consumers' response to issues such as climate change, increased energy conservation, etc.).
- **Review significant replacement projects:** for larger system assets, rather than automatically replacing existing end-of-life assets with the modern equivalent, a review is carried out to confirm the continued need for the assets, as well as the optimal size and system configuration that will meet First Gas's needs for the next asset lifecycle.
- **Continuously review system performance:** to identify and apply action in respect of where asset performance can be improved.

H.2.3. Asset Management Enablers and Controls

This section describes how we ensure appropriate oversight and challenge are in place during the development and execution of our plans. Enablers and controls also ensure that resources are available and there is a formal approach to decision making, promoting consistent, repeatable and auditable actions.

Key asset management enablers and control elements include:

- **Capital and operational expenditure guides:** provide the basis for implementing a minimum standard to identify, prioritize, plan, budget, execute, control, and closeout capital expenditure projects and major operational expenditures.
- **Safety and operating plan:** details the controls in place to mitigate the risks that have been identified under the Formal Safety Assessment processes for the elimination, isolation or minimisation of harm to persons, property, the public, environment and assets.
- **Competency and training:** demonstrate how our staff and external parties performing design, construction, operations or maintenance on our distribution system meet the competency requirements as specified by our training matrix.

Capital and Operational Expenditure Guides

The purpose of the Capital and Operational Expenditure guides is to provide the basis for implementing a minimum standard to identify, prioritize, plan, budget, execute, control, and closeout capital expenditure projects and major operational expenditures. Key objectives are to:

- Evaluate Capex projects and major Opex according to the Business Plan, Strategic Planning, and Asset Management Policy and Strategy.
- Ensure a complete analysis has been conducted. (make vs buy, lease vs buy, rent vs own, outsource vs in-house, should cost modelling, Original Equipment Manufacturer (OEM) vs non-OEM).
- Leverage best practices used by FGL and the gas sector.
- Provide consistent evaluation of financial and non-financial factors to understand the total value during the life cycle.
- Evaluate the risk and exposure of not doing the capital or maintenance project.
- Compare alternatives to determine the best solution (e.g. replacing vs repairing equipment, doing the project now vs. later).
- Evaluate the project costs on a life cycle basis (long-term value).
- Provide advance sourcing planning to meet long-term objectives and manage supply risk.
- Lower costs through consistent integration of business resources and reduce process duplication through integration of financial requirements.
- Select the options to ensure the best investment of funds through consistent prioritisation of projects and transparency in decision-making.

Safety and Operating Plan

The constituents of NZS 7901 Gas Industry – Safety Management Systems for public safety are the following:

- Risks identification, assessment and treatment
- Asset descriptions
- Performance monitoring
- Safety and Operating Plan (SAOP)

It is in the format of an outline to safety and operating practices for compliance with the Gas Act and Gas (Safety and Measurement) Regulations and with the Health and Safety at Work Act. For more detailed requirements it provides references to First Gas policies, procedures, work instructions and other documentation.

It covers the requirements from network planning and design through to performance measurement and auditing.

Its structure follows closely the recently introduced joint Standards AS/NZS 4645.1 Gas distribution networks Part 1 Network management, AS/NZS 4645 .2 Gas Distribution Networks Part 2: Steel pipe systems and AS/NZS 4645.3 Gas Distribution Networks Part 3: Plastic pipe systems, which are now cited Standards.

Through a formal hazard identification and control process the hazards associated with the gas distribution network are identified and the risks assessed. The safety and operating policies and procedures that then are required to mitigate these risks have been identified and are set out in the Safety and Operating Plan. These cover not only controls to minimise harm to persons and damage to property but also for health and safety of its personnel and contractors, and for protection of the environment.

The Plan covers:

- **Network development** – to ensure adequate capacity and integrity and to minimise the risk of interference and damage.
- **Network operations and maintenance** – to ensure the on-going safety of the assets through appropriate operation, maintenance and awareness activities.
- **Emergency response** – to ensure that when a situation arises effective processes are in place to respond and restore safely.
- **Resource requirements** for all activities and the records management processes.
- **Monitoring of performance** to provide feedback on the effectiveness of the controls and to identify opportunities for continuous improvement.
- **Administration** of this document.

Competency and Training

All individuals performing design, construction, operations or maintenance on our distribution network must meet the competency requirements as specified by First Gas standard GNS-0080 - Personnel Qualification.

As a part of the contractual agreement with our FSPs and contractors, contracted personnel must meet the competency criteria for all work being performed. As specified, competency and training levels are managed by our service providers through a training matrix and green / red card system dictating competency levels for required works.

Internally, each staff role has a defined set of competency requirements within the position description that personnel performing that role are required to meet. We align training requirements with established competencies in technical operation and maintenance. A training and development plan exists to ensure that personnel involved with the operation and maintenance of the asset are appropriately trained. Our training and competency recording is maintained in Maximo and the validation of competency forms part of our NZ7901 accreditation.

H.2.4. Risk & Review

Risk management is a key component of good asset management. The consideration of risk plays a key role in our asset management decisions - from network development planning, asset replacement decisions through to operational decisions. The assessment of risk and the effectiveness of options to minimise it is one of the main factors in our investment choices.

Key Risk and Review elements include:

- **Risk Management:** our core processes designed to manage existing risks, and to ensure emerging risks are identified, evaluated and managed appropriately.
- **Contingency Planning and Response:** ensures that we are prepared for, and can respond quickly to a major incident that occurs or may occur on our gas distribution system.
- **Event Management:** provides clear definitions and guidance for all disciplines working for First Gas in order to ensure a consistent approach in recognising and reporting events.

Risk Management Policy

The identification and effective management of risk is central to the growth and success of First Gas. We are committed to developing a culture that understands and manages the risks to our business. In doing so we will provide greater certainty to our shareholders, employees, customers, suppliers, and the communities in which we operate.

The objective of risk management within First Gas is to:

- Ensure that the Board and Executive Management are aware of the material business risks.
- Implement a risk management process that proactively identifies and manages risk within the risk appetite agreed with the Board.
- Ensure that risks are understood so that decisions can be informed to allow opportunities to be realised and risk to be managed.
- Provide assurance to our shareholders that processes are in place to manage risk and to meet our commitments.

Risk Management Policy continued

First Gas will implement a risk management framework in accordance with industry standard AS/NZs ISO 3100:2009 across it organisation to ensure that the objective above can be met.

- The governance of this process will be assured by regular updates and reporting to the Board and Executive Management Team.
- All business units and functions will be responsible for developing and implementing their own risk management plans, based on their strategic objectives and operational needs.
- All managers are responsible for the management of risk in accordance with the First Gas Risk Management Process. This responsibility includes ensuring that the key controls are in place and effective at all times within the Board agreed risk appetite for each type of risk.

Performance measures will be implemented as part of the risk management framework. These measures will ensure that:

- Significant risks are escalated and reported to the Executive Management Team and the Board.
- Risks are reviewed and updated on a quarterly basis, or as required following a business change.
- All risks have assigned owners.
- Existing controls are monitored to measure their effectiveness against the Board agreed risk appetite for each type of risk.

To ensure that the risk management framework is implemented and maintained we will make the necessary resources available to make sure that this policy is satisfied.

This policy and the associated risk management framework will be reviewed on an annual basis.

Risk Management

Given the potentially severe nature of failures in operation (particularly loss of containment) appropriate and effective risk management is integral to our day-to-day asset management approach.

Our asset management information systems and our core processes are designed to manage existing risks, and to ensure emerging risks are identified, evaluated and managed appropriately. Our approach is to seek specific instances where features of our network which should make us resilient, do not suffice or apply. In particular, the following assessments are used.

- **Prioritise safety:** we prioritise those risks that may impact the safety of the public, our staff and service providers.
- **Ensure security of supply:** our works development and lifecycle management processes include formal evaluation of our assets against our security criteria.
- **Address poor condition/non-standard equipment:** our lifecycle management processes seek out critical items of equipment that are at a higher risk of failure or are non-standard.
- **Need for formal risk review and signoff:** our processes include formal requirements to manage the risks identified, including mandatory treatment of high-risk items and formal management signoff where acceptance of moderate risks is recommended.
- **Use of structured risk management:** we use structured risk capture and management processes to ensure key residual risks are visible and signed off at an appropriate level.

Gas industry codes require risk management to be a continuous process at all stages throughout the lifecycle of our gas distribution network. The nature of the gas distribution business is such that there are many inherent risks. In addition, safety management is one of our top operational priorities.

The gas distribution business unit has a risk management system that is outlined in GNS0083 Safety and Operating Plan. This document outlines the minimum requirements and ensures consistency in risk management by our business.

As risk severity is defined by the combination of likelihood and consequence, our approach to managing risk focuses on controls and treatments that either amend the likelihood of occurrence, or address the severity of the consequences.

The risk management process is not solely about limiting risk by mitigating against adverse impacts. Rather, it is about fully appreciating and recognising all the risks the business carries, and balancing them so as to take advantage of potential opportunities in an informed manner.

Our risk management process is in accordance with the process outlined in AS/NZS ISO 31000:2009.

Contingency Planning and Response

Our network and processes have been designed to be resilient to large events that are outside our control, such as natural disasters. The following aspects of our asset management approach limit the consequences should these events occur.

- **Multiple control options:** we have alternative control and emergency management capability available in the event that our primary site is disabled.
- **Emergency response plans:** we have well tested response plans and demonstrated capability to manage significant natural events and widespread damage to our system.
- **Business continuity plans:** we have structured business continuity plans in place to ensure that the functional support aspects of our business are resilient and can support ongoing operations.

Emergency Response Plan

To ensure that we are prepared for, and can respond quickly to a major incident that occurs or may occur on our gas distribution system, a comprehensive Emergency Response Plan has been developed. The plan describes the actions required and the responsibilities of staff during a major emergency or incident.

A key component of this plan is the formation of the emergency response management team. This team includes senior staff whose role is to oversee the management of potential loss of and restoration of supply following a significant event. The team is experienced and undertakes exercises at least annually.

Civil Defence and Emergency Management

As a "lifeline utility" under the Civil Defence and Emergency Management Act 2002 (CDEM), we are required to be "able to function to the fullest possible extent, even if this may be at a reduced level, during and after an emergency". We are also required to have plans regarding how we will function during and after an emergency and to participate in the development of a CDEM strategy and business continuity plans.

We participate in CDEM emergency exercises and area meetings on a regular basis to ensure CDEM protocols are understood, as well as to test aspects of our emergency plans.

Critical Spares and Equipment

Key to minimising the consequence of any unwanted event involving equipment failure are readily available tools and materials to enable quick restoration to normal operation.

To this end, a stock of spares is maintained for critical components of the gas distribution system, so that fault repair is not hindered by the lack of availability of required parts. Whenever new equipment is introduced to the system, an evaluation is made of the necessary spares required to be retained to support repair of any equipment failures.

Event Management

The Event Management standard provides clear definitions and guidance for all disciplines working for First Gas in order to ensure a consistent approach in recognising and reporting events, and also provide understanding of what to report and how to report.

Additionally, it provides guidance on investigation methodologies and techniques to identify causes, contributing factors and hazards thereby producing valuable information on lessons learned and future improvements.

The objective of event reporting and investigation is to prevent harm and damage through learning and improving, as well as comply with statutory requirements.

The primary objectives of reporting all events including Learning Events (near misses) are:

- To ensure that any injury occurring or damage sustained receives the necessary treatment or repair.
- To gather initial information during the reporting stage that will be invaluable should further investigation be required.
- To provide valuable learning for the organisation.
- To collect information for reporting to the Authorities

This will be achieved by:

- Immediate notification of an event
- Gathering good quality information
- A timely investigation process
- Analysis of investigation findings
- Identification and implementation of actions
- Sharing of information
- Ability to record and track actions

H.2.5. Life Cycle Delivery

This section explains our approach to managing our gas distribution assets. We use a lifecycle-based asset management approach. We discuss this approach and the main activities it entails during the planning period.

Key Life Cycle Delivery elements include:

- **Asset lifecycle management:** provides an overview of our approach to managing our gas distribution assets.
- **Asset replacement and renewal:** discusses our approach to renewing our asset fleets.
- **Asset relocations:** discusses how we relocate assets to accommodate third parties.
- **Maintenance:** sets out our approach to maintaining our gas distribution assets.

- **Other-network Opex:** discusses additional network related Opex including Network Support costs and our expenditure on compressor fuel.

H.2.6. Asset Lifecycle Management

Safety is the key consideration in the design, construction and maintenance of our gas distribution system. We manage our assets in accordance with relevant acts, regulations and industry standards. Our distribution assets are designed and built to deliver gas to service levels set out in our Security Standard (GTS-01) and to meet the needs of our customers.

To cost-effectively achieve the required level of safety and service, the assets have to be kept in good operating condition. This is achieved by replacing, renewing and maintaining the assets. We use the term asset lifecycle management to describe these activities.

The asset lifecycle approach we use includes the following main activity phases.[1]

- **Aquire:** this includes investments in new (or larger) assets to ensure we can meet demand on our network at appropriate security levels.
- **Operate:** includes real-time network control, monitoring and event response. This involves planning for assets to be safely taken out of service (discussed in this appendix).
- **Maintain:** is the care of assets to ensure they provide the required capability in a safe and reliable manner from commissioning through to their replacement or disposal (discussed in this appendix).
- **Asset replacement, renewal and disposal:** includes the replacement of assets with new modern equivalents, investments that extend an asset's useful life or increase its functionality (discussed in this appendix).

We also discuss asset relocation works where existing services need to be moved as a result of the activities of other utilities or developers.

Lifecycle Management Strategy

Our overarching lifecycle strategy is to maintain a safe, efficient and reliable network while ensuring an optimal trade-off between Capex and Opex. Achieving this requires a balance between effective maintenance and prudent asset renewal.

To inform decisions and policy regarding asset lifecycle management, the following strategic drivers are taken into consideration. These form the basis of our long-term asset management, maintenance and asset renewal approaches.

Safety

- Ensure the safety of the public, employees and contractors at all times.
- Ensure our inspection regimes effectively identify safety hazards.
- Protect the integrity of our network and assets by monitoring the activities of third parties.

Security and Reliability

- Ensure the pipeline system is designed, operated and maintained to the required standard to provide the agreed level of service.
- Maintain an informed and justified view of the expected life of all asset types based on asset information, industry practice, experience and knowledge.
- Maintain a feedback cycle from maintenance activities to inform current asset information and to continually refine maintenance standards.
- Maintain existing assets in good and safe working order until new assets are built or they are no longer required.
- Ensure pipe system operation is reliable.

Environment

- Preserve the environment by operating in a manner that mitigates environmental risks.

Compliance

- Comply with relevant acts, regulations and industry standards.

Communication

- Ensure an appropriate level of response to customer concerns, requests and enquiries taking into account any pricing and regulatory trade-offs.
- Minimise landowner disruption when undertaking work.

Value

- Strive to achieve the optimal balance between capital and operational costs.
- Ensure pipe system investments and operating activities are prudent and efficient.
- Strive for continual innovation and efficiency improvements in our lifecycle activities.

Decision Making

- Coordinate asset replacement and new asset creation programmes.
- Maintain a business funding approval process aligned to the anticipated replacement or decommissioning of assets.
- Apply innovative approaches to solutions, development and projects execution.

1. Our approach also includes construction and disposal phases.

H.2.7. Asset Replacement and Renewal

Asset Replacement and Renewal (ARR) is necessary to address asset deterioration and to ensure the system remains in a serviceable and safe condition. As the level of condition deterioration increases, the asset reaches a state where ongoing maintenance becomes ineffective or excessively costly. Once assets reach this stage we look to replace or renew them.

- **Replacement Capex:** includes replacing assets with like-for-like or new modern equivalents.
- **Renewal Capex:** is expenditure that extends an asset's useful life or increases its functionality.

If an asset is identified for replacement or renewal, the original design basis is reviewed for validity prior to confirming replacement. During this review we also assess other alternatives, such as decommissioning. The availability and feasibility of these options depends on a range of factors. ARR investments are generally managed as a series of programmes focused on a particular asset fleet.

Investment Drivers

Optimisation of Capex requires comprehensive evaluation of the condition, performance and risk associated with our assets. From this evaluation, we are able to schedule asset renewals. In some cases, it may be more efficient to extend the life of an asset beyond normal predicted life by renewing the asset.

There are a number of factors taken into account when assessing assets for replacement or renewal including:

- Ensuring safety
- Legislative and standards
- Asset condition
- Overall lifecycle cost

Ensuring Safety

A key strategy is to ensure the safety of the public, employees and contractors at all times. This includes making sure our inspection regimes effectively identify safety hazards. We also focus on protecting the integrity of our network and assets by monitoring and managing the activities of third parties.

There are a number of events or changes which may impact on the system which may result in a change of the identified risk level. Any such changes in design or substantive change to the operating environment lead to a review of network safety. Such changes can include:

- Third party incidents
- Findings from routine monitoring
- System improvements
- System modifications
- Inspections and audits

Safety-in-Design

We are committed to ensuring that our operations do not put our employees, contractors or the public at risk. This extends to safety being a key focus of the design phase of the work we do. It is at the design stage of creating assets that the greatest opportunity exists to build in safe operability for the whole lifecycle of the asset.

Safety-in-design is about eliminating or controlling risks to health and safety as early as possible in the planning and design stage, so that whatever is designed will be safe to construct, operate, repair and maintain and ultimately, safe to decommission and dispose of at the end of its lifecycle. This concept is implicit in our work practices.

Legislation and Standards

Our gas distribution assets have been designed, constructed, and operated in accordance with the following principal acts, Regulations and industry codes:

- Gas Act 1992 and Gas Amendment Act
- Health and Safety in Employment Act
- Gas (Safety and Measurement) Regulations
- Civil Defence and Emergency Management Act
- Hazardous Substances and New Organisms Act
- NZS 5258 Gas Distribution Networks
- NZS 7901 Electricity and Gas Industries – Safety Management Systems for Public Safety
- AS/NZS 4645.1 Gas Network Management
- NZS 5263 Gas Detection and Odorization

These acts, regulations and industry codes include prescriptive and performance based requirements that have been embedded into our suite of design, construction, maintenance and material specification standards. The purpose of these technical standards is to provide a comprehensive reference source for use by our personnel and others involved in the design, construction and maintenance of our distribution system.

Standardised Equipment and Designs

We use standardised equipment and designs throughout our network.

Standardisation has been applied to pipes, DRS equipment, and installation practices. We may apply differing architectural treatments to DRS to better align with local architecture, however construction techniques, materials and fit-outs align with our well-established standards.

Generally speaking, standard designs are introduced to avoid producing bespoke solutions for similar network installations. We have adopted the approach that when a design is repeatedly used on the network, a standard design is developed. Subsequently, as design improvements are identified (either by our own staff or as feedback from our FSP) standard designs are amended and updated.

