

8.0 LIFECYCLE MANAGEMENT PLAN

Prior to 1950, the district was largely undeveloped and sparsely populated. Since that time, population has increased rapidly to approximately 32,907 (2013 census). It is noted that there is an increase of 486 people, or 1.5 percent, since the 2006 Census. Urban growth has focused on Taupo Township and various lakeshore settlements, whilst rural land development has been dramatic with the conversion of scrub wastelands to productive farmlands and vast exotic forest plantations and future conversion to lifestyle properties.

Taupo District Council provides water services to many urban & rural areas within the district (Taupo, Turangi (and Tokaanu), Acacia Bay, Mapara Road, Bonshaw Park, Centennial drive including Rakanui Road, Hatepe, Kinloch, Motuoapa, River Road, Tirohanga, Waihaha, Whakamoenga, Whakaroa, Waitahanui, Omori (Kuratau and Pukawa included), Whareroa, Whakamaru, Atiamuri, Mangakino and Motutere motor camp.

This section contains life cycle management plans for the following water asset components:

Treatment Plants and pump stations Reticulation (pipes, valves, fire hydrants, water meter and backflow preventors)

Most of these assets are seen as critical assets where failure would have a dramatic impact. This has been discussed in further detail in the Risk Management section.

Background data for the asset type including asset description, capacity, performance, condition and valuations is included in the Asset Data section.

This section contains the general *management strategies*, to achieve the levels of service defined in Level of Service section. These strategies are divided into four main work categories (routine maintenance, renewal, capital and disposal) as illustrated in the following figure.

A management strategy for each of the schemes is included in the appendices.

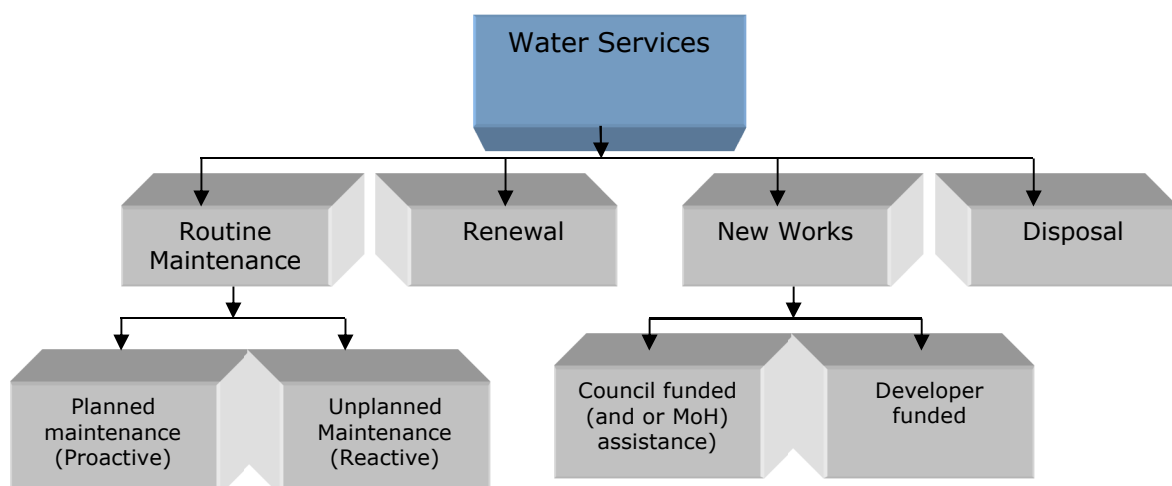


Figure 8-1: Asset Works Categories

The work categories are defined as follows:

Routine Maintenance

Routine maintenance falls into two broad categories as follows:

Planned (Proactive) Maintenance: Proactive inspection and maintenance works planned to prevent asset failure.

Unplanned (Reactive) Maintenance: Reactive action to correct asset malfunctions and failures on an as required basis (i.e. emergency repairs).

A key element of asset management planning is determining the most cost-effective blend of planned and unplanned maintenance as illustrated in the following figure.

