## Asset information

***Summary***

- Two water intakes (Black Birch Stream and Glencoe Stream) with turbidity and flow metering.
- Five storage tanks (total capacity: 3,030,000 litres untreated, 2,960,000 litres treated), plus 540,000 litres of untreated fire fighting capacity owned by Aoraki/Mount Cook Alpine Village Limited.
- Ultraviolet treatment plant capable of treating up to 11 litres per second.
- Three electric water pumps and a standby generator.
- 4.8 kilometres of pipes for treated water and 3.7 kilometres of pipes for untreated water.
- 32 fire hydrants.
- Water meters on all connections.
- Control, monitoring, and alarm systems on turbidity (cloudiness) meters and water-treatment plant.

***Description of the water system***

Two tanks for fire-fighting water supply at Glencoe Stream are owned by the Hermitage (Aoraki/Mount Cook Alpine Village Limited). All other infrastructure assets are owned by the Crown and managed by the department.

Water is taken from intakes at Black Birch and Glencoe Streams. Water inflows are measured for turbidity, and intakes are automatically closed when this is high to comply with the New Zealand Drinking Water Standards. Within the next six months, water flow meters will be installed on the intakes as required by the water take Resource Consents.

A further intake is present at Kitchener Creek but is not in use. The resource consent for the Kitchener Creek intake is limited to "emergency periods when water is not available to be taken from either Black Birch or Glencoe Streams".

Untreated water is stored in two 270,000-litre, fire-fighting tanks and a 30,000-litre header tank above the Hermitage at Glencoe Stream, and three 1 million litre tanks at Black Birch Stream, which are connected by a rising main to the main plant at Glencoe Stream. The rising main runs in a 'ring' configuration around the lower village and feeds hydrants along the main.

Water is automatically pumped from the storage tanks at Black Birch Stream through the rising main when water levels drop in the tanks at the treatment plant at Glencoe Stream, using three electric pumps with a backup diesel generator. The three pumps are load balanced and switch on automatically as required to cope with the pumping load. Control systems have been upgraded (November 2008) to soft start and stop the pump motors, which should prolong their life.

Overflow from the Glencoe fire-fighting tanks, when full, can be switched to flow into the header tank or back into Glencoe Stream.

Untreated water flows from the 30,000-litre header tank through an ultraviolet light-treatment plant. The treated water is stored in the 240,000-litre balance tank and from there flows into the reticulation system, including two 136,000-litre storage tanks near Glencoe Stream[3] that supply the lower village drinking and hydrant supplies, as well as sprinklers in the Glencoe Lodge and YHA.

These tanks also reduce the head differential between the Glencoe Stream Balance Tank and the lower village to reduce water pressure to a manageable level.

Connections are provided to the boundary of leasehold properties in the village.

The local body team manages approximately 4.8 kilometres of reticulation for potable supply and 3.7 kilometres of reticulation for untreated water (the rising main to treatment plant and fire hydrant supply), as well as 32 fire hydrants.

A new water main has been laid from the White Horse Hill campground. This is owned and managed by the department as a national park asset to the point where it connects to the main water reticulation system in the village near the chalets.

The key components of the water system are shown in Figures 5 and 6.

[3] At the time of writing, only one of the two lower Glencoe Stream storage tanks is connected to the system. The second tank is being investigated for refurbishment or replacement, whichever is the most cost effective.