A standardised design provides the following advantages when managing our distribution assets:

- Ensures a rigorous equipment selection process to select fit-for-purpose units while ensuring appropriate equipment performance over the life of the equipment
- Delivers cost savings in design
- Lowers project costs through competitive bulk materials supply agreements
- Simplified procurement and reduced stockholding
- Standardised maintenance practices
- Reduced rework during construction
- Safer outcomes and improved mechanism for capturing incremental improvements

Table 7 identifies some of the key design standards used in the development of our distribution network.

Table 7: Key design standards by asset

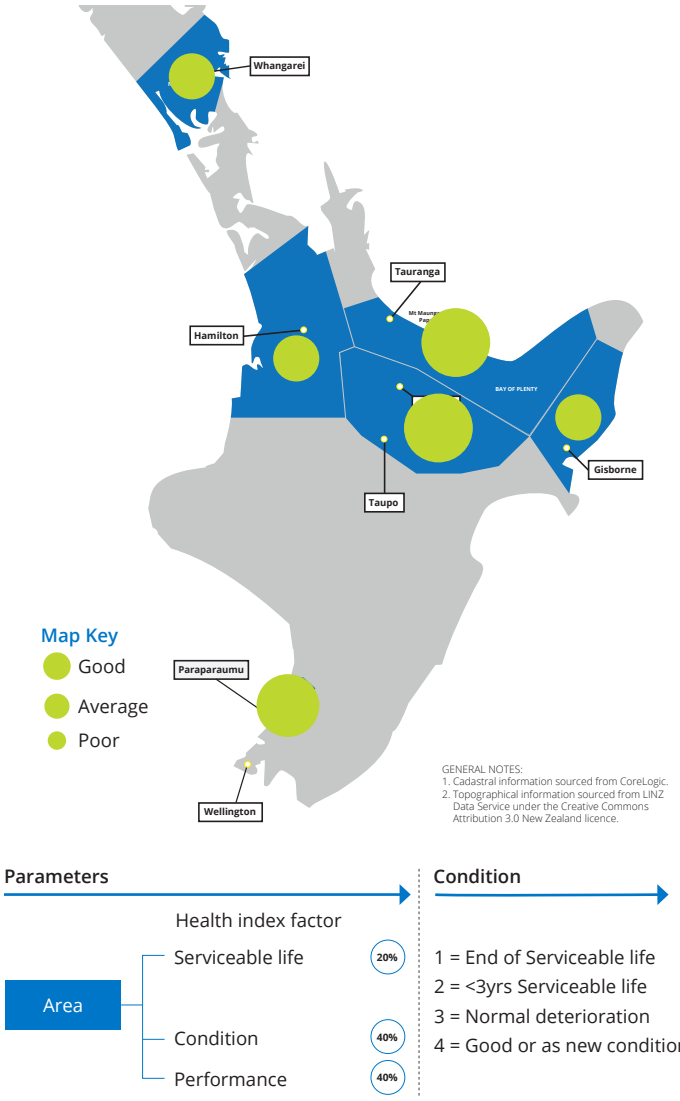
ASSET	STANDARD	DESCRIPTION
District regulating stations	GNS-0001	Design of district regulating stations
Pipes	GNS-0002	Piping system design
Corrosion protection systems	GNS-0003	Design of above ground corrosion protection systems
Corrosion protection systems	GNS-0004	Design of below ground corrosion protection systems

Asset Health and Criticality

We assess asset condition, performance and risk to determine the Asset Health index. The health index helps determine whether an asset requires planned repairs, replacement or renewal. These assessments are based on:

- Results of field surveys, inspections, tests and defect work schedules.
- Analysis of data associated with equipment condition e.g. compressor oil analysis, vibration monitoring of rotating equipment and water bath heater water sampling.

Figure 29: Asset Health dashboard and parameters



In addition to condition, other drivers for determining the asset health index are based on factors relevant to the particular asset and may include the following:

- They are irreparably damaged
- The risk of asset failure as determined through a failure-mode effect analysis (FMEA)
- Reliability and performance has become unacceptable
- The operational and/or maintenance costs over the remaining life of the asset will exceed that of replacement
- Assets become obsolete and hence impossible or inefficient to operate and maintain
- Factors affecting the rate of degradation such as the environment
- Failure and outage rate – historic and projected
- Known defects in certain assets or groups of assets
- Issues affecting acceptable life such as compliance with safety or environmental regulations
- Asset age and the life expectancy of the asset fleet

Where practical, all ARR investments are made taking into account the asset health index and the asset criticality which is an indication of the importance of the asset.

Overall Lifecycle Cost

Optimisation of Capex and Opex is a key consideration. This requires comprehensive evaluation of the condition, performance and risk associated with the assets, to provide a clear indication of the optimal time for assets' replacement or renewal.

Efficiencies can often result from solutions that allow conventional system investment to be deferred without compromising performance or safety. In evaluating possible solutions, we consider the following factors:

- Estimation of maintenance costs over the remaining life of the asset relative to cost of replacement.
- Determine whether a change in maintenance or operational regimes would alleviate the identified issue and whether such a change could be implemented safely.
- The use of non-network solutions and demand management techniques.
- Scope to leverage off other projects (e.g. growth projects) to gain synergies.

Summary of ARR Capex

Once an asset is identified for replacement or renewal, our prioritisation methodology is applied to determine the ranking of replacement projects. This methodology is based on assessing the criteria giving rise to the need for replacement.

- Risk
- Asset criticality
- Asset health
- Customer needs
- Potential financial impacts

The final project prioritisation list, along with cost estimates, forms the basis of the annual renewal budgets for each fiscal year.

Our asset replacement and renewal investment decisions are made within the context of our wider asset management activities (e.g. system development), so that investments are optimised across all business objectives and constraints.

H.2.8 Relocations

We relocate existing mains when required as a result of the activities of other utilities, authorities or customers. For example, the development of a state highway in the vicinity of our assets and may require us to relocate the asset. Relocations are identified following third party works notifications. Typically, asset relocations projects are predominantly funded through capital contributions by the third parties requesting the relocation.

H.2.9 Maintenance

Our overarching maintenance policy is to maintain our assets to ensure a safe, efficient and reliable network.

Maintenance Approach

Our maintenance approach is designed to ensure that our assets achieve their expected life and to minimise lifecycle costs. We use information obtained in the course of maintenance work to guide our future maintenance programmes and to inform renewal decisions.

We are required by the Gas Act to design, construct, maintain and operate our network in accordance with the Gas (Safety and Measurement) Regulations 2010. This regulation cites both NZS 5258 and AS/NZS 4645 as a means of compliance. We have adopted NZS 5258 as our means of compliance.

We have a comprehensive suite of asset maintenance standards that describe our approach to maintaining our asset fleets. There are significant differences required in the approach for different asset types, but as a broad rule the maintenance standards specify the following.

- Required asset inspection frequency.
- Routine and special maintenance activities to be carried out during these inspections.
- Condition testing that needs to be carried out and the required response to the test results.

We are currently in the process of reviewing these technical standards to align with AS/NZS 4645. The review has seen a progressive adoption of specific requirements of AS/NZS 4645. This will continue until the review is competed in FY2017, at which time the migration from NZS5258 to AS/NZS 4645 will be complete.

Maintenance Objective

The overarching maintenance philosophy adopted for the asset is to provide timely, quality and cost-effective maintenance services to ensure that assets are maintained to support the required level of safety, reliability, availability, output capacity, and service quality.

During the planning period our main strategies to achieve this objective are as follows:

- Regularly review the effectiveness of routine maintenance for each asset type and update our maintenance standards and activities as required to deliver optimum performance.
- Regularly review the effectiveness of our monitoring programme to identify components that may require more intrusive inspection or could have less frequent inspections.
- Ensure that staff are vigilant in identifying the activities of third parties working near our assets, and taking appropriate action to ensure the integrity of our network is not compromised.
- Educate the public, landowners and customers through regular communication about the dangers of working near our network.

Activity Drivers

Our approach to maintenance is influenced by a number of factors. These include the number, type and diversity of our asset fleets, their condition and age, and external factors such as legislative requirements, environmental factors and third party activity.

Maintenance Standards

We have developed maintenance regimes for each asset fleet. The regimes form a key part of our schedule for planned maintenance. The purpose of these regimes, in conjunction with corrective maintenance, is to ensure assets operate safely and deliver their designed outcomes with regard to life and performance.

As part of the asset maintenance standards, the frequency of inspection and reporting per asset category has also been defined. This forms the basis of the asset maintenance schedule.

All relevant standards are available to personnel engaged in maintenance activities, as well as to our FSP. They must comply with the standards and inspection schedules for each class of assets.

Our standards are updated in accordance with an established review cycle, and any new findings or updates are incorporated in the standards as soon as they are reviewed by the Asset Management Team, and signed off by all interested parties. Our service providers contribute to, and form an integral part of this continuous improvement process.

We monitor progress of our maintenance schedules and associated maintenance costs on a monthly basis. Any concerns identified during asset maintenance or inspections are recorded in an asset management database. Our service providers provide recommendations for the priorities of remedial works for asset defects, which we then reviewed prior to issuing orders for the work. Maintenance priorities are based on cost, risks and safety criteria.

In making a decision to repair an asset we will consider recommendations submitted by our service providers, as well as the factors discussed above. We also take into account the long-term asset plans as supported by trend analysis when making these decisions.

Root cause analysis is normally undertaken as a result of faulty equipment. If this identifies systemic faults or performance issues with a particular type of asset, and if the risk exposure warrants it, a programme will be initiated to carry out the appropriate remedial actions on an asset fleet. We also amend the asset and maintenance standards to reflect the learnings from such analysis.

Information Disclosure

For the purposes of the AMP we categorise our maintenance work into the following Information Disclosure categories.[2]

- Routine and Corrective Maintenance and Inspection
- Service Interruptions, Incidents and Emergencies

Routine and Corrective Maintenance and Inspection (RCMI)

Immediately after new assets are commissioned the RCMI maintenance regime begins. As an asset ages and its condition worsens, the cost of corrective repairs to maintain fitness for purpose will escalate until it becomes more cost-effective to decommission or replace it. We use ongoing condition monitoring throughout the asset's life to identify the point when the asset should be decommissioned.

Routine and corrective maintenance, and inspection measures may include:

- Pipe patrols, inspection and condition detection tasks and maintenance service work.
- The coordination of shutdowns of station facilities, restoration of supply along with the capture and management of all defined data.
- Advanced investigative and corrective technologies to extend machinery life such as root cause failure analysis, installation/commissioning performance verification, purchase specification, spare parts management, reliability engineering and research.
- Painting and repair of buildings and asset enclosures, removal of decommissioned assets, one-off type inspection and condition detection tasks outside of planned maintenance standards.
- Repair of assets identified from programmed inspections or service work assessed to be unserviceable or in poor condition.

Taking all of the above into account, maintenance strategies and plans are developed that determine maintenance activities and frequencies. The plans are updated as required on a monthly basis and used to inform our Network Opex forecasts. The routine maintenance and inspection tasks carried out on our distribution network are detailed in Appendix K, along with categorised forecasts for the activities over the planning period.

Service Interruptions, Incidents and Emergencies (SIE)

The occurrence of SIEs will result in the need to carry out activities to understand the nature of the SIE and rectify asset failure or damage to assets caused by unplanned or unforeseen circumstances. This may include the following activities:

- Safety response and repair (or replacement) of any part of the asset damaged due to environmental factors or third party interference.
- Response to any fault at a station where safety or supply integrity could be compromised.
- Remediation or isolation of unsafe network situations.

We take every reasonably practicable precaution to prevent third party interference with pipelines and carry out rigorous inspection and maintenance practices. However, experience and history has shown that emergency situations arise from time to time. In most circumstances pipeline integrity breaches do not result in catastrophic failure or rupture of the pipeline and suitable repair methodology and techniques can be applied. In more serious cases pipelines may have to be isolated and sections of pipeline replaced.

Delivery Model

We have a mixture of insource and outsource approaches for field work delivery within First Gas. We see this mixture as being currently appropriate and is driven by the concept of having scarce and specialised skills supplied internally. Where the skill set is more broadly available and a competitive market exists then outsourcing is preferred.

We outsource some capital project construction and a number of other technical roles to a group of 'service providers'. We seek to build sustainable and effective relationships with them through appropriate commercial arrangements.

This approach enables us to keep core engineering competencies in-house while leveraging the expertise and resources of our service providers. While our approach has several benefits, it requires that we effectively align our respective aims and incentives.

2. We currently do not assign any expenditure to the ARR Opex category.

Maintenance Delivery

Field maintenance is predominantly an outsourced activity. Following a review of our Field Service Provider (FSP) in 2017, Electrix Ltd was re-contracted with the contract commencing Jan 2018. Electrix is responsible for the preventive, corrective and reactive maintenance works on the gas distribution network.

We are establishing new contractual KPIs with Electrix and a framework with guiding principles to manage the working relationship. The objective of our outsourced business model is to improve the efficiency and quality of delivered services.

We have begun the process of working with our FSP on continuously improving the coordination of the various activities associated with the delivery of the capital works programme. The objective is to achieve better utilisation of resources, enhance capital efficiency, and deliver improved customer outcomes. Improvement initiatives include:

- Introduction of integrated works planning across the end-to-end Capex process. This is to drive an efficient and deliverable works plan that coordinates work to optimise outage impacts and resource requirements.
- Introduction of early contractor involvement to drive:
  - Improved risk management.
  - Clear understanding and development of scope and delivery sequence.
  - Early constructability input and reviews.
  - Earlier operational acceptance.
  - Improved innovation.
  - Improved cost certainty and better executed project management with less variations.

Significant refinement of the Capex programme delivery process to better define accountabilities across all involved parties.

Asset maintenance is delivered by our FSP based on the standards and inspection schedules for each class of asset.

The resources employed by the Distribution Services Team are mainly in-house and are supplemented by the use of external contractors to balance work load requirement as required. The Distribution Services Team is responsible for planning and scheduling maintenance requirements and ensuring that sufficient skilled resources are available to deliver against requirements.

Progress against the maintenance schedules and associated expenditure is monitored on a monthly basis.

H.2.10 Systems Operations And Network Support

System operations and network support Opex relates to expenditure where the primary driver is the management of the network. These expenses include the following activities:

- Asset planning, including preparation of the AMP, load forecasting and network modelling
- Network and engineering design (excluding design costs capitalised for capital project)
- Network policy development
- Standards and documentation development for network management
- Network record keeping and asset management database maintenance including GIS
- Outage recording
- Connection and customer records/customer management databases
- Customer queries and call centre
- Operational training for network management and field staff
- Field staff operational vehicles and transport
- T & telecoms network management including IT support for asset management information systems
- Day-to-day customer management
- Engineering and technical consulting
- Network planning and systems audits
- Logistics and stores, easement management, surveying of new sites to identify work requirements
- Contractor/contract management
- Network related research and development

H.2.11 Asset Management Support

This appendix discusses the functions and capabilities that support our day-to-day asset management activities. It describes our:

- **Non-network assets:** including our Information and Communications Technology (ICT) systems and office facilities.
- **Business support:** activities that support our gas distribution service.

H.2.12 Non-Network Assets

This section discusses our non-network assets. It explains our approach to delivering ICT capabilities and managing associated assets. It also discusses our other non-network assets (e.g. our buildings).

H.2.13 ICT Assets

We have implemented a number of systems since the initial transition to improve organisational capability.

These include:

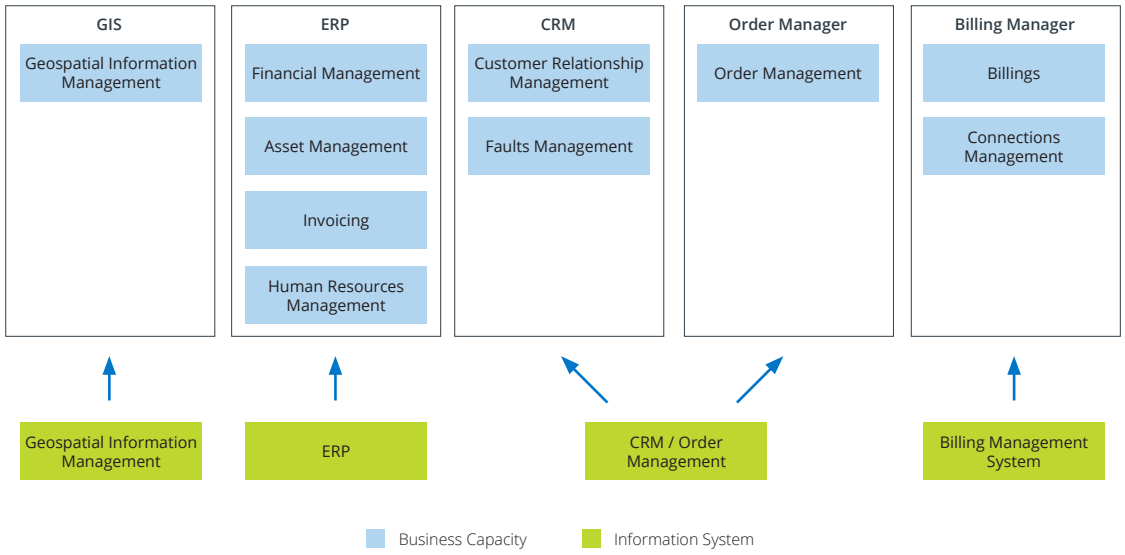
- X-Info Suite, a Land & Planning management toolset.
- Solufy Akwire, a field resource scheduling tool that interfaces with Maximo.
- ESRI ArcGIS for the transmission asset data so all our GIS data is now in the same system.
- Project Server Online as the collaborative project management tool.

The ICT systems and functions include:

- **Core network related systems:** support capabilities that manage information directly relating to First Gas network assets and their operation and management.
- **Supporting network related systems:** are smaller systems that support capabilities that manage information that directly relates to our assets and their operation and management.
- **Supporting ICT infrastructure systems:** support the integration and operation of both the core network and supporting network related systems.

Figure 30 below illustrates the relationship between our business functions and processes – hereafter referred to as business capabilities – and our core network related systems.

Figure 30: Business Capabilities and Core Network Related Systems



We expect to continue investing over the next few years to ensure the systems are being used effectively and efficiently. We expect to invest particularly in information management strategies and digital workspace transformation.