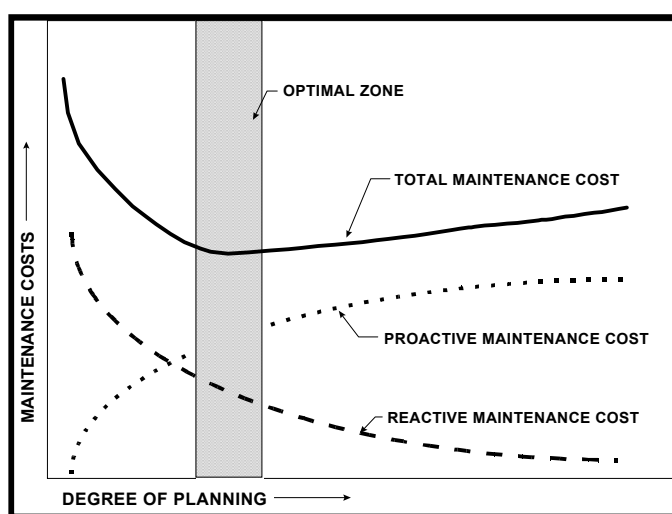


Figure 8-2: Balancing Proactive and Reactive Maintenance

Renewals

This includes replacement and rehabilitation of existing assets to their original condition and capacity.

New Works

Creation Works: New works which extend or upsize assets, which are required to cater for new development and growth. Creation works fall into two separate categories as follows:

Council funded - Works funded and constructed by TDC.

Developer funded - Works funded by developers as part of sub divisional development or by way of contributions that are then vested in Council.

Asset disposal: Retirement or sale of surplus assets.

A forecast of the 10 year expenditure for each asset group in each of the categories outlined above has been provided in the Financial Summary section.

8.1 Overarching issues/ strategies for water supply

A clean, safe, reliable supply of water is essential for the community. The DWSNZ and Health (Drinking water) amendment act 2007 requires Council to be able to demonstrate that the quality of the drinking-water supplied to the community, is safe to drink at all times. Therefore the council adopted the water supply strategy and has commenced installation of continuous monitoring equipment. This will assist council staff, to be aware of the contaminants that may be contained within a water source before that water is treated, at all times.

It has been nearly 10 years since the water strategy was adopted and it now requires review and update. An Infrastructure Strategy document has since been developed at it may make sense to include water supply strategy into this document for the next LTP.. The water supply strategy provides policy guidance and strategic direction for the supply and management of potable water throughout Taupo district. Council recognises that local water demand can be affected by local conditions and hence Water Demand Management Plan was reviewed in 2016, to meet the resource consent conditions. Council also has prepared Water Safety Plans for water supply and these plans outline the upgrades required for each scheme to meet the drinking water standards.

To meet the required compliance standards and to provide the most cost effective means of supplying potable water to the district the urban areas of Taupo, Turangi and Mangakino have been upgraded to meet the DWSNZ. Atiamuri has achieved compliance through Section10 (alternative compliance criteria for small supplies).Other water supply schemes are scheduled to be upgraded over the next 10 years. The objective is to provide cost-effective water treatment that meets the scheme capacity requirements and also the resource consent conditions. (Refer section 8.3)

The main water source for the district is Lake Taupo and few other water supply schemes acquire their water from spring, stream, river, or groundwater sources. To ensure that council/ community do not misuse water resource, all water use is allocated by Waikato Regional Council through resource consents.

Water shortages can be a problem during summer because of excessive water use by societies’ lifestyle living in Taupo district. The variation 6 requires council to report on instantaneous water take volumes based on regional council allocation. Therefore the water demand management plan (WDMP) is in place with enforcement by means of water bylaws to be strictly controlled during summer/ low lake levels and also during any emergency till the electricity power lost can be restored. If power is lost to the plant backup and or portable generators and a diesel store is available that can provide power for the essential processes for couple of days. The WDMP has been dated in 2016.

