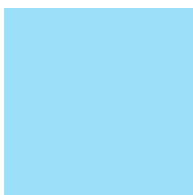
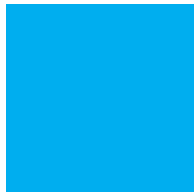
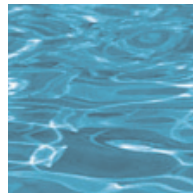
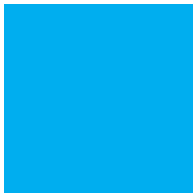




Appendix G
Economic Analysis



Option B: Lower Maungakotukutuku dam

Cashflow - most likely

(NZ\$'000)

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	54	55
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2064	2065
PV															
Investigation and consenting	2,369	2,369	0	0	0	0	0	0	0	0	0	0	0	0	0
Land purchase	1,557	1,557	0	0	0	0	0	0	0	0	0	0	0	0	0
Construction costs	16,278	0	0	0	10,647	10,647	0	0	0	0	0	0	0	0	0
Risk register	2,940	0	0	0	1,923	1,923	0	0	0	0	0	0	0	0	0
Total capital expenditure	23,144	3,926	0	0	12,570	12,570	0	0	0	0	0	0	0	0	0
Operation & maintenance costs															
Operation & maintenance costs	12,143	0	0	0	0	1,303	1,305	1,308	1,310	1,312	1,315	1,317	1,319	1,419	1,421
Total O&M	12,143	0	0	0	0	1,303	1,305	1,308	1,310	1,312	1,315	1,317	1,319	1,419	1,421
Total Costs	35,286	3,926	0	0	12,570	12,570	1,303	1,305	1,308	1,310	1,312	1,315	1,317	1,319	1,421

NPV - \$'000 \$ 35,286

Sensitivity analysis - discount rate	
NPV - \$'000	
4%	\$ 51,302
6%	\$ 41,489

Discount Rate 8.0%

Uncertain variables	Low	Most Likely	High	@risk
Construction	16,396	21,094	26,297	21,294
Risk register	1,345	3,646	6,452	3,846
O&M	0.95	1.00	1.05	1.00

Note: Years 13 to 53 have been hidden in order to fit into a page but O&M costs are included in the hidden columns.

Option D2: Extended borefield & storage

Cashflow - most likely

(NZ\$'000)

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	54	55
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2064	2065
PV															
Investigation and consenting	2,136	2,136	0	0	0	0	0	0	0	0	0	0	0	0	0
Land purchase	82	82	0	0	0	0	0	0	0	0	0	0	0	0	0
Construction costs	21,068	0	0	0	0	28,663	0	0	0	0	0	0	0	0	0
Risk register	2,474	0	0	0	0	3,366	0	0	0	0	0	0	0	0	0
Total capital expenditure	25,760	2,218	0	0	0	32,028	0	0	0	0	0	0	0	0	0

Operation & maintenance costs

Operation & maintenance costs	15,058	0	0	0	0	1,635	1,638	1,641	1,644	1,648	1,651	1,654	1,657	1,796	1,799
Total O&M	15,058	0	0	0	0	1,635	1,638	1,641	1,644	1,648	1,651	1,654	1,657	1,796	1,799
Total Costs	40,818	2,218	0	0	0	32,028	1,635	1,638	1,641	1,644	1,648	1,651	1,654	1,657	1,796

NPV - \$'000 \$ 40,818

Sensitivity analysis - discount rate	
NPV - \$'000	
4%	\$ 60,826
6%	\$ 48,629

Discount Rate 8.0%

Uncertain variables	Low	Most Likely	High	@risk
Construction	25,280	28,589	32,084	28,663
Risk register	1,235	3,352	5,503	3,366
O&M	0.95	1.00	1.05	1.00

Note: Years 13 to 53 have been hidden in order to fit into a page but O&M costs are included in the hidden columns.