H.2.14 Information And Data

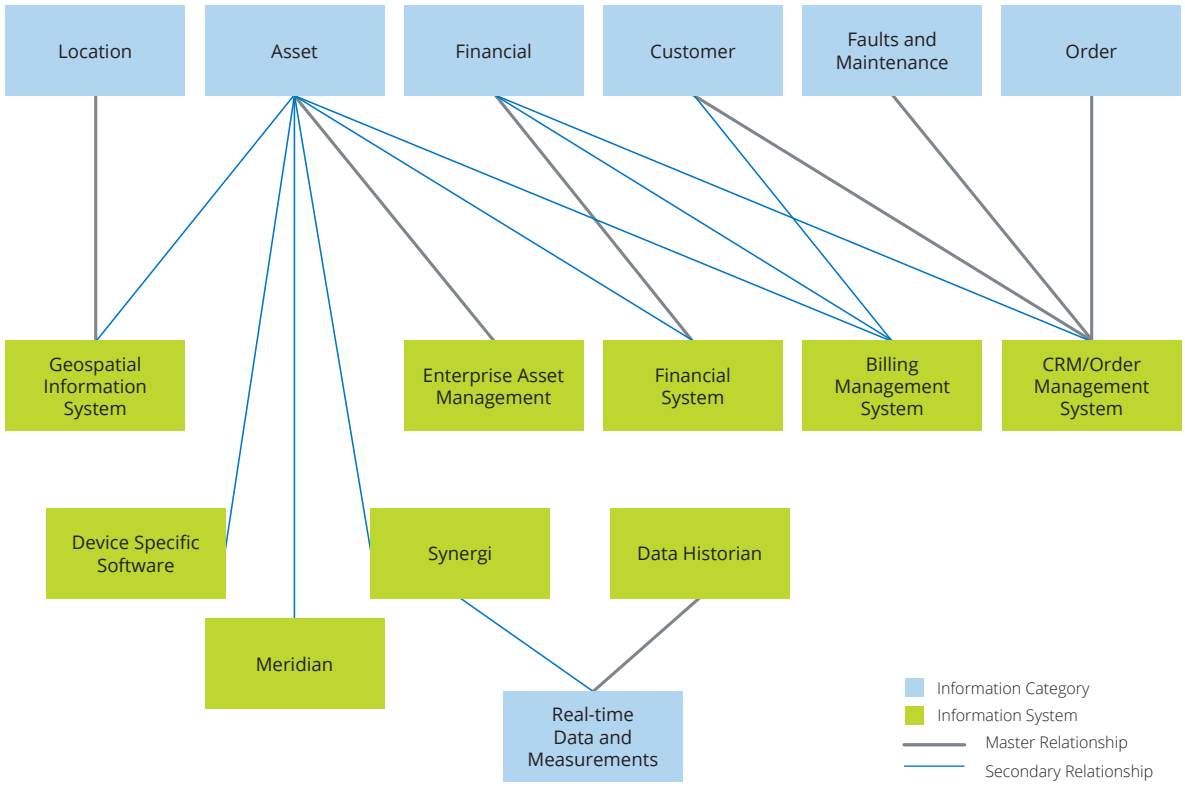
Our network and supporting network information systems manage data that is necessary for the effective day-to-day operation of our network assets and the ongoing planning activities relating to those assets.

The information can be divided into several categories:

- Asset (e.g. type, size, installation date, operating/maximum pressures)
- Location
- Customer
- Order
- Financial
- Faults and maintenance
- Real-time data and measurements

These information categories managed by our information systems are shown in Figure 31 below.

Figure 31: Information and Systems Relationships



Information Systems Strategic Plan (ISSP)

Our ISSP aims to ensure we develop capabilities enabling us to support our planned asset management changes over the planning period, including:

- Enhancing our asset management analysis capabilities
- Supporting increased work volumes on our networks
- Providing real-time information to customers, including through new information channels
- Enhancing the way we deliver works with our service providers

Over the planning period, we recognise that the range of available options to deliver ICT capability will shift and evolve rapidly. Our strategies and plans are designed to maximise flexibility in a changing environment.

As a lifeline utility, we also recognise that system resilience is a fundamental expectation.

Our architecture must be developed on industry accepted standards for cyber security in an increasingly connected communications landscape. Over the planning period we need to ensure that our ICT assets are:

- **Flexible:** built on technologies forming a solid central platform that allow rapid development of new capabilities around the margins.
- **Scalable:** to accommodate increased data processing/storage and accessible to ensure customers and internal users have real-time access to the information they need and can rely on the quality and security of that information.
- **Resilient:** to maintain 'lifeline' utility levels of reliability, ensuring our systems are resilient, reliable and responsive, designed with multiple layers of redundancy matched to the criticality of the capabilities they support.

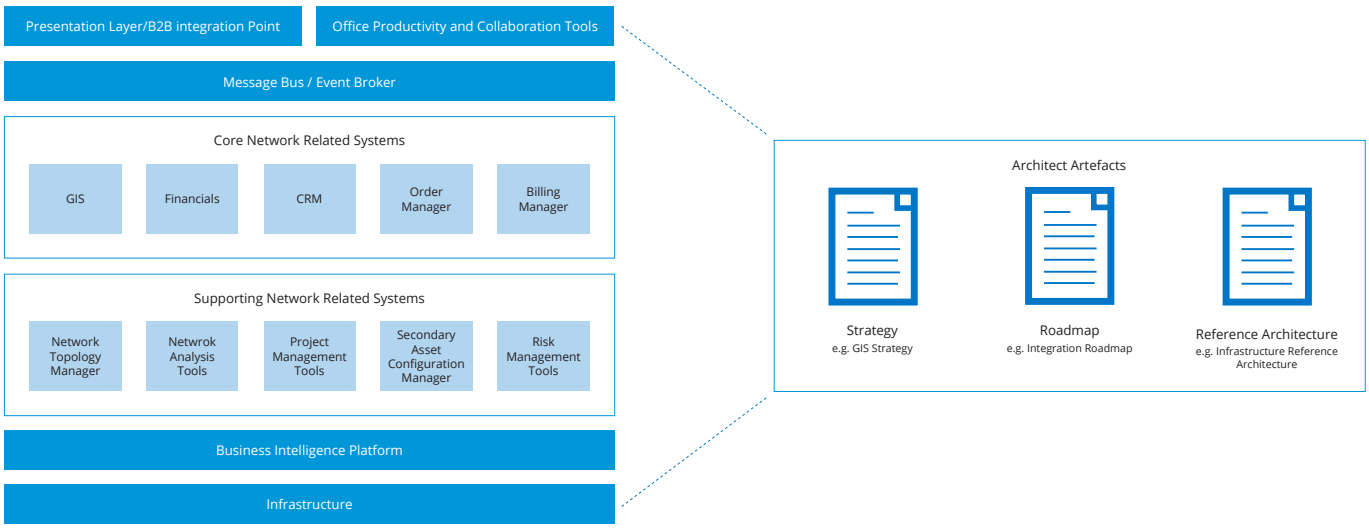
ICT Investments

This section describes our approach to investing in ICT assets that support our asset management functions and the cost of maintaining these services.

It includes investments in ICT change initiatives and network related ICT. It covers the ICT programmes and projects that ensure our processes, technology and systems help deliver our asset management objectives.

Each component within our technology architecture has a collection of supporting architecture documents. These documents are referred to as 'Architecture Artefacts'. They are used to define the strategy, roadmap, and detailed reference architecture specific to each component.

Figure 32: Architecture Artefacts



These 'Architecture Artefacts' are used to inform the investment planning for each information technology system and infrastructure component. Financial modelling is also used in addition to these artefacts to ensure that ICT investment decision-making takes into account financial constraints such as total cost of ownership and IS asset depreciation.

Furthermore, our expenditure forecasts are informed by historical costs, expected unit cost, and price trends. We have worked with suppliers to determine unit costs for current technologies or their likely replacements. Due to the rapidly changing nature and relatively short lifecycle of ICT related hardware and software it is difficult to determine accurate unit cost estimates for products and services more than two years out.

To develop 10-year expenditure forecasts we have assumed that software costs will progressively move from Capex to Opex as software providers shift to the software as a service model. We also assumed that hardware costs are likely to be stable over the next 10 years on a like-for-like basis.

We believe an uplift in ICT expenditure will be required over the first two to three years of the planning period due to our investments in new systems. From year four expenditure is expected to stabilise.

Main ICT Systems

Table 8: Key Systems

SYSTEM	DESCRIPTION
Microsoft Dynamics NAV	Finance
Maximo	Enterprise Asset Management
Akwire	Field Resource Scheduler
ESRI ArcGIS	Geospatial Information System
X-Info	Land & Planning Management
Microsoft Dynamics CRM	Customer Relationship Management
Axos	Billing

Finance (Dynamics NAV)

Our Financial Systems Strategy is to ensure that all financial solutions are fit for purpose and cost effective to maintain. This will allow us to leverage asset information without the systems becoming overly complex and costly. We selected Microsoft Dynamics NAV as our financial management system and implementation of this system occurred in FY2016.

We have moved some of the financial processes out of our EAM solution so they better align with business management processes and reporting requirements. These include:

- Inventory management
- Procurement management
- Inter-Entity Billing

Enterprise Asset Management (EAM): Maximo

To meet our organisational objectives, we must focus on capturing accurate data at source and making information accessible to the business with tools that allow us to leverage value and improve our performance.

In line with our objective of optimising lifecycle asset management capability, the EAM and associated business processes have been designed to hold the planned maintenance schedule for each asset, according to the relevant engineering standard. It also captures transactional information against each asset record, including that gathered through inspection activities, maintenance activities and defects lists.

The format for transactional information entered into the EAM is defined by our engineering standards, including maintenance standards. Works management is enabled by deriving inspection and maintenance schedules from the information held in the EAM, in line with our operational and engineering standards and supported by our asset engineers. The EAM includes the functionality provided by a computerised maintenance management system.

Capturing field data regarding maintenance activities is carried out using both a paper system with data inputted by administrative staff and an electronic based system comprising of tablet devices and associated software linking between tablets and the EAM.

Our EAM includes four management modules in an enhanced service-oriented architecture. It allows us to use asset information to achieve our customer & regulatory outcomes, increase our operational efficiency and to identify opportunities for disciplined growth and improvements in our cost efficiency. These modules are:

- Asset management
- Work management
- Service management
- Contract management

Geographical Information System (GIS)

The ESRI ArcGIS now holds both the distribution and transmission asset data. GIS is the master asset register for below ground pipeline assets and includes geospatial, technical, hierarchical, spatial, contextual, connectivity, CP and land management data. The locations of assets generated and recorded in the EAM are also recorded in GIS for cross referencing.

GIS provides a computerised mapping system, which shows the location of all assets against land-based data provided by Land Information New Zealand via CoreLogic. Its primary purposes are to provide pipeline information for the BeforeUDig service and to support Pipeline Integrity Management System (PIMS) and demand modelling systems.

A key piece of equipment used in the field to capture the location of assets is GPS receivers. GPS uses satellites to establish an accurate position and coordinates on the earth's surface and allows data to be captured about the asset loaded into the GIS.

Customer Relationship Management (CRM)

Our CRM Systems Strategy ensures that all CRM solutions are used "as designed" with the minimal amount of customisation. Such solutions will allow us to better serve customers without the systems becoming overly complex and costly. It will enable us to interact with our customers effectively and efficiently to achieve our customer and regulatory outcomes, increase our operational efficiency and identify opportunities for improvements in our cost efficiency.

Billing (Axos)

Our Billing Systems Strategy ensures that the billing solution is "fit for purpose" for the billing requirements of the business. "Fit for purpose" Billing Management Solutions will allow us to better control billing processes without the systems becoming overly complex and costly. It will enable us to execute billing processes effectively and efficiently to achieve our customer and regulatory outcomes, increase our operational efficiency, to identify opportunities for disciplined growth and improve our cost efficiency.

Open Access Transmission Information System (OATIS)

OATIS is the pipeline operation system which facilitates third party access to the transmission system. OATIS balances pipeline receipt and delivery nominations, processes pipeline metering information and performs a myriad of essential pipeline tasks.

The system is considered to have reached the end of its life and replacement is planned over FY2018 and FY2019. A replacement system has been formally selected and this will be implemented once the new Gas Transmission Access Code has been approved by the GIC.

Training Manager

Our training and competency recording is maintained in Maximo. This enables planning, budgeting and resourcing capability for internal and external courses. Industry and regulatory training is also able to be recorded and reported on. It allows for local configuration of set up so it can be customised to business requirements aligning with the organisational structure.

Data Quality Management

Our asset data is largely captured and maintained through an as-building process. These activities are controlled by asset data standards, business rules, work instructions and the relevant provisions of any contractual agreements with service providers.

Our asset data standards determine which assets are captured in our asset management information systems, what attributes of those assets are recorded, and what transactions we want to be recorded e.g. records of planned inspections, faults and defect data.

We gather and upload data in accordance with our standards, but we are responsible for processing the data or formulating maintenance plans or strategy on the basis of the data.

H.2.15 Other Non-Network Assets

This includes all other Capex not encompassed within our direct network or ICT Capex. It comprises the following main expenditure types:

- **Offices and facilities:** costs related to the relocation, refurbishment and development of our office buildings and facilities.
- **Vehicles:** includes investments that maintain our motor vehicle fleet.
- **Minor fixed assets:** costs of ongoing replacement of office equipment including workstations, laptops, mobile phones and peripheral devices.

Offices and Facilities

Our expenditure during the planning period mainly relates to the refurbishment of our New Plymouth offices. The main drivers are the improved productivity and effectiveness of a fit for purpose office. The current office is overdue for major refurbishments. Refurbishment costs are based on estimates of the likely 'fit-out' (e.g. interior partitioning and office furniture) costs.

Vehicles

Our approach with vehicles is to lease our fleet. However, for some limited examples it makes better strategic sense to own a vehicle directly. This might be where certain towing ability is required or where specific plant equipment is required.

Minor Fixed Assets

All our employees are provided with a standard workstation setup that includes a desk, chair, storage, PC and communication equipment. We classify minor fixed assets as the following:

- Desktop and laptop hardware
- Monitors and screens
- Video conferencing equipment
- Other peripherals (e.g. printers and scanners)

Expenditure is driven by the need to provide staff with the tools necessary to carry out their roles efficiently and to leverage business improvements (such as new ICT systems) and increase staff mobility and collaboration.

H.2.16 Non-Network Capex Expenditure Allocation Methodology

Non-network Capex is allocated between our transmission and distribution businesses based on factors such as size of asset base and staff headcount.

H.3 BUSINESS SUPPORT

People across our business play a central role in managing our assets. Ensuring we have enough people with the right competencies is essential if we are to achieve our asset management objectives over the planning period.

H.3.1 Business Support Expenditure

We directly employ about 150 people across our gas businesses (who also support our distribution assets). We support the employment of many more field staff and engineers through our service providers. To support our asset management teams, we have a number of corporate support functions. These include customer management, finance, and ICT. These functions either directly or indirectly support the distribution side of our business as set out in the examples below:

- **Finance:** financial management, management reporting and analysis and operations to support the business.
- **Human resources:** attracting and retaining capable and effective people, managing competency development and ensuring a positive working environment.
- **Health and safety:** leadership and coordination of safety across the company.
- **Legal and regulatory:** compliance with statutory requirements, including regulatory and environmental obligations.

This expenditure is largely driven by the human resource requirements. A large portion relates to our direct staff costs. The other main elements are insurance, legal, audit and assurance fees (primarily to support regulatory compliance), office accommodation costs and travel costs.

Our forecasts have been developed from the bottom up for each individual business unit by the executive manager responsible for that business unit. Each individual executive manager regularly assesses the resource requirements for their business unit/s.

- **Salaries and wages:** the majority of the costs are related to internal staff salaries and wages for permanent positions.
- **Staff costs:** the next major driver is staff costs which include training costs, travel, meals and accommodation, recruitment costs and mobile phones etc. These costs are driven by headcount and to some degree technology.
- **Professional and legal advice:** we use professional advice for a wide range of purposes, including supplementing our internal capabilities in our legal, tax, internal audit, regulatory, and ICT teams with specialist skills and advice as required.

As a regional employer, we may struggle to attract specialist professionals, particularly from overseas, who are less familiar with our locations. This means we need to remain competitive with our benefits packages.

These investments in people are essential if we are to operate as an effective company and to ensure that our workforce is appropriately skilled and qualified.

ICT Opex

ICT Opex covers ICT costs associated with operating our business. More specifically it covers software licensing, software support, data and hosting, and network running costs. These costs are driven from the need to support corporate and network operations with appropriate technology services. It is driven by the following factors.

- Increased technology capability requirements as a standalone business
- System complexity
- Increases in the number of staff and contractors
- Software audit requirements from vendors are met ensuring that we comply with vendor End User Licensing Agreements
- Ensures access to appropriate levels of software support from vendors and access to bug fixes and maintenance packs
- Lifecycle stage of IT assets and data needs of the business

The software industry as a whole is moving to subscription 'pay-as-you-go' model due to cloud-delivered software and technologies. It is likely in the 2018-2022 timeframe we will use more cloud based software as service subscriptions meaning expenditure previously classified as Capex will increasingly be occurred as Opex.

Our forecasts are based on the most accurate information we have been able to obtain from suppliers and service providers and is based on the current technologies available and required scale to meet our needs.

H.3.2 Business Support Expenditure over the Planning Period

Our Business Support Opex forecast includes expenditure related to the functions that support our gas distribution business. It includes indirect staff costs and associated expenses advice. The other material elements are office accommodation costs, legal and insurance costs.

A portion of our Business Support Opex is allocated to our gas distribution business in accordance with our cost allocation policy.

H.3.3 Business Support Allocation Methodology

The allocation of Business Support costs to our transmission and distribution businesses is based on a combination of three factors. The first, which is applied to expenditure that has a relationship with the assets (such as ICT systems) is an allocation on a proportion of RAB basis. The second, which is related more to supporting the people in our business (such as-building costs) is proportioned on the basis of the relative headcount working in each particular business. The third allocation applies to other or miscellaneous spend and is an average of the first two methodologies.

H.4 PERFORMANCE MEASURES

This section describes our performance targets. A key premise for the AMP is that existing reliability and supply quality levels will be maintained and improved.

The targets specified below are applicable for each year of the AMP planning period. Where appropriate the targets have been developed to align with the definitions developed by the Commerce Commission for Information Disclosure.

Our service providers undertake data capture activities in accordance with our Gas Distribution Network Reliability, Integrity and Consumer Service standard. Through collation of this data into our Engineering Asset Management and Customer Management systems, we are able to provide integrity and reliability measures for disclosure reporting purposes. Reportable measures in addition to those described below include:

- Number of telephone calls to emergency numbers answered within 30 seconds
- Average call response time
- Number of reported emergencies
- Response time to all emergencies (service level within 60 minutes), (Commerce Commission requirement within 180 minutes)
- SAIDI/SAIFI

H.4.1 Safety

We routinely monitor HSE performance (internally and externally) and the HSE performance of our core contractors. In addition, we have a strong reporting culture and all incidents are reviewed weekly to ensure the appropriate level of investigation and that incident owners are assigned.

We are increasing our focus on critical risks, particularly those that can result in serious injury or fatality. Safety initiatives:

- **Collaboration:** we work collaboratively with our partner service providers. For example, we are making a step change in works planning to produce our plans earlier and improve their stability to create an environment where our staff and service providers can operate more safely and working with service providers to get better policies, work practices and reporting disciplines.
- **Asset management framework:** is being used to drive safe outcomes. We are implementing Safety in Design principles and applying these from concept to design, construction contracting and management and disposal of assets. We are training workers in these practices.
- **Communications:** we are supporting health and safety committees to work on meaningful projects, allocating resources to regularly communicate to workers, and setting up reward programmes to recognise individuals' behaviour.
- **Safety systems:** we are providing service specifications and policies to service providers to ensure best practice, reviewing work management policies and providing an improved and transparent safety system.