Council also plans for future demand for potable water for new residential subdivisions as per structure plans. A water supply model has been developed for the Taupo water network and this is being used to examine the impact of new development on the existing network and aids in identifying the growth projects that need to occur to support these projects.

8.2 Service delivery & rationale

The water supply services are carried out by a number of providers.

Service	Provider	Rationale (Why?)
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Asset Management	Council	We retain in-house knowledge
WTP operation	Council	We retain in-house knowledge
Management of Maintenance Contracts	Council Business unit	Control of cost
Minor concept design	Council	We retain in-house and local knowledge
Major detail design	Tendered	To capitalise on external expertise resource/ experience and take advantage of competition.
Maintenance	Tendered	To capitalise on external specialist resource/ experience at a competitive market rate.

The following table shows a summary of all TDC maintenance and renewals contracts

Contract Name	Contract No.	Approx. Value (\$)	Term (yrs)	Comments	Maintenance/Renewal/ Creation
Three Waters Network Maintenance Contract	TDC/1516/155	\$11,399,600 (total for 5 years)	5 +2+2	Contractor: Downer Contract Start: 1 July 2016	Mostly reactional electrical and mechanical maintenance but includes some renewal and new works. Includes water wastewater and stormwater.
Sludge cartage Contract	TDC/1314/115	\$914,840 (total for 4years)	4+1+1	Contractor: Hydra-Care Ltd Contract started July 2014	Maintenance
Effluent Disposal Farms Crop Harvesting	TDC/1516/163	\$800k per year	2+1+1+1	Contractor: Pritchard Agricultural Contractors	Maintenance

Table 8-1: Maintenance, operations and renewal contracts

Contract types

TDC has a Procurement Policy and procurement guide that sets out how TDC procures the products and services it need. Refer the Procurement Policy for details.

Asset Type

8.2.1 TREATMENT PLANTS

Overall Asset Objective:	To provide safe and clean water that meets the requirements of the drinking water standards for New Zealand, and at the quantity required.
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Key treatment issues are:

- The protozoa barrier, arsenic removal in the WTP with source water from Lake are required DWSNZ.
- The costs of providing treatment.
- Specific information on each scheme is included in Appendix A to U.

8.2.1.1 Treatment Plant Operations and Maintenance

Maintenance is carried out on treatment plants to ensure that the levels of service outlined in the Level of Service section of this document are met. A summary of the future operations & maintenance due to changes in demand is included in Section 6, with a full financial summary in Section 9.

The treatment plants are operated by TDC operators and the maintenance is mostly carried out internally by the TDC maintenance team. Specialist maintenance such as equipment calibration, reservoir cleaning, instrumentation maintenance and calibration, electrical and telemetry works are carried out by specialist contractors.

The treatment plants, pump stations and reservoirs are regularly assessed the council operating staff and renewal / maintenance plans are prepared. Annual the fire hydrants are tested for its performance during summer and any faults are reported to maintenance contractor. The network maintenance contractor does the maintenance of leaking toby, pipes and fire hydrants regularly. The network is maintained under the maintenance contract. Some specialist maintenance such as network hydrant flow testing annually, pipe lining or renewals and electrical maintenance works are carried out by specialist contractors. The Three Waters contractor routinely attends the customer requests. The proactive maintenance/ renewals in toby is planned to reduce the call outs and maintenance costs.

Council operates an electronic service request to record and manage responses issues raised by the public. Asset Finda provides this function for the three waters. This system links directly with the three waters maintenance contractor. Service requests have response times and ramp through the Council hierarchy if not completed on time. Council undertakes network condition assessment by way of analysing the three waters contract and the customer service requests for future maintenance and renewal requirements.

Each treatment plant has operational manuals and management plans. These can be found in the council's objective filing system as folders with files as below:

Sr. No.	Description of file folder	Objective Reference no.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326

4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Historical and Projected Treatment Operation and Maintenance

	Actuals 2014/15	Actuals 2015/16	Actuals 2016/17	Annual Plan 2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
Treatment Expenses	1,801,229	1,829,494	1,855,437	1,821,494	1,879,394	1,866,444	1,892,644	1,887,669	1,896,280	1,899,054	1,903,754	1,903,054	1,909,054	1,909,054

Note: Opex expenditure do not include, Overhead cost, financial cost, interest – Loans, Depreciation etc.