Option E: Aquifer storage & recovery

Cashflow - most likely

(NZ\$'000)

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	54	55
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2064	2065
PV															
Investigation and consenting	2,135	2,135	0	0	0	0	0	0	0	0	0	0	0	0	0
Land purchase	101	101	0	0	0	0	0	0	0	0	0	0	0	0	0
Construction costs	15,138	0	0	0	0	20,595	0	0	0	0	0	0	0	0	0
Risk register	1,476	0	0	0	0	2,007	0	0	0	0	0	0	0	0	0
Total capital expenditure	18,849	2,236	0	0	0	22,602	0	0	0	0	0	0	0	0	0

Operation & maintenance costs

Operation & maintenance costs	12,207	0	0	0	0	1,322	1,325	1,328	1,331	1,333	1,336	1,339	1,342	1,465	1,468
Total O&M	12,207	0	0	0	0	1,322	1,325	1,328	1,331	1,333	1,336	1,339	1,342	1,465	1,468
Total Costs	31,056	2,236	0	0	0	22,602	1,322	1,325	1,328	1,331	1,333	1,336	1,339	1,342	1,465

NPV - \$'000 \$ 31,056

Sensitivity analysis - discount rate	
NPV - \$'000	
4%	\$ 46,902
6%	\$ 37,205

Discount Rate 8.0%

Uncertain variables	Low	Most Likely	High	@risk
Construction	19,011	20,573	22,191	20,595
Risk register	923	1,976	3,109	2,007
O&M	0.95	1.00	1.05	1.00

Note: Years 13 to 53 have been hidden in order to fit into a page but O&M costs are included in the hidden columns.

Option F: Groundwater river recharge

Cashflow - most likely

(NZ\$'000)

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	54	55
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2064	2065
PV															
Investigation and consenting	2,083	2,083	0	0	0	0	0	0	0	0	0	0	0	0	0
Land purchase	73	73	0	0	0	0	0	0	0	0	0	0	0	0	0
Construction costs	13,391	0	0	0	18,218	0	0	0	0	0	0	0	0	0	0
Risk register	1,207	0	0	0	1,642	0	0	0	0	0	0	0	0	0	0
Total capital expenditure	16,754	2,156	0	0	19,861	0	0	0	0	0	0	0	0	0	0
Operation & maintenance costs															
Operation & maintenance costs	12,054	0	0	0	0	1,304	1,307	1,310	1,313	1,316	1,319	1,322	1,325	1,450	1,453
Total O&M	12,054	0	0	0	0	1,304	1,307	1,310	1,313	1,316	1,319	1,322	1,325	1,450	1,453
Total Costs	28,808	2,156	0	0	19,861	1,304	1,307	1,310	1,313	1,316	1,319	1,322	1,325	1,450	1,453

NPV - \$'000 \$ 28,808

Sensitivity analysis - discount rate	
NPV - \$'000	
4%	\$ 44,169
6%	\$ 34,742

Discount Rate 8.0%

Uncertain variables	Low	Most Likely	High	@risk
Construction	16,363	18,173	20,097	18,218
Risk register	644	1,622	2,651	1,642
O&M	0.95	1.00	1.05	1.00

Note: Years 13 to 53 have been hidden in order to fit into a page but O&M costs are included in the hidden columns.

Water demand

('000 m3)

Year	0 2010	1 2011	2 2012	3 2013	4 2014	5 2015	6 2016	7 2017	8 2018	9 2019	10 2020	11 2021	12 2022	54 2064	55 2065
PV															
Water volume	54,807	0	0	0	0	5,767	5,795	5,822	5,850	5,878	5,906	5,933	5,961	7,126	7,154
PV - '000 m3	54,807														

Sensitivity analysis - discount rate

Discount Rate	PV - \$'000	
	4%	6%
8.0%	115,291	77,069

Uncertain variables

	Low	Most Likely	High	@risk
Demand variability	0.85	1.00	1.15	1.00

Note: Years 13 to 53 have been hidden in order to fit into a page but O&M costs are included in the hidden columns.

1. Water demand is estimated at 15,800 m3 per day in 2015 and growing to 19,600 m3 per day by 2065. Annual increase is in equal increment of 76 m3 per day based on 365 days per year.
2. Water demand variability is plus/minus 15%