Note: there is no historical data available for safety statistics on our distribution network.

Safety Target

Lost Time Injury Frequency Rate: 0

H.4.2 Security and Reliability: Customer Complaints

Although we seek to provide a high standard of service and a safe and reliable gas supply, there may be times when customers have concerns with their service.

Table 9: RTE – historical performance

	FY2015	FY2016	FY2017
Proportion of RTE within one hour	93.8%	80%	94.3%
Proportion of RTE within three hours	100%	100%	100%

RTE response within one hour has varied between 80% and 94% historically. We would like to push towards the upper half of this band over time. Our RTE target and definition are aligned to the quality standard specified in our DPP.

RTE Target

Proportion of RTE within one hour: 80%

Proportion of RTE within three hours: 100%

H.4.3 Security and Reliability: Customer Complaints

Although we seek to provide a high standard of service and a safe and reliable gas supply, there may be times when customers have concerns with their service.

Table 10: Complaints per Customer – historical

	FY2015	FY2016	FY2017
Number of Complaints per Customer	0.0003	0.0005	0.00005

Historically there has been a move to a relatively low number of complaints and we would like to maintain the level reached as we stabilise our customer management systems.

Complaints Target

Number of complaints per customer is less than: 0.0005

H.4.4 Safety And Reliability: Outage Timeframes

System Average Interruption Duration Index (SAIDI) measures the total time, on average, that a customer could expect to be without gas over the reporting period. It is a measure of interruptions, including third party damage and excludes interruptions directly resulting from interruptions on the transmission system. It is calculated by dividing the product of the number of interrupted customers and the duration of the interruption (in minutes), by the total number of customers connected to the network and further dividing by 1,000.

Table 11: SAIDI – historical performance

	FY2015	FY2016	FY2017
SAIDI (minutes per 1000 customers)	1,180	988	1,874

Historical achievement in SAIDI has not yet reached target levels. We are intending to hold the challenging target to continue to drive our focus and investment in reliability. The FY2017 SAIDI results were impacted by Unplanned (not caused by third party damage (Class C)) caused by 12 temporary disconnection events during the period. These 12 temporary disconnection events accounted for 1,172 of the unplanned SAIDI minutes reported in the 2017 disclosure period. In all cases, the extended period of disconnection of supply was undertaken with the customer's agreement.

Outage Timeframe Target

SAIDI (minutes per 1000 customers): 1300

H.4.5 Safety And Reliability: Outage Frequency

System Average Interruption Frequency Index (SAIFI) measures the average number of interruptions that a customer could expect over the reporting period, including those due to third party damage, but excluding those directly resulting from interruptions of the transmission system. SAIFI is calculated by dividing the total number of interruptions on the network in the relevant year by the total number of customers connected to the network and further dividing by 1,000.

Table 12: SAIFI – historical performance

	FY2015	FY2016	FY2017
SAIFI (interruptions per 1000 customers)	13	5.9	9.5

Historical achievement in SAIFI has not yet reached target levels. We are intending to hold the challenging target to continue to drive our focus on reliability.

Outage Frequency Target

SAIFI (interruptions per 1000 customers): 5.9

H.4.6 Safety And Reliability: Outage Duration

Customer Average Interruption Duration Index (CAIDI) measures the average outage duration of an interruption of supply per customer who experienced an interruption in the reporting period. CAIDI is the sum of the duration of each (excluding transmission) interruption, divided by the total number of (excluding transmission) interruptions.

Table 13: CAIDI – historical performance

	FY2015	FY2016	FY2017
CAIDI (minutes per interruption)	90	152	197

CAIDI performance has varied between 90 and 241 historically. We have selected a midpoint target consistent with previous target levels.

Customer Outage Duration Target

CAIDI (minutes per interruption): 152

H.4.7 Safety and Reliability: Publicly Reported Gas Escapes (Pre)

We use Public Reported Escapes (PRE) as its primary technical network service quality measure for operational purposes. It is a critical safety measure and a reliable indicator of the condition of the network. This measure is impacted by a number of factors, including the effectiveness of renewal strategies, the condition and composition of assets, the level of odorant added (which increases the likelihood of PREs), and the extent and effectiveness of leakage surveys.

PRE is calculated by dividing the total number of confirmed public reported escapes of gas on the network (including mains, service pipes, valves, and pressure stations) in the relevant year by the total length of network (mains and services) and further dividing by 1,000.

Table 14: PRE – historical performance

	FY2015	FY2016	FY2017
PRE events per 1000km	42	53	39

Historically the performance against this KPI has been good ranging between 42 and 53 events per 1,000km. We are going to maintain the existing historical target.

Publicly Reported Escapes Target

Public reported escapes (events per 1000km): 53

H.4.8 Safety and Reliability: Leakage Surveys

Leakage surveys are a proactive maintenance strategy that attempts to locate gas leaks in the network. Leaks detected by system surveys are a clear indicator of the condition of the network and the effectiveness of maintenance strategies. Renewal strategies play an important role in improving the condition of the gas distribution network and reducing the number of leaks. We survey different parts of our network every year, taking five years to complete an entire network survey. It is therefore not meaningful to compare leak data on a yearly basis; a five year rolling average should be applied to any analysis of overall network condition.

Leak survey is calculated by adding up the number of leaks detected by routine survey and dividing this number into the total length of pipeline and further multiplying by 1,000.

Table 15: Leakage Surveys – historical performance

	FY2015	FY2016	FY2017
Leakage surveys (events per 1000km)	0.2	1.4	0.6

Historical performance has consistently met target and we intend to continue this level of target while we complete the current series of surveys.

Leakage Survey Events Target

Leakage Surveys (events per 1000km): 1.4

H.4.9. Safety and Reliability: Poor Pressure

Poor pressure due to network causes is a count of the number of unplanned incidents where delivery pressure drops below contracted delivery requirements. These events can be reported through customer or our own monitoring equipment.

Table 16: Poor Pressure – historical performance

	FY2015	FY2016	FY2017
Poor pressure due to network causes	2	3	8

Historical performance has consistently met target apart from in 2017 so we intend to continue to use the historical target.

Poor Pressure Events Target

Poor pressure due to network causes: 3

H.4.10. Safety And Reliability: Odorization

The purpose of this measure is to ensure the odorant levels of gas conveyed through our gas networks are maintained in accordance with the requirements of the Gas Regulations 1993 and the New Zealand standard NZS 5263 Gas Detection and Odorization.

Monitoring the number of non-compliant odour tests enables us to monitor the level of odour in the gas and identify if corrective action is required. A non-compliant odour test means the odour test result is above 0.9% gas-in-air or where the odorant concentration test result is less than 3 mg/m^3.

Table 17: Non-compliant Odour Tests – historical performance

	FY2015	FY2016	FY2017
Number of non-compliant odour tests	0	3	3

Historical performance has consistently met target. Moving forward we intend to continue the same level of target.

Poor Pressure Events Target

Poor pressure due to network causes: 3

H.4.11. Safety and Reliability: Third Party Damage

Third party damage events to networks are a significant cause of gas escapes and customer supply interruptions. The levels of third party interference damage provide some indication of the network operator's level of success in communicating awareness to those who control and/or are directly engaged in any activities that put gas networks at risk. As described in this appendix, we have a number of strategies, such as public safety awareness communications programmes, which are designed to increase public and contractor awareness and reduce the number of third party incidents.

Table 18: Third party damage – historical performance

	FY2015	FY2016	FY2017
Third party damage (events per 1,000km)	50	67	50

Historical performance has consistently met target and we intend to continue this level of target.

Third Party Damage Events

Third party damage (events per 1,000km): 67

H.5 ASSET MANAGEMENT MATURITY ASSESSMENT TOOL

As a regulated of supplier of gas distribution services, we undertake a self-assessment of the maturity of our practices in relation to asset management using a prescribed Asset Management Maturity Assessment Tool (AMMAT).

The AMMAT seeks to identify the maturity of a company's current asset management practices, relative to an objective standard based on good asset management practices, such as that described in ISO 55000. The AMMAT consists of 30 questions from the ISO 55000 assessment module, scoring maturity in each asset management area on a scale from zero to four. The detailed results of our self-assessment are included as Appendix B to the AMP.

We support the disclosure of the AMMAT because it allows interested persons to understand how well we are managing our assets against an objective and internationally recognised standard.

H.5.1 AMMAT Results

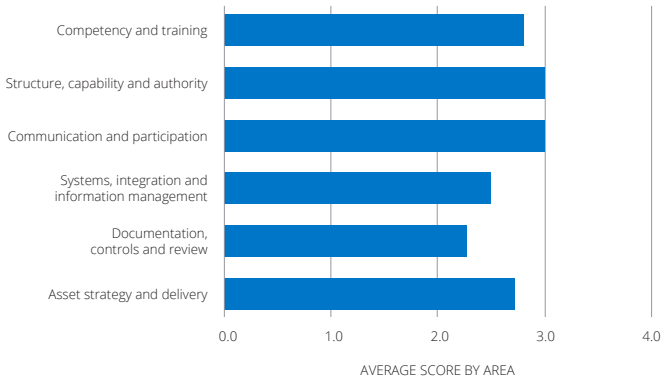
The AMMAT has been used to assess the maturity of our asset management practices. A summary of the rating in each area is as illustrated in Figure 33.

Figure 34 shows the overall performance for the 31 questions for this this assessment compared to the assessment conducted in 2016. Overall, we have 21 questions within maturity level 3 and the remaining 12 elements were within the maturity level 2.

Our current score is 2.7 compared to our initial assessment score of 2.6 in 2016.

The AMMAT result indicates that while we are building on the solid core competency established in 2016 we need to embed them and still have activities where we need to improve to get to maturity level 3 across all the areas.

Figure 33: AMMAT Summary



Areas of strength include:

- Structure, capability and authority
- Communication and participation

Areas of opportunity include:

- Systems, integration and information management
- Documentation. Controls and review

Our goal is to move to an average score of 3.0 by 2021.

The variances and evidence summary are detailed Table 19 on the next page.

Figure 34: AMMAT detailed results for 2016 and 2018

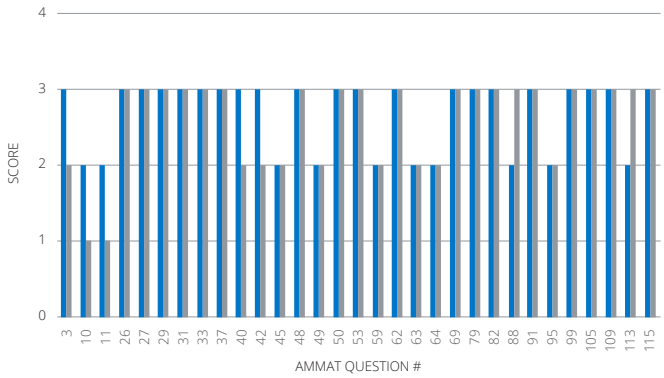


Table 19: Variance detail between 2016 and 2018

QUESTION NO.	DISCUSSION	2016	2018	EVIDENCE - SUMMARY
3	To what extent has an asset management policy been documented, authorised and communicated?	2	3	Asset Management Policy is authorised, published and communicated to all relevant stakeholders.
11	In what way does the organization's asset management strategy take account of the lifecycle of the assets, asset types and asset systems over which the organization has stewardship?	1	2	Asset Management Strategy has been developed and incorporated into the AMP. Need to expand to cover all asset, asset types and asset systems.
26	How does the organization establish and document its asset management plan(s) across the life cycle activities of its assets and asset systems?	1	2	First Gas has developed an Asset Management Plan for the Distribution Network. This plan covers the distribution network holistically. It includes the full asset lifecycle. Plans for critical assets are identified in the AMP. The plan meets the objectives of the Asset Management Policy as well as key performance standards such as NZS 7901.
40	What evidence can the organisation's top management provide to demonstrate that sufficient resources are available for asset management?	2	3	First Gas has a process for determining what resources are required for asset management activities and in most cases these are available but in some instances resources remain insufficient.
42	To what degree does the organisation's top management communicate the importance of meeting its asset management requirements?	2	3	First Gas communicates the importance of meeting its asset management requirements to all relevant parts of the organisation.
88	How does the organisation establish implement and maintain process(es) for the implementation of its asset management plan(s) and control of activities across the creation, acquisition or enhancement of assets. This includes design, modification, procurement, construction and commissioning activities?	3	2	First Gas is currently reviewing its processes and procedures for the design, construction, maintenance and operation and modification of the assets across their lifecycle.
113	How does the organisation achieve continual improvement in the optimal combination of costs, asset related risks and the performance and condition of assets and asset systems across the whole life cycle?	3	2	Continuous improvement is applied across most of the asset lifecycle. Some systems are in place to improve the condition, reliability and performance of the assets based on asset condition, commercial drivers and perceived risk to security and reliability. Capital and Operational budget allocations for renewal are assigned and approved by management.

APPENDIX I: LOAD FORECASTS

This appendix sets out the projected annual and total growth rates at each of our existing gate stations, as are applied in our network models.

Table A1: Gate station Growth

REGION	NETWORK SYSTEM	GATE STATION / NETWORK SYSTEM	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	ANNUAL GROWTH	TOTAL GROWTH
Northland	Marsden Point	Marsden Point Gate Station	216	216	216	216	216	216	216	216	216	216	216	0.0%	0.0%
Northland	Whangarei	Whangarei Gate Station	1,052	1,058	1,064	1,070	1,076	1,082	1,089	1,095	1,101	1,107	1,113	0.6%	6%
Waikato	Cambridge	Cambridge Network System (Excl. Load Of Hautapu Df)	1,560	1,560	1,560	1,560	1,560	1,560	1,560	1,560	1,560	1,560	1,560	0.0%	0.0%
Waikato	Cambridge	Cambridge (Hautapu Df)							No Data						
Waikato	Cambridge	Cambridge Gate Station (Non Co-Incident)	1,555	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	0.8%	8%
Waikato	Cambridge	Cambridge Gate Station (Co-Incident)	2,996	2,993	2,990	2,986	2,983	2,979	2,976	2,973	2,969	2,966	2,962	-0.1%	-1%
Waikato	Hamilton	Hamilton – Te Kowhai Gate Station	5,531	5,561	5,591	5,621	5,651	5,681	5,711	5,741	5,771	5,801	5,831	0.5%	5%
Waikato	Hamilton	Hamilton – Temple View Gate Station	10,746	10,891	11,035	11,180	11,325	11,470	11,615	11,760	11,904	12,049	12,194	1.3%	13%
Waikato	Hamilton	Hamilton Network System (Non Co-Incident)	16,277	16,452	16,626	16,801	16,976	17,151	17,326	17,500	17,675	17,850	18,025	1.0%	11%
Waikato	Hamilton	Hamilton Network System (Co-Incident)	15,186	15,734	15,795	15,856	15,918	15,979	16,041	16,103	16,166	16,229	16,292	0.7%	7%
Waikato	Horotiu	Horotiu Gate Station	1,072	1,083	1,094	1,105	1,115	1,126	1,137	1,148	1,159	1,169	1,180	1.0%	10%

REGION	NETWORK SYSTEM	GATE STATION / NETWORK SYSTEM	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	ANNUAL GROWTH	TOTAL GROWTH
Waikato	Huntly	Huntly Gate Station	563	563	563	563	563	563	563	563	563	563	563	0.0%	0.0%
Waikato	Kiwitahi	Kiwitahi Gate Station	165	166	168	170	172	173	175	177	179	180	182	1.0%	10%
Waikato	Matangi	Matangi Gate Station	No Data												
Waikato	Morrinsville	Morrinsville Gate Station	502	502	502	502	502	502	502	502	502	502	502	0.0%	0.0%
Waikato	Ngaruawahia	Ngaruawahia Gate Station	71	71	71	71	71	71	71	71	71	71	71	0.0%	0.0%
Waikato	Otorohanga	Otorohanga Gate Station	155	155	155	155	155	155	155	155	155	155	155	0.0%	0.0%
Waikato	Pirongia	Pirongia Gate Station	30	30	30	30	30	30	30	30	30	30	30	0.0%	0.0%
Waikato	Te Awamutu	Te Awamutu North – No.2 Gate Station	591	591	591	591	591	591	591	591	591	591	591	0.0%	0.0%
Waikato	Te Awamutu	Kihikihi Gate Station	753	753	753	753	753	753	753	753	753	753	753	0.0%	0.0%
Waikato	Te Awamutu	Te Awamutu Network System (Non Co-Incident)	1,344	1,344	1,344	1,344	1,344	1,344	1,344	1,344	1,344	1,344	1,344	0.0%	0.0%
Waikato	Te Awamutu	Te Awamutu Network System (Co-Incident)	1,234	1,234	1,234	1,234	1,234	1,234	1,234	1,234	1,234	1,234	1,234	0.8%	8%
Waikato	Te Kuiti North	Te Kuiti North Gate Station	229	229	229	229	229	229	229	229	229	229	229	0.0%	0.0%
Waikato	Te Kuiti South	Te Kuiti South Gate Station	1,110	1,137	1,164	1,191	1,218	1,245	1,272	1,299	1,326	1,353	1,380	2.2%	24%
Waikato	Te Rapa	Te Rapa (Inactive Distribution Network)	No Data												

REGION	NETWORK SYSTEM	GATE STATION / NETWORK SYSTEM	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	ANNUAL GROWTH	TOTAL GROWTH
Waikato	Waikeria	Waikeria Gate Station	217	217	217	217	217	217	217	217	217	217	217	0.0%	0.0%
Waikato	Waitoa	Waitoa Gate Station	2,113	2,168	2,224	2,282	2,341	2,402	2,465	2,529	2,595	2,662	2,731	2.6%	29%
Central Plateau	Rotorua	Rotorua Gate Station	3,690	3,690	3,690	3,690	3,690	3,690	3,690	3,690	3,690	3,690	3,690	0.0%	0.0%
Central Plateau	Taupo	Taupo Gate Station	1,230	1,234	1,237	1,240	1,243	1,247	1,250	1,253	1,256	1,260	1,263	0.3%	3%
Central Plateau	Kinleith	Kinleith Gate Station	322	331	341	351	360	370	380	389	399	409	418	2.7%	30%
Central Plateau	Okoroire Springs	Okoroire Springs Gate Station							No Data						
Central Plateau	Putaruru	Putaruru Gate Station	507	507	507	507	507	507	507	507	507	507	507	0.0%	0.0%
Central Plateau	Tirau	Tirau Gate Station	61	61	62	63	64	64	65	66	67	67	68	1.2%	12%
Central Plateau	Tokoroa	Tokoroa Gate Station	1,385	1,459	1,533	1,607	1,681	1,755	1,829	1,903	1,977	2,051	2,125	4.4%	53%
Central Plateau	Reporoa	Reporoa Gate Station	2,607	2,607	2,607	2,607	2,607	2,607	2,607	2,607	2,607	2,607	2,607	0.0%	0.0%
Bay Of Plenty	Edgecumbe	Edgecumbe Mp4 Pressure System	19	20	22	23	25	26	27	29	30	31	33	5.7%	74%
Bay Of Plenty	Edgecumbe	Edgecumbe Ip20 Pressure System	6,282	6,282	6,282	6,282	6,282	6,282	6,282	6,282	6,282	6,282	6,282	0.0%	0.0%
Bay Of Plenty	Edgecumbe	Edgecumbe Gate Station (Non-Co-Incident)	6,301	6,302	6,304	6,305	6,307	6,308	6,309	6,311	6,312	6,313	6,315	0.0%	0.0%
Bay Of Plenty	Edgecumbe	Edgecumbe Gate Station (Co-Incident)	6,282	6,282	6,282	6,282	6,282	6,282	6,282	6,282	6,282	6,282	6,282	0.0%	0.0%