8.2.1.2 Treatment Plant Renewal

Renewal expenditure is major work that restores an existing asset to its original capacity or the required condition. By renewing plant equipment as required the quality level of service is met. Where assets become surplus to requirements or no longer meet the required level of service, they are renewed and the existing asset is removed either used in other schemes or sold as surplus where possible or disposed of, which occurs normally at the end of useful life.

Over the last three years more information has been obtained which in term enables a more detailed renewals programme to be developed. Undertaking renewals at the identified time due to loss of condition will ultimately reduce the reactive maintenance and renewal spending enabling better budget planning with reduced unbudgeted spending.

The renewal programme is prepared through condition rating of the assets by operational staff. This information is currently stored in an excel file in objective (TDC Ref No. A309067) and is updated as required with no more than three years between condition rating and review.

Renewals work over \$50,000 is listed individually for the first three years of the LTP, all the rest for each plant is grouped to together for the respective financial year. Project sheets for these works are included in the appendices. If an unexpected renewal is required the lesser prioritised renewal (or renewals) is deferred till the next year. Renewals that are grouped together include smaller pump replacements, valve or bearing replacements, seals, small motors.

A summary of the renewals is given in the following table:

ProjectName	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
Taupo Water Operations / treatment renewals	380,032	629,504	585,600	439,040	450,560	395,584	428,480	491,136	527,424	568,000
Acacia Bay Water Operations / treatment renewals	20,832	2,560	5,088	11,520	6,880	14,080	18,144	27,136	6,624	11,520
Kinloch Water Operations / treatment renewals	89,728	102,528	35,456	31,744	2,944	13,440	6,912	1,920	21,888	5,760
River Road Water Operations / treatment renewals	14,080	80,832	2,432	13,056	3,584	1,280	15,552	2,688	11,661	17,920
Mapara Operations / treatment renewals	5,184	-	8,704	-	2,752	2,048	15,936	-	704	2,048
Whakamboenga Point Water Operations / treatment renewals	7,680	7,232	71,680	18,048	1,280	38,400	10,048	7,552	18,994	-
Bonshaw Park Water Operations / treatment renewals	9,984	11,520	78,464	30,464	9,728	2,560	15,488	-	8,448	45,568
Centennial Water Operations / treatment renewals	186,880	11,264	9,344	37,248	6,144	23,040	39,680	31,104	90,048	9,344
Whakaroa Water Operations / treatment renewals	94,720	42,752	1,280	16,960	20,480	11,136	9,216	6,400	59,776	5,376
Mangakino Water Operations / treatment renewals	143,616	138,368	41,344	41,152	38,912	19,200	29,952	22,528	40,960	16,128
Waihaha Water Operations / treatment renewals	76,800	3,520	11,520	33,984	640	1,408	26,752	4,096	41,344	40,704
Tirohanga Water Operations / treatment renewals	170,432	51,328	25,984	13,888	3,200	9,344	24,064	30,592	35,200	39,552
Aiamuri Water Operations / treatment renewals	16,768	16,384	82,496	4,224	11,904	2,304	30,208	55,744	32,128	15,104
Whakamaru Water Operations / treatment renewals	124,544	15,872	20,864	2,048	7,168	12,416	21,248	13,568	4,608	21,248
Motuopa Water Operations / treatment renewals	4,224	74,112	11,840	640	11,264	15,360	13,056	16,000	113,984	-
Omori Water Operations / treatment renewals	16,064	8,832	10,336	21,824	38,720	47,520	42,240	48,064	15,840	59,200
Whareoa Water Operations / treatment renewals	85,184	75,840	4,992	17,920	960	34,880	960	30,976	61,440	7,488
Hatepe Water Operations / treatment renewals	6,720	6,144	13,504	6,016	9,024	-	13,120	3,968	5,440	11,904
1718 Vehicle renewal - KS	118,000	46,000	-	-	81,000	36,000	108,000	92,000	110,000	-
Turanui Reticulation / network renewals - RS	5,376	29,440	53,504	79,488	16,256	19,200	60,544	46,464	55,168	80,640
Rakaunui Road Water Operations / treatment renewals	74,624	11,712	61,440	14,720	20,864	11,264	5,952	11,264	23,040	2,304
Small Plant Renewals	-	2,000	-	5,200	-	2,700	1,400	1,000	16,500	-

Table 8-2: Future Treatment Plant Renewal Expenditure from 2018-48

8.2.1.3 Treatment Plant Creation

The section covers strategies for the creation of new assets (including those created through subdivision and other development) or works which upgrade or improve an existing asset beyond its existing capacity/performance in response to changes in capacity requirements, legislation or influent quality.

ProjectName	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
Taupo water Taupo WTP capacity upgrade to 30 MLD	1,750,000	-	-	-	-	-	-	-	-	-
Acacia Bay water DWSNZ Upgrade	300,000	2,100,000	2,100,000	-	-	-	-	-	-	-
Kinloch water DWSNZ upgrade	150,000	413,000	5,407,000	930,000	490,000	-	-	-	-	-
River Road water DWSNZ upgrade	-	-	-	25,000	250,000	-	-	-	-	-
Whakamboenga Pt water DWSNZ upgrade	-	-	-	-	-	-	-	-	500,000	-
Bonshaw Park water DWSNZ Upgrade	-	-	-	-	-	-	-	-	1,500,000	-
Waihaha water DWSNZ upgrade	-	-	-	-	-	25,000	250,000	-	-	-
Tirohanga water DWSNZ upgrade	-	-	-	-	-	25,000	250,000	-	-	-
Tirohanga water intake structure improvements	75,000	-	-	-	-	-	-	-	-	-
Whakamaru water DWSNZ upgrade	-	-	-	25,000	250,000	-	-	-	-	-
Motuopa water DWSNZ upgrade	-	-	-	200,000	2,000,000	-	-	-	-	-
Omori water DWSNZ upgrade	-	-	500,000	2,700,000	-	-	-	-	-	-
Omori water pretreatment	50,000	250,000	-	-	-	-	-	-	-	-
Whareroa water DWSNZ upgrade	-	-	-	-	-	25,000	250,000	-	-	-
Hatepe water DWSNZ Upgrade	-	-	-	50,000	600,000	-	-	-	-	-
Districtwide water IT Server purchase	-	-	-	15,000	-	-	-	-	-	-
Rakaunui Rd water DWSNZ Upgrade	-	-	-	-	-	-	-	-	-	1,500,000
Kinloch WTP Capacity Upgrade	-	-	-	-	-	-	-	-	-	-
Taupo water Taupo WTP capacity upgrade to 35 MLD	-	-	-	-	-	-	-	-	-	-

Table 8-3: Future Treatment Plant Asset Creation Expenditure

8.2.1.4 Treatment Plant Asset Disposal

In general where assets become surplus to requirements or no longer meet the required level of service, they are renewed and the existing asset is removed either used in other schemes or sold as surplus where possible or disposed of, which occurs normally at the end of useful life.

We expect that the water treatment plant and bores at Waitahanui will be redundant once the scheme is connected to Taupo in 2018.

8.2.2 RETICULATION AND PUMP STATIONS

Overall Objective:	<i>To safely supply Water from WTP's to the users at adequate flow and pressure.</i>
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The purpose of the WTP is to remove existing contaminants in the water, or reduce the concentration of such contaminants so the water becomes fit for its desired end-use. The reticulation & pump stations then deliver this water to the end user.