REGION	NETWORK SYSTEM	GATE STATION / NETWORK SYSTEM	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	ANNUAL GROWTH	TOTAL GROWTH
Bay Of Plenty	Kawerau	Kawerau Network System (Excl. Loads Of Ex-Caxton & Ex-Tasman)	144	145	146	146	147	148	149	150	150	151	152	0.5%	6%
Bay Of Plenty	Kawerau	Kawerau (Ex-Caxton) (20Tj Site In Ip Network)	854	869	884	899	914	929	944	960	975	990	1,005	1.6%	18%
Bay Of Plenty	Kawerau	Kawerau (Ex-Tasman) (20Tj Site In Ip Network)	2,157	2,172	2,186	2,201	2,215	2,230	2,245	2,259	2,274	2,288	2,303	0.7%	7%
Bay Of Plenty	Kawerau	Kawerau Gate Station (Non-Co-Incident)	3,154	3,184	3,214	3,243	3,273	3,303	3,333	3,363	3,393	3,422	3,452	0.9%	9%
Bay Of Plenty	Kawerau	Kawerau Gate Station (Co-Incident)	2,966	3,004	3,043	3,082	3,121	3,159	3,198	3,237	3,276	3,314	3,353	1.2%	13%
Bay Of Plenty	Mt Maunganui	Mt Maunganui Gate Station	3,364	3,421	3,478	3,535	3,593	3,650	3,707	3,764	3,821	3,878	3,935	1.6%	17%
Bay Of Plenty	Mt Maunganui	Papamoa Gate Station	835	838	841	844	847	850	853	856	859	862	865	0.4%	4%
Bay Of Plenty	Mt Maunganui	Papamoa No.2 Gate Station	446	446	446	446	446	446	446	446	446	446	446	0.0%	0.0%
Bay Of Plenty	Mt Maunganui	Mt Maunganui Network System (Non Co-Incident)	4,645	4,705	4,765	4,826	4,886	4,946	5,006	5,066	5,126	5,186	5,246	1.2%	13%
Bay Of Plenty	Mt Maunganui	Mt Maunganui Network System (Co-Incident)	4,012	4,090	4,169	4,247	4,325	4,404	4,482	4,561	4,639	4,718	4,796	1.8%	20%
Bay Of Plenty	Opotiki	Opotiki Gate Station	174	175	175	175	176	176	176	176	177	177	177	0.2%	2%
Bay Of Plenty	Tauranga	Tauranga Station	1,916	1,916	1,916	1,916	1,916	1,916	1,916	1,916	1,916	1,916	1,916	0.0%	0.0%
Bay Of Plenty	Tauranga	Pyes Pa Station	793	824	854	884	915	945	975	1,006	1,036	1,067	1,097	3.3%	38%

REGION	NETWORK SYSTEM	GATE STATION / NETWORK SYSTEM	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	ANNUAL GROWTH	TOTAL GROWTH
Bay Of Plenty	Tauranga	Tauranga Network System (Non Co-Incident)	2,709	2,739	2,770	2,800	2,830	2,861	2,891	2,921	2,952	2,982	3,013	1.1%	11%
Bay Of Plenty	Tauranga	Tauranga Network System (Co-Incident)	2,600	2,651	2,701	2,751	2,801	2,851	2,902	2,952	3,002	3,052	3,102	1.8%	19%
Bay Of Plenty	Te Puke	Te Puke Gate Station	439	441	442	444	445	447	448	450	451	453	454	0.3%	3%
Bay Of Plenty	Te Teko	Te Teko Gate Station							No Data						
Bay Of Plenty	Whakatane	Whakatane Network System							No Data						
Bay Of Plenty	Whakatane	Whakatane (20Tj Site – Chh)							No Data						
Bay Of Plenty	Whakatane	Whakatane Gate Station (Non Co-Incident)	0	0	0	0	0	0	0	0	0	0	0		
Bay Of Plenty	Whakatane	Whakatane Gate Station (Co-Incident)	4,332	4,492	4,652	4,812	4,972	5,132	5,292	5,452	5,612	5,772	5,932	3.2%	37%
Gisborne	Gisborne	Gisborne Gate Station	3,283	3,298	3,314	3,330	3,346	3,362	3,378	3,394	3,410	3,425	3,441	0.5%	5%
Kapiti	Kuku	Kuku Gate Station	No Data												
Kapiti	Otaki	Otaki Gate Station	266	266	266	266	266	266	266	266	266	266	266	0.0%	0.0%
Kapiti	Paraparaumu	Paraparaumu Gate Station	1,581	1,606	1,632	1,658	1,685	1,711	1,739	1,767	1,795	1,824	1,853	1.6%	17%
Kapiti	Te Horo	Te Horo Gate Station							No Data						
Kapiti	Waikanae	Waikanae Gate Station	617	623	630	636	642	648	654	660	666	673	679	1.0%	10%

APPENDIX J: EXPENDITURE OVERVIEW

This appendix sets out a summary of our forecast expenditure on our gas distribution network over the planning period. It is structured to align with our expenditure categories and with information provided throughout the AMP.

The forecasts presented here provide a consolidated view of our proposed expenditure. It provides further commentary and context on our planned investments including key assumptions used in developing our forecasts.

The discussion focuses on providing high-level commentary and context for the forecasts. Each section includes cross references to appendix with more detailed information. To avoid duplication, we have not repeated discussions in previous appendices.

Note on Expenditure Charts and Tables

The charts in this Appendix depict budgeted expenditure for FY2018 (2017/2018) and our forecasts for the remainder of the period.

Expenditure is presented according to our internal categories. It is also provided in Information Disclosure categories in Schedules 11a and 11b, in Appendix B.

All expenditure figures are denominated in constant value terms using FY2018 New Zealand dollars.

J.1 INPUTS AND ASSUMPTIONS

This section describes the inputs and assumptions used to forecast our Capex and Opex over the planning period.

J.1.1. Forecasting Inputs and Assumptions

Our forecasts rely on several inputs and assumptions. These include:

- Escalation to nominal dollars
- Capital contributions
- Finance during construction

Escalation

Forecasts in this chapter are in constant (real) value terms. In preparing Schedules 11a and 11b we have escalated our real forecasts to produce nominal forecasts for Information Disclosure.

While we expect to face a range of input price pressures over the planning period we have based our escalation approach on the consumer price index (CPI). This has been done to align forecast inflation with the initial 'exposure' financial model for the gas DPP. Therefore, for the purposes of this AMP we have assumed changes are limited to CPI rather than adopting more specific indices or modelling trends in network components or commodity indices. Similarly, we have not sought to reflect trends in the labour market.

For Year Ended	CPI
FY2018	0.00%
FY2019	2.03%
FY2020	2.01%
FY2021	2.01%
FY2022	2.00%
FY2023	2.00%
FY2024	2.00%
FY2025	2.00%
FY2026	2.00%
FY2027	2.00%
FY2028	2.00%

Capital Contributions

Customer connections and asset relocations expenditure included in the body of the AMP are gross amounts i.e. capital contributions have not been netted out from the forecast. Details of expected capital contributions can be found in Schedule 11a in Appendix B.

Finance During Construction (FDC)

Our Capex forecasts exclude FDC (or cost of financing). We have included a forecast of FDC based on expected commissioning dates in Schedule 11a in Appendix B.

J.2 EXPENDITURE SUMMARY

This section summarises our total Capex and Opex forecasts for the planning period.

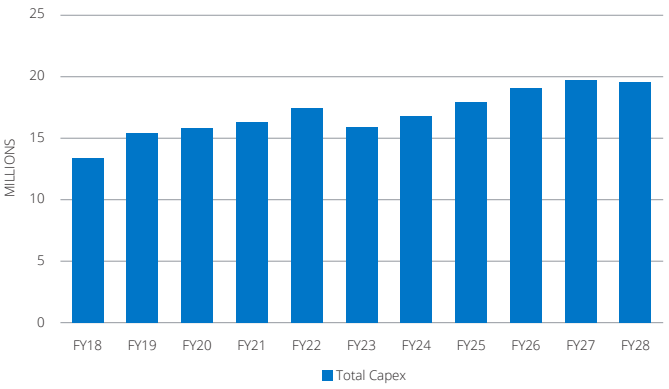
J.2.1. Total Capex

Total Capex includes expenditure in the following categories:

- System development Capex: discussed in Appendix F
- Lifecycle management Capex: discussed in Appendix H
- Investment in non-network assets: discussed in Appendix H

Our total forecast Capex for the planning period is shown in the Figure 35 below.

Figure 35: Total Capex during the Planning Period



Our Capex profile reflects the underlying network needs discussed in this AMP. Key drivers for the expenditure trend include:

- **Network growth:** is the main driver for expenditure across the period. Reinforcement works including projects in Waitoa and Cambridge leading to increases in FY2019, FY2020 and FY2022 respectively. These are discussed further in Appendix G.
- **Renewals:** expenditure during FY2018 includes a number of programmes and initiatives including DRS upgrades and increased volumes of pre-1985 pipe replacement. This renewal expenditure occurs through our planning period. These are discussed further in Appendix H.
- **Non-network:** expenditure in FY2018 includes a portion of total expenditure on IT systems and building refurbishment costs. These are discussed further in Appendix H.

As we have refined our asset management approaches and modelling we have altered our expenditure profile to reflect the minor changes.

Table 20 sets out the expenditure per year. These are consistent with our Schedule 11a disclosure included in Appendix B.

Table 20: Total Capex during the planning period ($000 in real 2018)

For Year Ended	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Capex	13,371	15,511	15,836	16,321	17,487	15,969	16,796	17,994	19,122	19,720	19,598

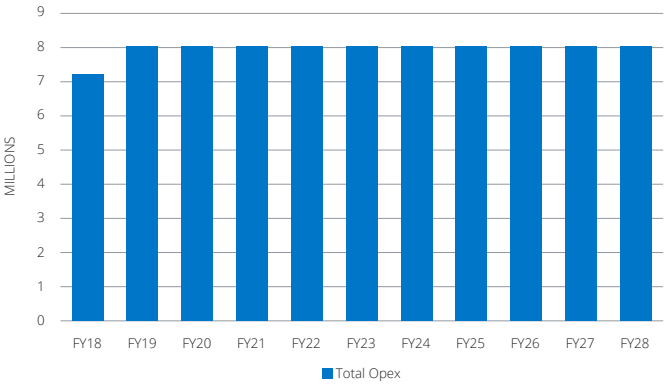
J.2.1. Total Opex

Our Opex forecast includes expenditure relating to the following activity categories discussed in Appendix H:

- Maintenance related expenditure
- System operations and network support
- Business support activities

Our total forecast Opex for the planning period is shown in Figure 36 below.

Figure 36: Total Opex during the Planning Period



Our Opex for the period is generally forecast using FY2018 as a typical year. Individual forecasts have specific adjustments based on expected activity and costs over the period. Transitional expenditure has been removed and a trending approach applied to inform the forecast over the remainder of the period.

A number of activities will require increased expenditure to ensure we meet our asset management objectives. However, we will continue to look for operational efficiencies to fund these activities without increasing overall spend.

Table 21 sets out the expenditure per year. These are consistent with our Schedule 11b disclosure included in Appendix B.

Table 21: Total Opex during the planning period ($000 in real 2016)

For Year Ended	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Opex	7,476	8,329	8,329	8,329	8,329	8,329	8,329	8,329	8,329	8,329	8,329

1. http://pstrust.org/docs/ntsb_doc30.pdf

J.3 NETWORK GROWTH CAPEX

In this section we summarise our forecast asset investments to address expected network growth. Detail on the included projects is provided in Appendix F.

Our forecast Capex for the planning period is shown in Figure 40.

Reflecting the project-based nature of this expenditure, the profile for the period is impacted by a number of large one-off projects. In addition to these large projects we expect an underlying 'baseline' level of works. The main works driving the profile include:

- Multiple reinforcement projects scheduled for FY2018
- Reinforcement works in Cambridge (FY2019-FY2022)

Table 22 sets out the expenditure per year. These are consistent with our Schedule 11a disclosures included in Appendix B.

Figure 37: Network Growth Capex during the Planning Period

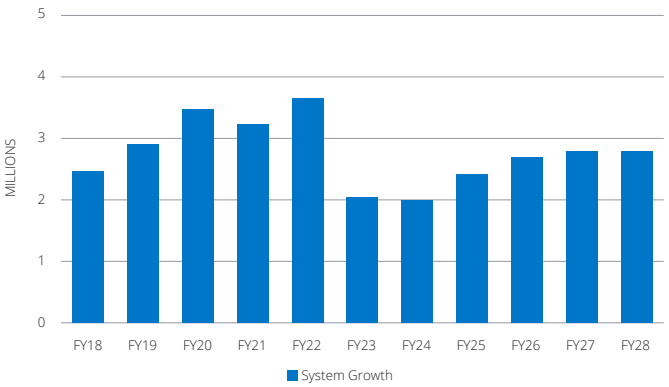


Table 22: Net Customer Connection Capex during the Planning Period ($000 in real 2018)

For Year Ended	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Capex	2,461	2,905	3,475	3,230	3,660	2,056	2,000	2,440	2,710	2,789	2,789

J.4 CUSTOMER CONNECTIONS CAPEX

In this section we summarise our expected investments to enable customer connections. Further detail on this expenditure is provided in Appendix F, System Development.

Consistent with historical trends and our ICP connection forecast we are forecasting an increasing trend of customer connection Capex over the period.

Table 23 sets out the net expenditure by year. These are consistent with our Schedule 11a disclosure included in Appendix B.

Figure 38: Net Customer Connection Capex during the Planning Period

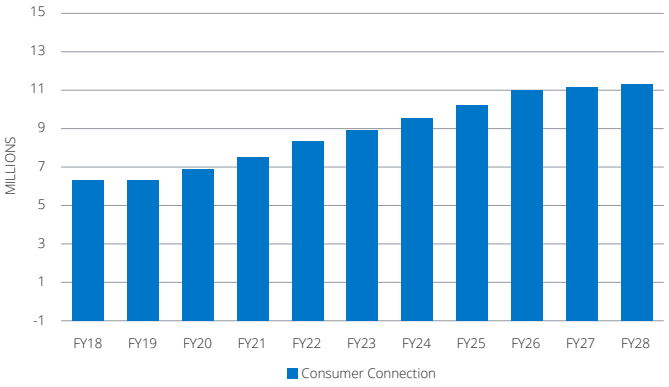


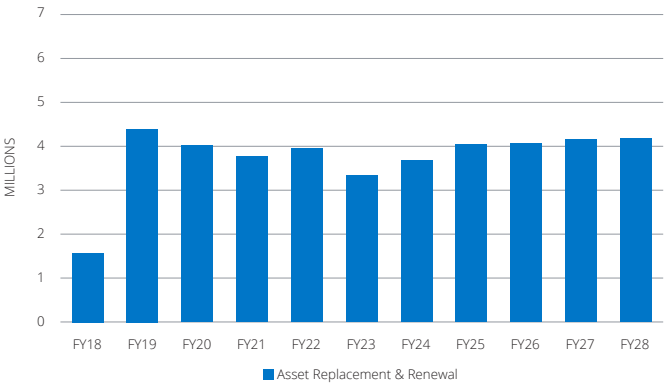
Table 23: Net Customer Connection Capex during the Planning Period ($000 in real 2018)

For Year Ended	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Capex	6,862	6,882	7,462	8,090	8,818	9,356	9,948	10,599	11,316	11,470	11,641

J.5 ASSET REPLACEMENT AND RENEWAL CAPEX

In this section we summarise our expected investments to replace and renew our asset fleets. Detail on the included work and associated drivers is provided in Appendix H.

Figure 39: Replacement and Renewal Capex during the Planning Period



Replacement Capex includes replacing assets with like-for-like or new modern equivalents. Renewals Capex is expenditure that extends an asset's useful life or increases its functionality. These investments are generally managed as a series of programmes focused on a particular asset fleet.

As discussed in AMP Summary and Appendix E, one of the key drivers for ARR on the distribution network is the replacement of PE pipe installed prior to 1985. Over the planning period we will progressively increase our investment levels to address this safety issue.

In addition, there are the following main projects and programmes over the period:

- Mechanical coupling and small pipe replacement on the Hamilton MP4 steel network to address leakage risk due to corrosion (i.e. of the fitting and/or pipe) or movement of the pipe within the coupler.
- Hamilton CP replacement programme to restore CP to parts of the MP4 steel service pipes.
- Replacement of a plug type riser valve that is prone to seizing and gas escapes.

Table 24 below sets out the expenditure by year. These are consistent with our Schedule 11a disclosure included in Appendix B.

Table 24: Replacement and Renewal Capex during the Planning Period ($000 in real 2018)

For Year Ended	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Capex	1,583	4,411	3,995	3,795	3,920	3,350	3,650	4,050	4,050	4,153	4,153

J.6 ASSET RELOCATIONS CAPEX

In this section we summarise our expected investments to relocate assets on behalf of third parties. Further detail on this expenditure is provided in Appendix H.

Our forecast Capex for the planning period is shown in Figure 40.

Consistent with average historical trends we are forecasting a relatively constant trend of asset relocations Capex over the period.

The trend for FY2019 is driven by a NZTA roading project, B2B road relocation in the Mt Maunganui area.

Table 25 below sets out the net expenditure per year. These are consistent with our Schedule 11a disclosure included in Appendix B.