Key issues relating to the pipes and pump stations are:

- blockages of intake screen due to the algae or any other floating matter build up
- damage of pipes through pressure surges/ water hammer and or ground instability
- Failure of key equipment within pump stations.
- Power and or treatment plant failure
- Capacity during peak flow periods for some assets
- Groundwater and stormwater backflow into the leaky reticulation system.
- Scheme specific information is included as Appendix A to U

8.2.2.1 Reticulation Operations & Maintenance

The reticulation, reservoirs and all pump station maintenance is carried out by a specialist maintenance. The reservoirs are generally inspected by council staff but any major work is done by suitable contractor as and when required.

Future maintenance expenditure includes;

- Reactive (i.e. response to breakages or leaks)
- Investigation (i.e. intake structure / screen inspection)
- WTP & Pump Station monthly checks
- Telemetry services

	Actuals 2014/15	Actuals 2015/16	Actuals 2016/17	Annual Plan 2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
Network Expendes	770,464	673,718	765,786	790,400	927,000	927,000	927,000	927,000	927,000	927,000	927,000	927,000	927,000	927,000

Note: Opex expenditure do not include, Overhead cost, financial cost, Interest – Loans, Depreciation etc.

8.2.2.2 Reticulation and Pump Station Renewal

The majority of renewals are due to pump, pipes or valve failure in the case of reactive renewals or planned renewals based on condition rating provided by the maintenance contractors. To understand the current network capacity and identify the areas that are causing problems to meet LoS, the annual fire hydrant test report with coincident demand and service requests are analysed. Future developments are funded by developers who must increase the capacity of the downstream network if their development requires additional capacity.

Based on asset age, the majority of renewals are for AC /GI pipes, pump station and toby/water meter components. The renewal programme for pump stations, Turangi GI pipes and Taupō AC pipes are developed using condition rating information supplied by the operation staff, fire hydrant testing and maintenance contractors.

8.2.2.3 Future Creation

Future reticulation asset creation is generally constructed by land developers through new subdivisions and these often become vested in Council.

There are also some growth related reticulation assets included in the LTP. These assets can include pipes, reservoirs, pump stations. All growth related information is included in Section 6.

The Waitahanui water supply project will create a significant amount of new reticulation infrastructure. This project is providing reticulated water to a community that was previously on private water supplies. The project is due to complete in June 2018.

8.2.2.4 Reticulation and Pump Station Asset Disposal

A new Mapra Road pump station is being constructed and will be completed before June 2018. The old pump station, will be disposed of. Ultimately the entire site of the old pump station, reservoir maybe disposed.

8.2.3 RESOURCE CONSENTS

TDC have acquired numerous resource consents for the water abstraction and treatment. Copies of these consents are filed in document management system (Objective). The table below summarises the consented water abstraction volumes for each scheme, along with the date that the consent expires.

Resource Consent	EW File Number	Objective RC file reference	Purpose	Location	Granted Date	Expiry Date	Status
104296	60 55 22A	A466031	Take up to 6300 m3/day from a tributary of the Tokaanu Stream for public water supply.	Turangi	37327	42794	New application made
970485	60 55 30A	A518554	Discharge filter backwash into the ground	Motuoapa	35656	42856	
970484	60 55 30A	A466039	Take up to 750 m3/day from Lake Taupō for public water supply purposes	Motuoapa	35656	42979	New application made
102752	60 24 90A	A779458	Take up to 520 m3/day from and place an associated inlet structure on the bed of Lake Taupō at Whakamoenga Point for water supply	Whakamoenga Point	36507	43799	Current
102792	60 01 75A	A464959	Take water from unnamed tributary of Waikato River for Mangakino town supply	Maraetai - Mangakino	36558	43799	Current
105576	60 55 05A	A518607	Take up to 37,000 m3/day of water from the Uanui Stream for Tirohanga Rural Water Supply Scheme to supply up to 2000 m3/day to users on the scheme with the remaining 35,000 m3/day being used to drive the turbine and pump	Atiamuri - Pokuru Rd	37166	44440	Current
105580	60 55 05A	A518601	Discharge, up to 35 000 m3/day of water to the Uanui Stream and discharge backwash associated with the cleaning of the filters	Atiamuri - Pokuru Rd	37166	44440	Current
105864	60 91 72A	A465977	Take up to 440 m3/day for municipal supply from Lake Taupō,	Hatepe	37306	44562	Current
116661	60 55 24A	A465007	Take up to 280 m3/day of ground water for Waitahanui Community water supply purposes	Waitahanui	39358	44743	Current
109046	60 06 77A	A466025	Take up to 600 m3/day at a max rate of 10 litres/second from Kaiwhitiwhiti Spring for water supply purposes	Tiverton Downs Rd (River Rd)	37770	45078	Current
107514	60 55 49A	A465009	Take up to 9439 m3/day of water from Lake Taupō for public water supply purposes	Oregon Drive - Taupō	37879	45169	Current
127393.01.01	60 55 28A	A1572683	Take surface water from Lake Taupō - up to 130 m3/day	Motutere Camp Ground	42296	45169	Current
124398	60 54 63A	A983449	Filter backwash discharge into the Waihora Stream	State Highway 32 Waihora	41151	46507	Current
950565	60 55 49A	A464949	Allow a public water supply pipeline across Waikato river	Taupō and Taupō South	34974	47665	Current
950556	60 55 06A	A464781	Conduct works Taupō Lake bed for extending intake pipe	Acacia Bay	34974	47696	Current
121300	60 54 64A	A1063505	Take up to 682 m3/day of groundwater for community water supply	Whareroa	41305	48610	Current
126710	60 01 88A	A1140835	Take up to 200 m3/day of groundwater for municipal supply	Mountview Close Whakamaru	41478	48791	Current
126712	60 01 86A	A1140849	Take up to 225 m3/day of groundwater for municipal supply	Moana Ave Atiamuri	41478	48791	Current
102924	69 06 02	A464952	Construct a well for water supply purposes	Waitahanui	36490	49250	Current
102925	69 06 02	A464955	Construct a well for water supply purposes	Bonshaw Park	36490	49250	Current
135505.01.01	61 66 11A	A1515061	Take up to 3000 m3/day from Lake Taupō for municipal water supply in the vicinity of Acacia Bay	Acacia Bay	42216	49521	Current
105572	60 55 05A	A466023	Dam and occupy the bed of the Uanui Stream, to supply the Tirohanga Rural Water Supply Scheme,	Atiamuri - Pokuru Rd	37166	49919	Current
132689.01.01	60 54 63A		Take and use water from the Waihora Stream	Waihora		49985	Current
120056	60 30 41A	A644410	Take groundwater for rural water supply purposes	Bonshaw Park	40266	53050	Current
121069	60 30 41A	A644409	Use groundwater for rural supply purposes	Bonshaw Park	40266	53050	Current
113405	60 55 10A	A692820	Take up to 2,168 m3/day of water from Lake Taupō for municipal water supply purposes	Kinloch	40403	53144	Current
121023	60 55 10A	A692823	use surface water for public supply purposes	Kinloch	40403	53144	Current
137026.01.01	60 55 08A	A1936351	To take water from the Waikato River	Centennial Drive Taupō	42845	53803	Current
122974	60 55 49A	A1575690	To take and use water from Lake taupō in the vicinity of Lake Terrace, Taupō	Lake Terrace	42335	53996	Current
125016	60 55 49A	A1015888	To install 12m of pipework with associated support structures on bed of Lake Taupō and enlarge a structure for replacement water intake screen	Lake Terrace - Taupō	41578	53996	Current
125017	60 55 49A	A1015888	Discharge filter backwash from town water supply	Lake Terrace - Taupō	41578	53996	Current
121770	60 54 71A	A1707848	Take water from Lake Taupō at Omori	Kurutau Lakeshore Reserve	42559	55341	Current

Table 8-4: Summary of Water Resource Consents

8.2.3.1 Resource Consenting Cost

The annual resource consent and monitoring costs are included in the operations budget. Any costs associated with applying for new consent (or replacements consents) are given in Section 9, Financial Summary, financial tables.