Figure 40: Total Asset Relocations Capex during the Planning Period

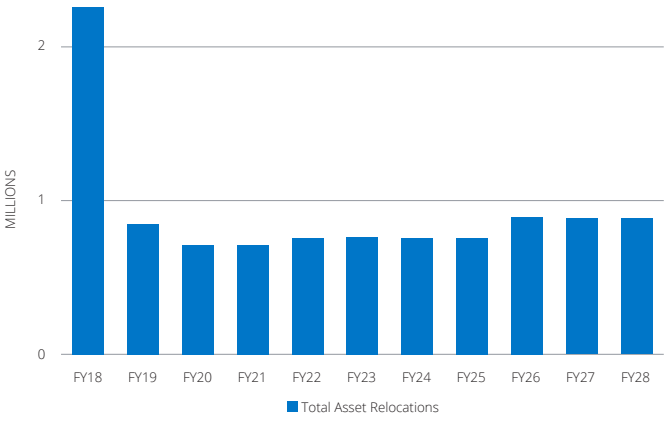


Table 25: Total Asset Relocations Capex during the Planning Period ($000 in real 2018)

For Year Ended	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Capex	2,263	849	710	710	765	765	765	765	895	895	895

J.7 NON-NETWORK CAPEX

In this section we summarise our expected investments in non-network assets to support our asset management activities. Detail on the included projects is provided in Appendix H.

Our forecast non-network Capex for the planning period is shown in Figure 41.

Non-network Capex is allocated between our transmission and distribution businesses based on factors such as size of asset base and staff headcount. Over the planning period we expect to invest in lifecycle-based asset renewals for ICT equipment and office assets.

Table 26 sets out the expenditure per year. These are consistent with our Schedule 11a disclosure included in Appendix B.

Figure 41: Non-network Capex during the Planning Period

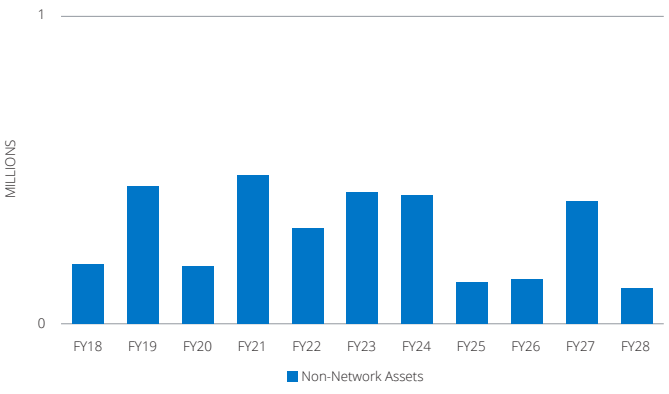


Table 26: Non-network Capex during the Planning Period ($000 in real 2018)

For Year Ended	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Capex	202	464	194	496	324	442	433	140	151	413	121

J.8 NETWORK OPEX

In this section we summarise the Network Opex we expect to incur over the planning period. To align with Information Disclosure, we use the following expenditure categories.[1]

- Service interruptions, incidents and emergencies (SIE)
- Routine and corrective maintenance and inspection (RCMI)

Detail on the activities included in these categories is provided in Appendix H.

J.8.1. Service Interruptions, Incidents and Emergencies

Our SIE Opex forecast for the planning period is shown in Figure 42 to the right.

We expect the cost of undertaking reactive maintenance (SIE) to be largely stable over the period. This is consistent with our arrangements with our service provider. We expect to see higher work volumes as the network expands in line with our ICP growth projections. However, we have not increased this expenditure over the period as we believe we can achieve delivery efficiencies.

Table 27 sets out the expenditure per year. These are consistent with our Schedule 11b disclosures included in Appendix B.

Figure 42: SIE Opex during the Planning Period

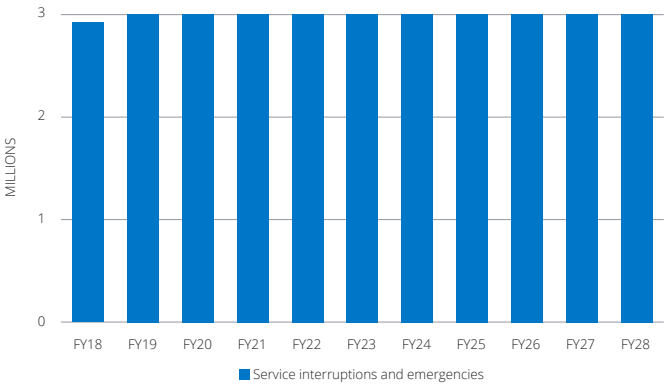


Table 27: SIE Opex during the planning period ($000 in real 2018)

For Year Ended	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Opex	2,921	3,032	3,032	3,032	3,032	3,032	3,032	3,032	3,032	3,032	3,032

1. We currently do not assign expenditure to the Asset Replacement and Renewal Opex category.

J.8.2. Routine and Corrective Maintenance and Inspection (RCMI)

Our RCMI Opex forecast for the planning period is shown in Figure 43.

We expect the cost of undertaking scheduled maintenance to be largely stable over the period. This is consistent with our arrangements with our service provider. We expect to see additional cost drivers and upward cost pressures over the period.

- We are transitioning towards higher compliance with AS/NZS 4645. This will require a review of all our maintenance standards and practices as we move away from the historical NZS 5258.
- Work volumes will increase as the network expands in line with our ICP growth projections.

However, we have not materially increased our expenditure forecast over the period as we believe we can achieve delivery efficiencies.

Table 28 sets out the expenditure per year. These are consistent with our Schedule 11b disclosure included in Appendix B.

Figure 43: RCMI Opex during the Planning Period

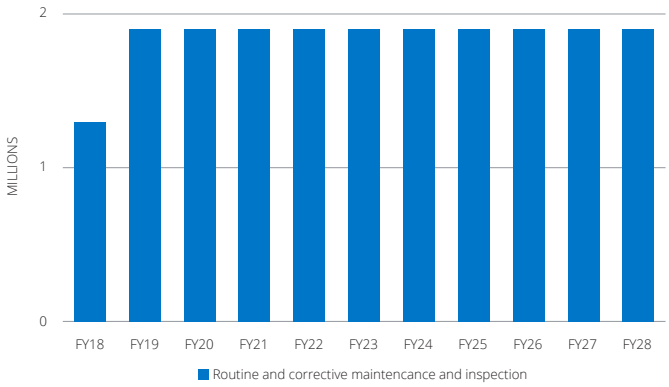


Table 28: RCMI Opex during the planning period ($000 in real 2018)

For Year Ended	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Opex	1,297	1,915	1,915	1,915	1,915	1,915	1,915	1,915	1,915	1,915	1,915

J.9 NON-NETWORK OPEX

In this section we summarise the Non-network Opex we expect to incur over the planning period. To align with Information Disclosure, we use the following expenditure categories.

- System Operations and Network Support
- Business Support

Detail on the activities included in these categories is provided in Appendix H.

J.9.1. System Operations and Network Support

Our System Operations and Network Support Opex forecast for the planning period is shown in Figure 44 below.

Our overall costs for Non-network Opex will be consistent with average historical spend. However, expenditure in this category will increase significantly (with an equivalent reduction in Business Support) following our re-categorisation of these costs. From FY2017 we expect this expenditure to stabilise.

Table 29 below sets out the expenditure per year. These are consistent with our Schedule 11b disclosures included in Appendix B.

Figure 44: System Operations and Network Support Opex during the Planning Period

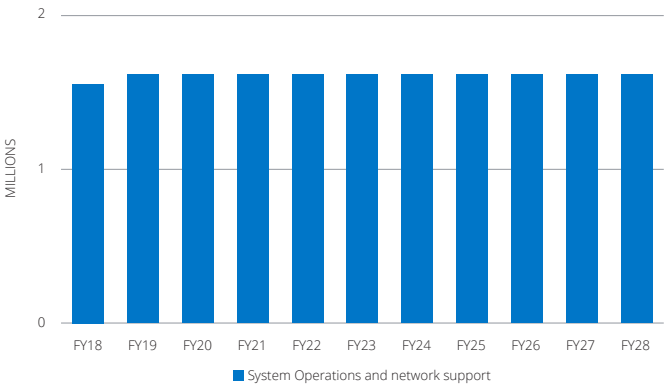


Table 29: System Operations and Network Support Opex during the planning period ($000 in real 2018)

For Year Ended	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Opex	1,558	1,617	1,617	1,617	1,617	1,617	1,617	1,617	1,617	1,617	1,617

J.9.2. Business Support

Business Support includes expenditure related to the functions that support our gas distribution business. It includes direct staff costs and external specialist advice. The other material elements are office accommodation costs, legal and insurance costs.

A portion of our Business Support Opex is allocated to our gas distribution business in accordance with our cost allocation policy.

Our forecast for the planning period is shown in Figure 45 right.

We expect this expenditure to stabilise for the remainder of the period.

Table 30 below sets out the expenditure per year. These are consistent with our Schedule 11b disclosure included in Appendix B.

Figure 45: Business Support Opex during the Planning Period

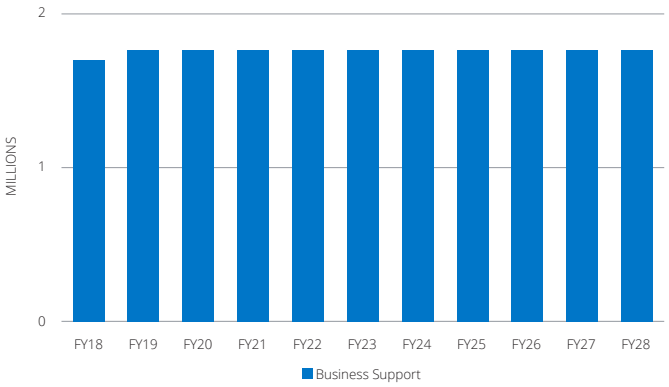


Table 30: Business Support Opex during the Planning Period ($000 in real 2018)

For Year Ended	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Opex	1,700	1,765	1,765	1,765	1,765	1,765	1,765	1,765	1,765	1,765	1,765

APPENDIX K: SCHEDULED MAINTENANCE

This appendix summarises our main scheduled maintenance activities by asset fleet.

K.1 ROUTINE MAINTENANCE ACTIVITIES

ASSET CATEGORY ACTIVITY STANDARD	INTERVAL	PREVENTIVE MAINTENANCE DESCRIPTION
Leakage survey GNS-0019	Yearly	Distribution systems adjacent to public buildings, hospitals, schools and business districts. Identified higher risk areas, steel pipelines without operating cathodic protection systems.
	Two-yearly	Service pipes located inside or under buildings. Distribution mains systems comprised predominantly of pre-1985 PE.
	Four-yearly	All other pipes located under hard-paved surfaces in close proximity to buildings; Shallow IP mains.
	Five-yearly	Balance of distribution system, including service connections.
Above ground steel pipework GNS-0014	Yearly	Above ground corrosion inspection.
Cathodic protection GNS-0015	Two-monthly	Inspection of impressed current transformer/rectifier sites. Inspection of drainage bonds.
	Three / Six-monthly / yearly	Inspect & test on and instant-off pipe/soil potential in major urban, urban and rural areas. Electrical test of galvanic anodes in major urban, urban and rural areas. Test electrical isolation at casing test points in major urban, urban and rural areas.
	Three / Six-monthly	Inspect & test "On" pipe/soil potential in rural and urban areas.
Gate Station and DRS GNS-0012	Three-monthly	Below ground DRS operational check.
	Six-monthly	Above ground operational check.
	Three-yearly	All DRS. Full inspection and confirmation of settings and function.
Odorant checks GNS-0020	Monthly	Gate station odorant and odorant concentration tests.
	Three-monthly	Extremity point ICP and designated DRS odorant and odorant concentration tests.
Valves GNS-0013	Yearly	Full service of emergency and designated valves, and partial service of other designated plug valves.
	Two-yearly	Full service of other designated ball valves, and partial service of other plug valves. Audit of a sample of service riser valves.
Telnet GNS-0016	Yearly	Annual - inspections of master station, field sites and repeater station.
	Four-yearly	Intrinsic safety inspections of field sites.
Patrols GNS-0021	Three-monthly	Visual inspection of above ground pipework, vent pipes and ducted crossings.
	Yearly	Visual inspection of service pipes inside/under buildings.

ASSET CATEGORY ACTIVITY STANDARD	INTERVAL	PREVENTIVE MAINTENANCE DESCRIPTION
Service regulators GNS-0073	Yearly	Visual inspection of below ground installations.
	Yearly	Visual inspection of above ground installations.
Critical spares and equipment GNS-0078	Monthly	Visual inspection.
	Yearly	Condition assessment of all critical spares and equipment. Review of inventory lists to determine level of inventory held is appropriate.
	Five-ten yearly	Manufacture's check/refurbishment of all major items of equipment.
Ground temperature	Monthly	Monitoring of ground temperature at key reference sites (Rotorua and Taupo).

K.2 MAINTENANCE ACTIVITIES FORECAST EXPENDITURE

Table 31: Maintenance Activities Opex Forecast Expenditure by Asset Category

EXPENDITURE DESCRIPTION	FINANCIAL YEAR ($000)								
	2018	2019	2020	2021	2022	2023	2024	2025	2026
Pipelines	3,544	4,155	4,155	4,155	4,155	4,155	4,155	4,155	4,155
Stations	127	148	148	148	148	148	148	148	148
Valves	253	297	297	297	297	297	297	297	297
Special crossings	84	99	99	99	99	99	99	99	99
Monitoring and control systems	42	49	49	49	49	49	49	49	49
CP systems	169	198	198	198	198	198	198	198	198
Other	0	0	0	0	0	0	0	0	0
Total	**4,218**	**4,947**	**4,947**	**4,947**	**4,947**	**4,947**	**4,947**	**4,947**	**4,947**

APPENDIX L: SIGNIFICANT PROJECTS

In this appendix, we provide a summary of the major project we are undertaking in FY2019.

L.1 REPLACEMENT OF PRE-85 PIPELINE

Our programme of work to replace pre-1985 pipeline will continue over the next 12 months. We currently have a study into pre-1985 pipeline strategy underway, that will identify and prioritise the assets requiring replacement during the coming year.

L.2 UPGRADES OF DRS AND METERING EQUIPMENT

We have a significant programme work underway to upgrade our DRS and metering equipment across our distribution network. Over the next 12 months, we plan to undertake the following projects:

- **DRS 100 Hamilton replacement:** the design work on this project has been completed, and the work has been scheduled to limit the impact on customers in the area.
- **DRS 101 Hamilton:** two options are being considered for the project. One option involves the replacement of DRS101 in situ. However, as this DRS is on a recreation reserve, time will be required to resolve the access agreement. The second option involves relocating the DRS101 on Dey Street to a position between DRS 101 and 103. DRS103 has to be relocated to suit planned council roadworks.
- **DRS 247 Waitoa:** the site of this DRS is subject to flooding, and the current DRS is located below ground. Our engineers are currently reviewing possible options for bringing this DRS above ground.
- **DRS 241 Whangarei:** this regulator is obsolete and does not meet First Gas' standards. The solution is to link the MP4 network supplied by DRS241 with another network and decommission the DRS241.
- **DRS 8002 Rotorua:** this DRS is not code compliant. To ensure compliance, we are implementing a solution that involves supplying and installing an underground DRS, together with inlet and outlet isolation valves. We are waiting for the new DRS unit to be delivered before the project can proceed.

This programme has been prioritised based on asset condition information gathered by First Gas and summarised in schedule 12a (see Appendix B). Data shows that 4.9% of the total number of intermediate pressure DRSs (approximately 5-6 DRSs) have **grade 2** rating.

L.3 REPLACEMENTS OF SMALL STEEL PIPELINES

We have a programme of work underway to replace selected steel pipelines within the distribution system. Steel is an older technology and it is very expensive to make connections to and maintain. First Gas intends to replace the steel pipe with PE pipes in locations where there is a high risk of delays in isolating the system for emergency situations, and the number of service connections that will be affected by the outage.

We are planning to replace steel distribution pipelines in the following locations:

- Fernleigh Road (Chartwell) where we will be replacing approximately 500 metres of pipeline.
- Corrin Road (Melville) where we will be replacing approximately 500 metres of pipeline.

This programme has been prioritised based on asset condition information gathered by First Gas and summarised in schedule 12a (see Appendix B). Data shows that 100% of the total length of the medium pressure steel service pipeline (approximately 14 kilometres) have **grade 2** rating.

L.4 REINFORCEMENT OF THE IP20 CAMBRIDGE NETWORK

Reinforcement work is required on the Cambridge IP20 network as its current capacity (1,305 scm/h) will not meet the future demand the forecast increase in residential users and upcoming commercial requests discussed with developers.

To ensure we can meet future demand in this area, we will construct a new IP20 steel pipeline from the south of the Waikato Expressway to Taylor Street, near DRS245 (approximately 1,430 metres in length). This work will enable up to 1,660 scm/h of capacity into the Cambridge network.

L.5 RELOCATION OF PIPELINES AT THE TAREWA ROAD INTERSECTION

First Gas will be relocating and reconstructing a section of the IP10 50mm carbon steel and 50mm MP4 PE network by the SH1/Tarewa Road intersection in Whangarei, to accommodate a roading upgrade project undertaken by the New Zealand Transport Agency (NZTA). The gas distribution network will be moved to a designated corridor provided by NZTA and a common services trench is also proposed.

L.6 REINFORCEMENT OF THE PARAPARAUMU PIPELINE

The Paraparaumu network will be reinforced to support increased growth. First Gas intends to install 1900 metres of MP pipeline from the proposed MP7/MP4 DRS along Ratanui Road to Mazengarb Road.

L.7 REPLACEMENT OF THE PUKETE BRIDGE PIPELINE

First Gas will replace the distribution pipeline across Pukete Bridge in Hamilton in the coming year. This pipeline has extensive corrosion damage and represents both a public safety and supply risk to the network.

First Gas intend to connect the existing pipeline at both ends of the bridge to a carbon steel pipeline that is also on the bridge, but does not have gas flowing through it. This solution will effectively bypass the corroded pipe and require the recommissioning of the carbon steel pipeline. This work will be undertaken around December 2018 - January 2019, when the conditions are suitable for work on this type and the old pipeline will be left in place, with all gas removed. The solution will eliminate the risk.

This programme has been prioritised based on asset condition information gathered by First Gas and summarised in schedule 12a (see Appendix B). Data shows that 8.7% of the total number of intermediate pressure crossings (approximately one of 17 total number of IP crossings) has **grade 1** rating.

L.8 NEW CUSTOMER CONNECTIONS

A large component (45%) of next year's Capex spend will continue to be allocated to connecting new customers and subdivision mains extensions. We are planning to connect 1,500 new customers in FY2019. Our work on extending our existing networks and/or constructing new networks to enable future connections will be determined by a scoping study.

There are a number of valuable large projects on the radar, with the two most likely being:

- A 7 kilometre pipeline to Waiuku ($4.0 million total cost with $2.4 million from our transmission business and $1.6 million Distribution).
- The supply of the Waharoa Dairy Factory ($21 million in total with $14 million from our transmission and $7 million from distribution).

During FY2019, we will also be focusing on reducing the customer disconnection rate from our network, in order to increase the net ICP gain per annum. This will help offset the reduction in target connections we have set for our business.

APPENDIX M: REGULATORY REQUIREMENTS LOOKUP

This table provides a look-up reference for each of the information disclosure requirements described in the Gas Information Disclosure Determination 2012 – (consolidated in 2017).

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION	AMP SECTION WHERE ADDRESSED
Disclosure relating to asset management plans and forecast information	
2.6.1 Subject to clauses 2.6.3 and 2.13, before the start of each disclosure year commencing with the disclosure year 2014, every GDB must: (1) Complete an AMP that: (a) relates to the gas distribution services supplied by the GDB. (b) meets the purposes of AMP disclosure set out in clause 2.6.2. (c) has been prepared in accordance with Attachment A to this determination; Gas Distribution Information Disclosure Determination 2012 – (consolidated in 2015 and subsequent amendments in June 2017). (d) contains the information set out in in the schedules described in clause 2.6.6. (e) contains the Report on Asset Management Maturity as described in Schedule 13. (2) Complete the Report on Asset Management Maturity in accordance with the requirements specified in Schedule 13. (3) Publicly disclose the AMP.	1(a) Section 1 of the AMP summary document explains the scope of the AMP. It states the AMP relates to the First Gas distribution network. 1(b) Compliance with clause 2.6.2 is summarised in the AMP summary document and explained in detail in appendices as described below. 1(c) Compliance with Attachment A is summarised in the AMP summary document and explained in detail in appendices as described below. 1(d) The schedules required in clause 2.6.6 are included in Appendix B of the AMP and provided separately to the Commission in native format. Expenditure for the planning period is summarised in section 5 of the AMP summary document. Other information from the schedules on asset condition, network utilisation and demand is also included, where relevant, in the AMP summary document. 1(e) The AMMAT report is included in Appendix B of the AMP. 2. First Gas has an asset management improvement programme in place. This is described in sections 3 and 4 of the AMP summary document and section 4 considers the AMMAT results in the application of our approach to asset management. The AMMAT report is included in Appendix B of the AMP. 3. The AMP and its appendices are publicly available on First Gas' website (www.firstgas.co.nz).

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION	AMP SECTION WHERE ADDRESSED
Disclosure relating to asset management plans and forecast information	
2.6.2 The purposes of AMP disclosure referred to in subclause 2.6.1(1)(b) are that the AMP: (1) Must provide sufficient information for interested persons to assess whether (a) assets are being managed for the long term. (b) the required level of performance is being delivered. (c) costs are efficient and performance efficiencies are being achieved. (2) Must be capable of being understood by interested persons with a reasonable understanding of the management of infrastructure assets. (3) Should provide a sound basis for the ongoing assessment of asset-related risks, particularly high impact asset-related risks.	1. (a) – (c) The AMP includes the following information: – The purpose of our AMP is outlined in section 1 of the AMP summary document. – Discussion on our Asset Management Policy and Framework is included in the commentary in section 2 of the AMP summary document while our asset management improvement programme is discussed in sections 3 and 4. More detail is provided in Appendix H which outlines our asset management approach. – Network Development programme. Our AMP summary document outlines the work undertaken in 2018 and significant projects planned for 2019 (sections 3 and 4). More detail on our network development programme for the full 10-year planning period is available in Appendix F and Appendix G. These appendices discuss our system development plans and network development programme respectively. – Performance Measures and Targets are included section 3 of the AMP summary document and in Appendix H. Asset Lifecycle Management Strategy. This is explained in detail in Appendix H. Our asset management approach is discussed in sections 2,3 and 4 of the AMP summary document. Section 3 includes a diagram of our approach indicating our focus on life-cycle management. The AMP has been structured and presented in a manner that is intended to be easier for persons with a reasonable understanding of the management of infrastructure assets to understand. This includes: – The detail of the asset management plan is now located in the appendices leaving the AMP summary document to deliver the core messages of the AMP. – Using common terminology to the extent possible. – Inclusion of less common terms in the AMP summary document and in the glossary in Appendix A to assist understanding of the terminology used in the AMP. – Clear description of expenditure forecasts presented in the AMP. 3. Risk management policy, framework and high-level risks are discussed in section 2 of the AMP summary document. In sections 3 and 4 we discuss the path between asset criticality and health, risk mitigation and resulting expenditure. Further detail on our approach to risk management is discussed in Appendix H (asset management approach) and Appendix L (significant projects). Detailed asset related risks and issues are discussed in Appendix E (asset fleets).
Clauses 2.6.3 to 2.6.5 relate to AMP updates.	N / A as First Gas have provided a full AMP this year.

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION		AMP SECTION WHERE ADDRESSED
Disclosure relating to asset management plans and forecast information		
2.6.6	Subject to clause 2.13.2, before the start of each disclosure year, each GDB must complete and publicly disclose each of the following reports by inserting all information relating to the gas distribution services supplied by the GDB for the disclosure years provided for in the following reports: – the Report on Forecast Capital Expenditure in Schedule 11a. – the Report on Forecast Operational Expenditure in Schedule 11b. – the Report on Asset Condition in Schedule 12a. – the Report on Forecast Utilisation in Schedule 12b. – the Report on Forecast Demand in Schedule 12c.	The expenditure forecasts are summarised in section 5 of the AMP summary document. Discussion on asset condition, utilisation and demand are included in the AMP summary document where relevant. The required reports are included in Appendix B of the AMP and have been provided to the Commission in native format.

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION	AMP SECTION WHERE ADDRESSED
Attachment A: Asset Management Plans	
AMP Design	
1. The core elements of asset management: 1.1. A focus on measuring network performance and managing the assets to achieve performance targets. 1.2. Monitoring and continuously improving asset management practices. 1.3. Close alignment with corporate vision and strategy. 1.4. That asset management is driven by clearly defined strategies, business objectives and service level targets. 1.5. That responsibilities and accountabilities for asset management are clearly assigned. 1.6. An emphasis on knowledge of what assets are owned and why, the location of the assets and the condition of the assets. 1.7. An emphasis on optimising asset utilisation and performance. 1.8. That a total life cycle approach should be taken to asset management. 1.9. That the use of 'non-network' solutions and demand management techniques as alternatives to asset acquisition is considered.	Our asset management approach is aligned to the First Gas vision and strategy. This is summarised in sections 1 and 2 of the AMP summary document explaining our corporate objectives, the purpose of the AMP in meeting those objectives and governance over asset management decisions. We discuss our asset management improvement programme in section 3 and 4. In section 3 a diagram is provided giving an overview of the asset management framework. This shows the line of sight from our Strategic Plan through to our asset management system and life cycle delivery. For more detail, Appendix H describes our asset management approach. Appendix H: – outlines the performance measures for the network, including targets, and outlines the asset management approach to achieving these targets. – discusses our performance measures and AMMAT results, along with providing details about our approach to continuous improvement and defining several improvement initiatives. – illustrates how our approach to asset management links to, and aligns with, our corporate vision and strategy. – Describes our service level targets and Asset Management Approach. – Describes the accountabilities for the asset management plan and asset management governance. – discusses optimisation of asset performance. – describes the total lifecycle management approach. – discusses the considerations for deferring asset purchases or renewal/replacement. This includes the consideration of 'non-network' solutions where they are available. As part of our approach to asset management, we need to understand the assets we own, their location and asset condition. In the AMP we provide: – an overview of our network configuration in Appendix C (network overview). – Further information on asset condition and configuration in Appendix E (asset fleets). – Identification of key asset locations in Appendix D (network maps).

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION	AMP SECTION WHERE ADDRESSED
Attachment A: Asset Management Plans	
AMP Design	
2. The disclosure requirements are designed to produce AMPs that:	
2.1 Are based on, but are not limited to, the core elements of asset management identified in clause 1.	2.1 The elements identified in clause 1 are discussed above.
2.2 Are clearly documented and made available to all stakeholders.	2.2 The AMP is distributed to major stakeholders and made publicly available on the First Gas website (www.firstgas.co.nz). The new format introduced this year is expected to make it easier for stakeholders to focus on the level of detail that is useful to them (e.g. the AMP summary document or the more detailed appendices).
2.3 Contain sufficient information to allow interested persons to make an informed judgement about the extent to which the GDB's asset management processes meet best practice criteria and outcomes are consistent with outcomes produced in competitive markets.	2.3 Our asset management practices and the results of our self-assessment against the AMMAT are discussed in sections 3 and 4 of the AMP summary document. The AMMAT reflects best practice criteria. Embedding strong asset management practices with a clear line of sight from corporate strategy through to managing our assets through their lifecycle, we consider our asset management practices are consistent with those we would follow if First Gas were in a competitive market. Further detail is provided in Appendix H.
2.4 Specifically support the achievement of disclosed service level targets.	2.4 Our key performance measures and target levels are summarised in section 3 of the AMP summary document and discussed in detail in Appendix H.
2.5 Emphasise knowledge of the performance and risks of assets and identify opportunities to improve performance and provide a sound basis for ongoing risk assessment.	2.5 Our approach to risk management is discussed in section 2 of the AMP summary document. A fuller view of our approach to risk management is included in Appendix H. Appendix E considers risks more specifically focussed on Assets, along with opportunities and projects related to performance improvements.
2.6 Consider the mechanics of delivery including resourcing.	2.6 Our delivery model is discussed in section 2 of the AMP summary document. As part of our asset management framework and system (refer section 3 of the summary document) we outline our planning and scheduling. A key part of our planning and scheduling is ensuring we have resources available. Our delivery model, including consideration of resourcing, is discussed further in Appendix H.
2.7 Consider the organisational structure and capability necessary to deliver the AMP.	2.7 The organisational structure and governance in relation to the delivery and responsibilities of the AMP is included in section 2 of the AMP Summary. Refer Appendix H for further detail.
2.8 Consider the organisational and contractor competencies and any training requirements.	2.8 Appendix H outlines competency and training requirements.
2.9 Consider the systems, integration and information management necessary to deliver the plans.	2.9 Asset management systems, integration and information management are discussed briefly in section 2 and section 4 of the AMP summary. They are outlined in detail in Appendix H.
2.10 To the extent practical, use unambiguous and consistent definitions of asset management processes and terminology consistent with the terms used in this attachment to enhance comparability of asset management practices over time and between GDBs.	2.10 Throughout the AMP we have used consistent terminology and definitions. We include definition of less common terms in the AMP summary document and in the glossary in Appendix A to assist understanding of the terminology used in the AMP.
2.11 Promote continual improvements to asset management practices.	2.11 Our key performance measures and AMMAT results are included in Appendix H. This appendix also describes our approach to continuous improvement and defines several improvement initiatives.
Disclosing an AMP does not constrain an GDB from managing its assets in a way that differs from the AMP if its circumstances change after preparing the plan or if the GDB adopts improved asset management practices.	

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION	AMP SECTION WHERE ADDRESSED
Contents of the AMP	
3. The AMP must include the following:	
3.1 A summary that provides a brief overview of the contents and highlights information that the GDB considers significant.	The AMP Summary document provides an overview of the: – scope and structure of the AMP including the document appendices. – key messages and themes. – Our asset management framework and systems and planned improvements in these areas. – A regional dashboard (in map format) indicating the line of sight between asset health and expenditure. – Capex & Opex forecasts and key projects.
3.2 Details of the background and objectives of the GDB's asset management and planning processes.	The asset management framework is described in sections 2 of the AMP summary document. Our asset management improvement plans are included in sections 3 and 4. Appendix H provides more detail on our asset management background, objectives and planning processes.
3.2 A purpose statement which: (a) makes clear the purpose and status of the AMP in the GDB's asset management practices. The purpose statement must also include a statement of the objectives of the asset management and planning processes. (b) states the corporate mission or vision as it relates to asset management. (c) identifies the documented plans produced as outputs of the annual business planning process adopted by the GDB. (d) states how the different documented plans relate to one another, with particular reference to any plans specifically dealing with asset management. (e) includes a description of the interaction between the objectives of the AMP and other corporate goals, business planning processes, and plans. *The purpose statement should be consistent with the GDB's vision and mission statements and show a clear recognition of stakeholder interest.*	Section 1 of the AMP Summary document outlines the statement of purpose of the and the corporate focus for asset management. Section 3 provides an illustrative overview of our asset management framework showing how our asset management system, including the asset management plan, feeds into and out of First Gas' strategic plan. The asset management framework and policy are outlined in Appendix H. This illustrates and describes how the asset management approach and objectives of the AMP align and interact with First Gas' corporate vision and mission. This appendix also describes how the different asset management plans and documentation relate to one another.
3.4 Details of the AMP planning period, which must cover at least a projected period of 10 years commencing with the disclosure year following the date on which the AMP is disclosed. *Good asset management practice recognises the greater accuracy of short-to-medium term planning and will allow for this in the AMP. The asset management planning information for the second five years of the AMP planning period need not be presented in the same detail as the first five years.*	Section 1 of the AMP summary document identifies the 10-year period covered by the AMP. This is defined as the planning period.

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION		AMP SECTION WHERE ADDRESSED
Contents of the AMP		
3.5	The date that it was approved by the directors.	The date this AMP was approved by directors is included in section 1 of the AMP summary document and on the Director's certificate in Appendix N.
3.6	A description of each of the legislative requirements directly affecting management of the assets, and details of: (a) how the GDB meets the requirements. (b) the impact on asset management.	Appendix H lists the applicable legislations, regulations, and industry codes that affect the management of assets and describes how these requirements are incorporated into asset management.
3.7	A description of stakeholder interests (owners, consumers etc.) which identifies important stakeholders and indicates: (a) how the interests of stakeholders are identified. (b) what these interests are. (c) how these interests are accommodated in asset management practices. (d) how conflicting interests are managed.	Section 6 of the AMP Summary document describes our stakeholder engagement. This includes an overview of how needs and interests are identified. Our diagram in section 3 illustrates that our asset management policy, strategies and objectives reflect stakeholder needs. Appendix H provides greater detail on stakeholder interests and indicates: (a) how stakeholder's needs are identified. (b) how the interests of each of the key stakeholders are identified. Stakeholder interests are accommodated in our decision making and asset management practices. The governance over the process considers stake holder interests and considers any conflict. The challenge and governance processes that are applied in determining our plans are included in Appendix H.
3.8	A description of the accountabilities and responsibilities for asset management on at least 3 levels, including: (a) governance – a description of the extent of director approval required for key asset management decisions and the extent to which asset management outcomes are regularly reported to directors. (b) executive – an indication of how the in-house asset management and planning organisation is structured. (c) field operations – an overview of how field operations are managed, including a description of the extent to which field work is undertaken in-house and the areas where outsourced contractors are used.	Section 2 of the AMP summary document describes First Gas' corporate and organisational structure and delivery model for distribution. In greater detail, Appendix H describes: (a) and (b) governance levels for Corporate and Organisation Structure. (c) the field operations delivery model.

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION	AMP SECTION WHERE ADDRESSED
Contents of the AMP	
3.9 All significant assumptions: (a) quantified where possible. (b) clearly identified in a manner that makes their significance understandable to interested persons, including: (c) a description of changes proposed where the information is not based on the GDB's existing business. (d) the sources of uncertainty and the potential effect of the uncertainty on the prospective information. (e) the price inflator assumptions used to prepare the financial information disclosed in nominal New Zealand dollars in the Report on Forecast Capital Expenditure set out in Schedule 11a & the Report on Forecast Operational Expenditure set out in Schedule 11b.	a) & (b) Key assumptions for the development of the AMP are outlined in Appendix H. Expenditure assumptions are outlined in Appendix J. (c) there are no changes proposed in this AMP where the information is not based on our current business. (d) Appendix H identifies sources of uncertainty and possible effects and describes methods of managing these uncertainties. (e) Escalation rates utilised for the purposes of disclosing nominal expenditure are appendix J.
3.10 A description of the factors that may lead to a material difference between the prospective information disclosed and the corresponding actual information recorded in future disclosures.	Section 4 of the AMP summary document discusses areas of focus for the year beginning 1 October 2018. Any significant projects on the radar but not yet certain have been summarised in this section. Appendix H identifies, in more detail, any sources of uncertainty and possible effects, as well as describing methods used to manage these uncertainties.
3.11 An overview of asset management strategy and delivery. To support the Report on Asset Management Maturity disclosure and assist interested persons to assess the maturity of asset management strategy and delivery, the AMP should identify: (a) how the asset management strategy is consistent with the GDB's other strategy and policies. (b) how the asset strategy takes into account the life cycle of the assets. (c) the link between the asset management strategy and the AMP. (d) processes that ensure costs, risks and system performance will be effectively controlled when the AMP is implemented.	The AMP summary document includes a narrative on our asset management approach in section 2 and improvement programmes in sections 3 and 4. These sections provide an overview of our asset management strategy including how it aligns with our other corporate strategy, links with the AMP and life cycle of assets. Section 2 provides information on the deliverability model for distribution. Appendix H describes in detail: (a) the Asset Management Framework and Policy and describes how the framework relates to corporate objectives. (b) how the Asset Management Framework includes asset lifecycle management. (c) the relationship between our Asset Management Framework / strategy and the Asset Management Plan. (d) the financial authority and control, risk management, and performance measures. Processes to support the framework and governance described above are discussed throughout the AMP document.

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION	AMP SECTION WHERE ADDRESSED
Contents of the AMP	
3.12 An overview of systems and information management data. To support the AMMAT disclosure and assist interested persons to assess the maturity of systems and information management, the AMP should describe: (a) the processes used to identify asset management data requirements that cover the whole of life cycle of the assets. (b) the systems used to manage asset data and where the data is used, including an overview of the systems to record asset conditions and operation capacity and to monitor the performance of assets. (c) the systems and controls to ensure the quality and accuracy of asset management information. (d) the extent to which these systems, processes and controls are integrated.	Section 2 of the AMP summary document includes a narrative on our asset management approach while improvement programmes are discussed in sections 3 and 4. Our asset management approach supports the AMMAT disclosure and shows how the AMMAT is used to monitor improvement of our systems and data. Appendix H provides a more detailed view of systems and information data supporting the AMMAT disclosure. Specifically, this appendix: (a) defines the categorisation and relationships of asset management data and the related systems used to manage the lifecycle of our assets. (b) identifies the systems used to manage asset data, including the condition and capacity of assets, and asset performance. (c) & (d) outlines asset data quality management processes, and system integration.
3.13 A statement covering any limitations in the availability or completeness of asset management data and disclose any initiatives intended to improve the quality of this data. Discussion of the limitations of asset management data is intended to enhance the transparency of the AMP and identify gaps in the asset management system.	Sections 3 and 4 of the AMP summary document include discussion of our asset management improvement program. Appendix H identifies data limitations and initiatives to improve data quality.
3.14 A description of the processes used within the GDB for: (a) managing routine asset inspections and network maintenance. (b) planning and implementing network development projects. (c) measuring network performance.	Section 4 of the AMP summary document discusses how we manage our asset life cycle delivery. Section 3 includes a summary of our key performance indicators. The detail of the underlying processes is included in Appendix H. Appendix H describes the: (a) maintenance approach and processes. This includes how we manage routine asset inspections and network maintenance. (b) system development and planning process. (c) the network performance measures and targets.

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION	AMP SECTION WHERE ADDRESSED
Contents of the AMP	
3.15 An overview of asset management documentation, controls and review processes. To support the Report on Asset Management Maturity disclosure and assist interested persons to assess the maturity of asset management documentation, controls and review processes, the AMP should: (a) identify the documentation that describes the key components of the asset management system and the links between the key components. (b) describe the processes developed around documentation, control and review of key components of the asset management system. (c) where the GDB outsources components of the asset management system, the processes and controls that the GDB uses to ensure efficient and cost-effective delivery of its asset management strategy. (d) where the GDB outsources components of the asset management system, the systems it uses to retain core asset knowledge in-house. (e) audit or review procedures undertaken in respect of the asset management system.	Appendix H describes the key components of the asset management system including documentation, controls and the review process. This includes: – identifying the documentation that describes the key components for the asset management system and the links between the key components outlining the organisational structure and financial controls. – outlining the processes around documentation, control and review of the key components of the asset management system. This includes describing any audit or review procedures undertaken in respect of the asset management system. – describing the systems for retaining asset knowledge. – describing the works management of our service provider.
3.16 An overview of communication and participation processes. To support the Report on Asset Management Maturity disclosure and assist interested persons to assess the maturity of asset management documentation, controls and review processes, the AMP should: (a) communicate asset management strategies, objectives, policies and plans to stakeholders involved in the delivery of the asset management requirements, including contractors and consultants. (b) demonstrate staff engagement in the efficient and cost-effective delivery of the asset management requirements.	Section 6 of the AMP summary document outlines our communication with key stakeholders on aspects of the AMP. In Appendix H we outline our: (a) communication with key stakeholders on aspects of the AMP. (b) staff engagement in the preparation of the AMP. Where applicable, throughout the AMP key internal stakeholder teams are referenced in relation to delivery of the asset management requirements.
3.17 The AMP must present all financial values in constant price New Zealand dollars except where specified otherwise.	All expenditure figures are denominated in constant value terms using FY2018 New Zealand dollars as stated in Appendix J, except where specified otherwise.
3.18 The AMP must be structured and presented in a way that the GDB considers will support the purposes of AMP disclosure set out in clause 2.6.2 of the determination.	The AMP has been structured and presented in a manner intended to simplify the presentation of information relevant to the disclosure. The AMP summary document can be read as a standalone document to provide a summarised view of our asset management plans including the development of our asset management strategy and implementation of an asset health and criticality approach to asset management. The appendices provide greater detail on our plans at an asset fleet level, our approach to asset management, and the systems and personnel to ensure the plans can be delivered.

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION	AMP SECTION WHERE ADDRESSED
Assets Covered	
4 The AMP must provide details of the assets covered, including:	
4.1 A map and high-level description of the areas covered by the GDB, including the region(s) covered.	A map of our gas distribution areas is provided in section 2 of the AMP summary. Section 4 of the same document maps the significant areas of work focus linking asset health with expenditure. Appendix C (network overview) & D (network maps) provide an overview maps and high-level region descriptions.
4.2 A description of the network configuration, including: if sub-networks exist, the network configuration information should be disclosed for each sub-network. (a) A map or maps, with any cross-referenced information contained in an accompanying schedule, showing the physical location of: (i) All main pipes distinguished by operating pressure. (ii) All ICPs that have a significant impact on network operations or asset management priorities, and a description of that impact. (iii) All gate stations. (iv) All pressure regulation stations. (b) if applicable, the locations where a significant change has occurred since the previous disclosure of the information referred to in subclause 4.2(a) above, including: (i) a description of the parts of the network that are affected by the change. (ii) a description of the nature of the change.	Appendix D includes network maps showing the following: (i) All mains pipes, colour coded by operating pressure. (ii) All ICPs greater than 20TJ. (iii) All gate stations feeding the distribution network. (iv) All pressure regulation stations. First Gas has no sub-networks as defined by the Information Disclosure Determination. There have been no significant network changes since the previous disclosure.
Network Assets by Category	
5. The AMP must describe the network assets by providing the following information for each asset category: 5.1 pressure. 5.2 description and quantity of assets. 5.3 age profiles. 5.4 a discussion of the results of formal risk assessments of the assets, further broken down by subcategory as appropriate. Systemic issues leading to the premature replacement of assets or parts of assets should be discussed.	Appendix E (asset fleets): 1. details the pressure levels around the distribution network and quantities of pipes operating at each level. 2. includes a description and quantity of each asset category. 3. includes age profiles and condition of assets. 4. lists risks and issues associated with assets and key projects
6. The asset categories discussed in clause 5 above should include at least the following: 6.1 the categories listed in the Report on Forecast Capital Expenditure in Schedule 11a. 6.2 assets owned by the GDB but installed at gate stations owned by others.	The distribution assets discussed in Appendices C, D and E include those specified in clause 6.1 and 6.2. We do not have any First Gas owned assets installed at gate stations owned by others.

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION	AMP SECTION WHERE ADDRESSED
Service Levels	
7. The AMP must clearly identify or define a set of performance indicators for which annual performance targets have been defined. The annual performance targets must be consistent with business strategies and asset management objectives and be provided for each year of the AMP planning period. The targets should reflect what is practically achievable given the current network configuration, condition and planned expenditure levels. The targets should be disclosed for each year of the AMP planning period.	Performance measures and quantified targets for the distribution asset management are summarised in section 3 of the AMP summary document and included in detail in Appendix H. Appendix H also details how these measures are consistent with the objectives of the AMP.
8. Performance indicators for which targets have been defined in clause 7 must include: 8.1 the DPP requirements required under the price quality path determination applying to the regulatory assessment period in which the next disclosure year falls. 8.2 consumer-oriented indicators that preferably differentiate between different consumer types. 8.3 indicators of asset performance, asset efficiency and effectiveness, and service efficiency, such as technical and financial performance indicators related to the efficiency of asset utilisation and operation. 8.4 the performance indicators disclosed in Schedule 10b of the determination.	Performance measures are summarised in section 3 of the AMP summary document and included in detail in Appendix H. This includes: – targets aligning with DPP quality standard requirements. – consumer-oriented performance measures. – indicators of asset performance and delivery. – the performance measures disclosed in schedule 10b of the determination.
9. The AMP must describe the basis on which the target level for each performance indicator was determined. Justification for target levels of service includes consumer expectations or demands, legislative, regulatory, and other stakeholders' requirements or considerations. The AMP should demonstrate how stakeholder needs were ascertained and translated into service level targets.	Appendix H describes the basis for each performance target.
10. Targets should be compared to historic values where available to provide context and scale to the reader.	Historical performance values have been provided in Appendix H to provide context to the reader. Key performance measures and the trend of results are included in section 3 of the AMP summary document.
11. Where forecast expenditure is expected to materially affect performance against a target defined in clause 7 above, the target should be consistent with the expected change in the level of performance.	Forecast expenditure is not expected to materially affect performance against any performance targets.

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION	AMP SECTION WHERE ADDRESSED
Network Development Planning	
12. AMPs must provide a detailed description of network development plans, including –	Section 4 of the AMP summary document discusses the significant activities planned for FY2019. Network development plans are described in Appendix G (network development programme) and further detailed in Appendix F (system development).
12.1 A description of the planning criteria and assumptions for network development.	Development planning criteria are discussed in Appendix G.
12.2 Planning criteria for network developments should be described logically and succinctly. Where probabilistic or scenario-based planning techniques are used, this should be indicated, and the methodology briefly described.	Development planning criteria are discussed in Appendix G.
12.3 The use of standardised designs may lead to improved cost efficiencies. This section should discuss: (a) the categories of assets and designs that are standardised. (b) the approach used to identify standard designs.	(a) Standardised equipment and designs are discussed in Appendix H, including the key design standards by asset type. (b) Appendix H discusses the approach adopted when identifying and developing a standard design.
12.4 A description of the criteria used to determine the capacity of equipment for different types of assets or different parts of the network. *The criteria described should relate to the GDB's philosophy in managing planning risks.*	Network and asset capacity is discussed in Appendix G, I, and can be read alongside our philosophy in managing planning risks discussed in Appendix H.
12.5 A description of the process and criteria used to prioritise network development projects and how these processes and criteria align with the overall corporate goals and vision.	The discussion on asset management improvements in sections 3 and 4 of the AMP summary document provides an overview of how all projects align with the overall corporate goals and vision. Appendix H describes project prioritisation in network development and how it is linked to the prioritisation of corporate investment.
12.6 Details of demand forecasts, the basis on which they are derived, and the specific network locations where constraints are expected due to forecast increases in demand. (a) explain the load forecasting methodology and indicate all the factors used in preparing the load estimates. (b) provide separate forecasts to at least the system level covering at least a minimum five-year forecast period. Discuss how uncertain but substantial individual projects/ developments that affect load are taken into account in the forecasts, making clear the extent to which these uncertain increases in demand are reflected in the forecasts. (c) identify any network or equipment constraints that may arise due to the anticipated growth in demand during the AMP planning period. *The AMP should include a description of the methodology and assumptions used to produce the utilisation and capacity forecasts and a discussion of the limitations of the forecasts, methodology and assumptions. The AMP should also discuss any capacity limitations identified or resolved in years during which an AMP was not disclosed.*	(a) The Load / demand forecasting methodology is described in Appendix F. (b) Detailed load forecasts for each gate station is provided in Appendix I (load forecasts) for the planning period and discussed in Appendix F and Appendix I. (c) Key areas on the network that are anticipated to be constrained due to growth during the planning period are discussed in Appendix G (network development programme).

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION	AMP SECTION WHERE ADDRESSED
Network Development Planning	
12.7 Analysis of the significant network level development options identified, and details of the decisions made to satisfy and meet target levels of service, including: (a) the reasons for choosing a selected option for projects where decisions have been made. (b) the alternative options considered for projects that are planned to start in the next five years. (c) consideration of planned innovations that improve efficiencies within the network, such as improved utilisation, extended asset lives, and deferred investment.	Section 4 of the AMP summary document discusses the significant projects for the upcoming year. Appendix F (system development) and H (asset management approach) describe the development projects and rational for decisions. This includes: (a) the reasons for choosing selected options, where decisions are made. (b) alternative options considered for projects. (c) consideration of innovations that improve efficiencies within the network.
12.8 A description and identification of the network development programme and actions to be taken, including associated expenditure projections. The network development plan must include: (a) a detailed description of the material projects and a summary description of the non-material projects currently underway or planned to start within the next 12 months. (b) a summary description of the programmes and projects planned for the following four years (where known. (c an overview of the material projects being considered for the remainder of the AMP planning period. For projects included in the AMP where decisions have been made, the reasons for choosing the selected option should be stated which should include how target levels of service will be impacted. For other projects planned to start in the next five years, alternative options should be discussed.	Section 4 of the AMP summary document discusses the significant projects for the upcoming year. Section 5 discusses the proposed expenditure for the planning period. Appendix G (network development) and Appendix F (system development) describe the development projects forecast for the planning period. Associated expenditure projections for network development are included in Appendix J.
Lifecycle Asset Management Planning (Maintenance and Renewal)	
13. The AMP must provide a detailed description of the lifecycle asset management processes, including:	Section 3 and 4 of the AMP summary document detail our asset management improvement aims. These sections provide a summarised view of our approach to lifecycle asset management.
13.1 The key drivers for maintenance planning and assumptions.	The key drivers for the asset maintenance are described in Appendix H (asset management approach).
13.2 Identification of routine and corrective maintenance and inspection policies and programmes and actions to be taken for each asset category, including associated expenditure projections. This must include: (a) the approach to inspecting and maintaining each category of assets, including a description of the types of inspections, tests and condition monitoring carried out and the intervals at which this is done. (b) any systemic problems identified with any particular asset types and the proposed actions to address these problems. (c) budgets for maintenance activities broken down by asset category for the AMP planning period.	The total Opex forecast is included in section 5 of the AMP summary document. (a) Routine inspections and maintenance are described in Appendix K (maintenance schedules). (b) Key risks and issues identified for each asset type are described in Appendices E (asset fleets) and G (network development programme). (c) Categorised budgets for maintenance activities are included in Appendix K (maintenance schedules).

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION	AMP SECTION WHERE ADDRESSED
Lifecycle Asset Management Planning (Maintenance and Renewal)	
13.3 Identification of asset replacement and renewal policies and programmes and actions to be taken for each asset category, including associated expenditure projections. This must include: (a) the processes used to decide when and whether an asset is replaced or refurbished, including a description of the factors on which decisions are based, and consideration of future demands on the network and the optimum use of existing network assets. (b) a description of innovations made that have deferred asset replacement. (c) a description of the projects currently underway or planned for the next 12 months. (d) a summary of the projects planned for the following four years (where known). (e) an overview of other work being considered for the remainder of the AMP planning period.	Our approach to asset management is summarised in sections 2, 3 and 4 of the AMP summary document and highlights the view of asset health leading to investment (whether replacement or renewal) decisions. Key asset replacement projects undertaken in 2018 are discussed in section 3 and key projects for the upcoming year are described in section 4 of the AMP summary document. Further detail identifying asset replacement and renewal policies is available in: – Appendix H. This appendix describes our approach to asset replacement and renewal, and the drivers behind investment. Appendix L (significant projects) describes the asset replacement projects and a describes innovations made, if any, that have deferred asset replacement
13.4 The asset categories discussed in clauses 13.2 and 13.3 should include at least the categories in clause 6 above.	The distribution assets discussed in the appendices noted against clauses 13.3 and 13.2 include those specified in clause 6.
Non-Network Development, Maintenance and Renewal	
14. AMPs must provide a summary description of material non-network development, maintenance and renewal plans, including:	Sections 2, 3 and 4 of the AMP summary document describes our asset management approach. The same approach to live cycle management and line of sight from the strategic plan to the asset management system applies to both network and non-network assets.
14.1 A description of non-network assets.	Non-network assets are described in Appendix H.
14.2 Development, maintenance and renewal policies that cover them.	Non-network assets are described in Appendix H.
14.3 A description of material capital expenditure projects (where known) planned for the next five years.	Non-network asset projects are described in Appendix H.
14.4 A description of material maintenance and renewal projects (where known) planned for the next five years.	Non-network asset projects are described in Appendix H.

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION	AMP SECTION WHERE ADDRESSED
Risk Management	
15. AMPs must provide details of risk policies, assessment, and mitigation, including:	Our asset management approach links expenditure to our assessment of asset condition. This targets our expenditure to areas we believe it is needed to reduce risk and maintain asset reliability. This is summarised in the asset management improvement programme discussion in sections 3 and 4 of the AMP summary document. For more detail refer to Appendix H. This appendix describes asset risk management policy, principles and framework, as well as key risk sources.
15.1 Methods, details and conclusions of risk analysis.	The risk management framework and identified general risks are defined in Appendix H.
15.2 Strategies used to identify areas of the network that are vulnerable to high impact low probability events and a description of the resilience of the network and asset management systems to such events.	Appendix H outlines various risk sources, with factors and strategies used to identify vulnerable areas.
15.3 A description of the policies to mitigate or manage the risks of events identified in clause 15.2.	Appendix H identifies the policy, and the processes used to evaluate and treat risks associated with the network.
15.4 Details of emergency response and contingency plans. Asset risk management forms a component of a GDB's overall risk management plan or policy, focusing on the risks to assets and maintaining service levels. AMPs should demonstrate how the GDB identifies and assesses asset related risks and describe the main risks within the network. The focus should be on credible low-probability, high-impact risks. Risk evaluation may highlight the need for specific development projects or maintenance programmes. Where this is the case, the resulting projects or actions should be discussed, linking back to the development plan or maintenance programme.	Appendix H outlines the emergency response and contingency plans.

2.6 ASSET MANAGEMENT PLANS AND FORECAST INFORMATION	AMP SECTION WHERE ADDRESSED
Evaluation of Performance	
16. AMPs must provide details of performance measurement, evaluation, and improvement, including:	Our performance measures are outlined in Appendix H and key performance measures are included in section 3 of the AMP summary document.
16.1 A review of progress against plan, both physical and financial. (a) referring to the most recent disclosures made under clause 2.5.1 of this determination, discussing any significant differences and highlighting reasons for substantial variances. (b) commenting on the progress of development projects against that planned in the previous AMP and provide reasons for substantial variances along with any significant construction or other problems experienced. (c) commenting on progress against maintenance initiatives and programmes and discuss the effectiveness of these programmes noted.	Section 3 of the AMP summary document reviews our progress against plan in 2018. Further detail on the progress of development projects and management initiatives/ programmes are discussed in Appendix H.
16.2 An evaluation and comparison of actual service level performance against targeted performance. (a) in particular, comparing the actual and target service level performance for all the targets discussed in the previous AMP under clause 7 and explain any significant variances.	A comparison of past performance measures is included in Appendix H. The trend of results for key performance measures are included in section 3 of the AMP summary document. First Gas has owned distribution assets since April 2016. Only the 2016 and 2017 results are available.
16.3 An evaluation and comparison of the results of the asset management maturity assessment disclosed in the Report on Asset Management Maturity set out in Schedule 13 against relevant objectives of the GDB's asset management and planning processes.	Section 4 of the AMP summary document includes a section on our asset management improvement programme. This section considers the AMMAT results and discusses in referent to our asset management and planning processes. Evaluation of AMMAT results, and future improvement initiatives are discussed in Appendix H.
16.4 An analysis of gaps identified in clauses 16.2 and 16.3. Where significant gaps exist (not caused by one-off factors), the AMP must describe any planned initiatives to address the situation.	Improvement initiatives based on gaps in the AMMAT results are discussed in section 4 of the AMP summary document and at greater detail in Appendix H.
Capability to Deliver	
17. AMPs must describe the processes used by the GDB to ensure that:	
17.1 The AMP is realistic, and the objectives set out in the plan can be achieved.	Our asset management approach sets a line of site between our corporate strategy and life cycle management (refer section 4 of the AMP summary document). This, alongside our governance and organisation structure and delivery model outlined in section 2 of the AMP summary document ensures our AMP is realistic and the objectives are achievable. Appendix H describes the governance and framework we have in place in greater detail to ensure we achieve a realistic AMP.
17.2 The organisation structure and the processes for authorisation and business capabilities will support the implementation of the AMP plans.	Section 2 of the AMP Summary describes the governance and framework of the AMP, as well as the organisational structure that supports the implementation of the AMP plans.

APPENDIX N: DIRECTOR CERTIFICATE

Certification for Year beginning Disclosures

Clause 2.9.1

We, Philippa Jane Dunphy and Euan Richard Krogh , being directors of First Gas Limited, certify that, having made all reasonable enquiry, to the best of our knowledge:

(a) The following attached information of First Gas Limited prepared for the purposes of clauses 2.6.1, 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.

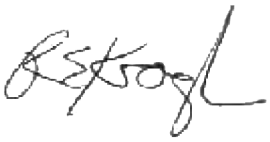
(b) The prospective financial or non-financial information included in the attached information has been measured on a basis consistent with regulatory requirements or recognised industry standards.

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

Director

20 August 2018

Date



Director

20 August 2018

Date