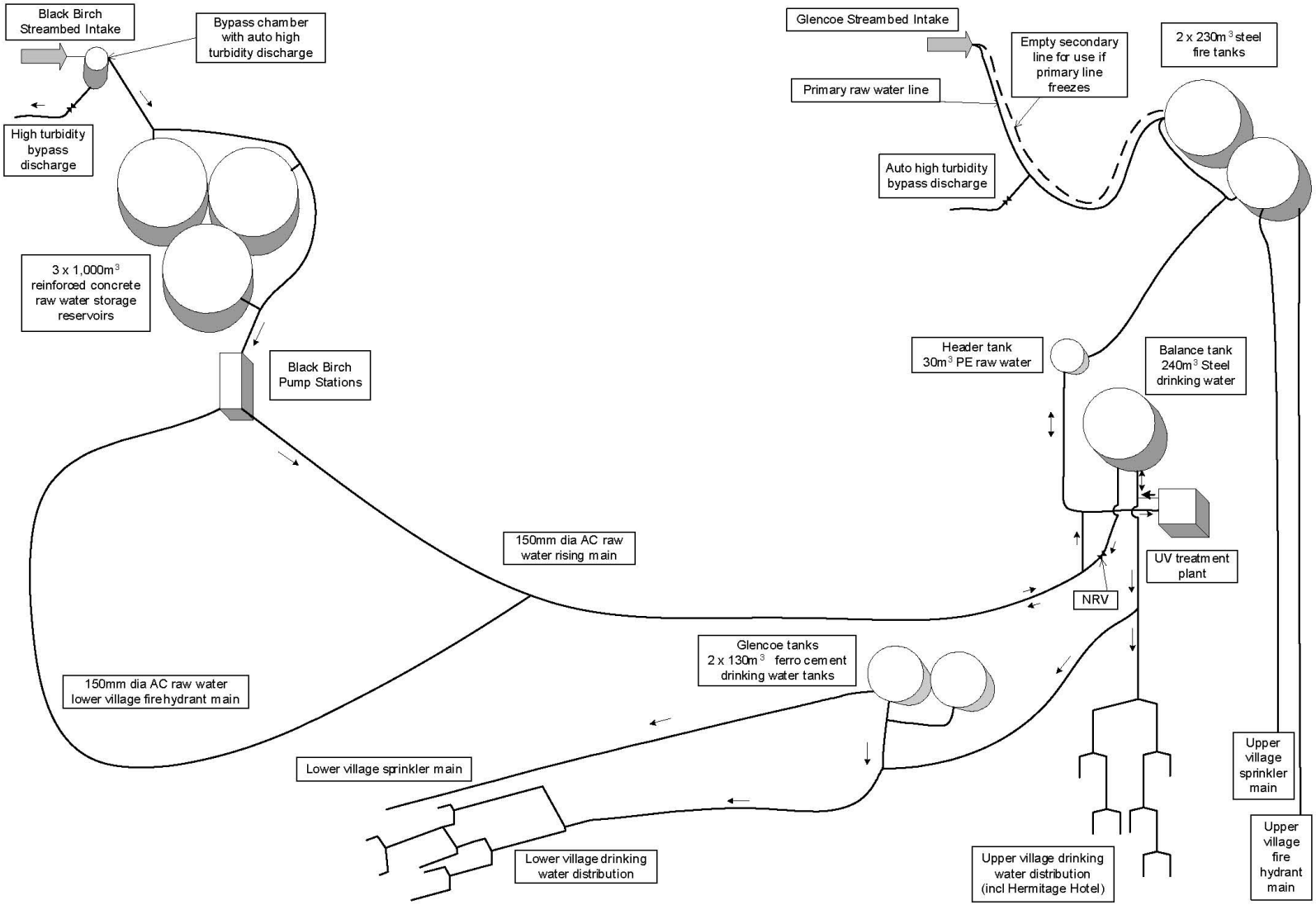


*Figure 5 – Water treatment and reticulation system diagram*

Image© Rob Dewhirst 2009

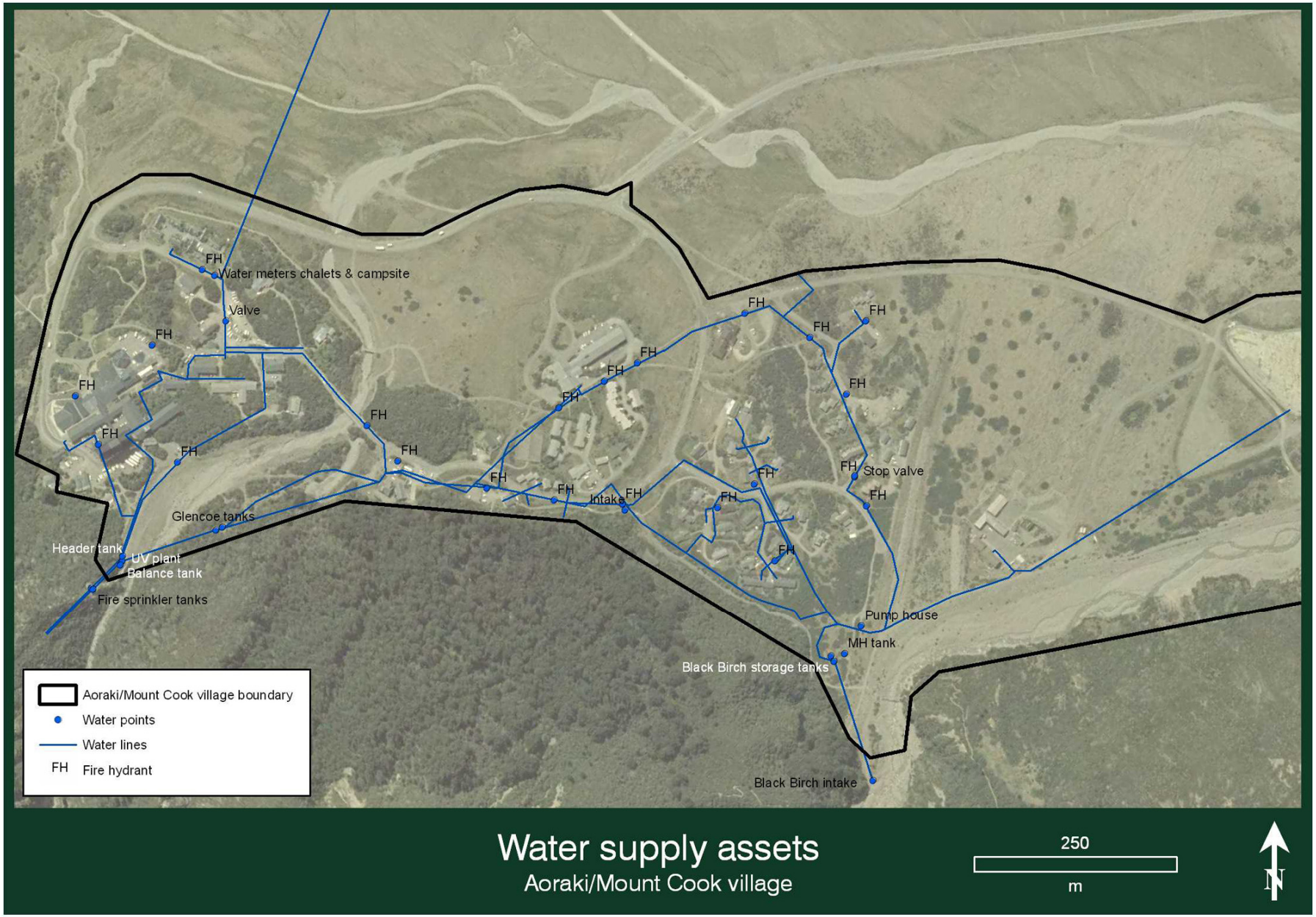


*Figure 6 – Water treatment and reticulation system map*

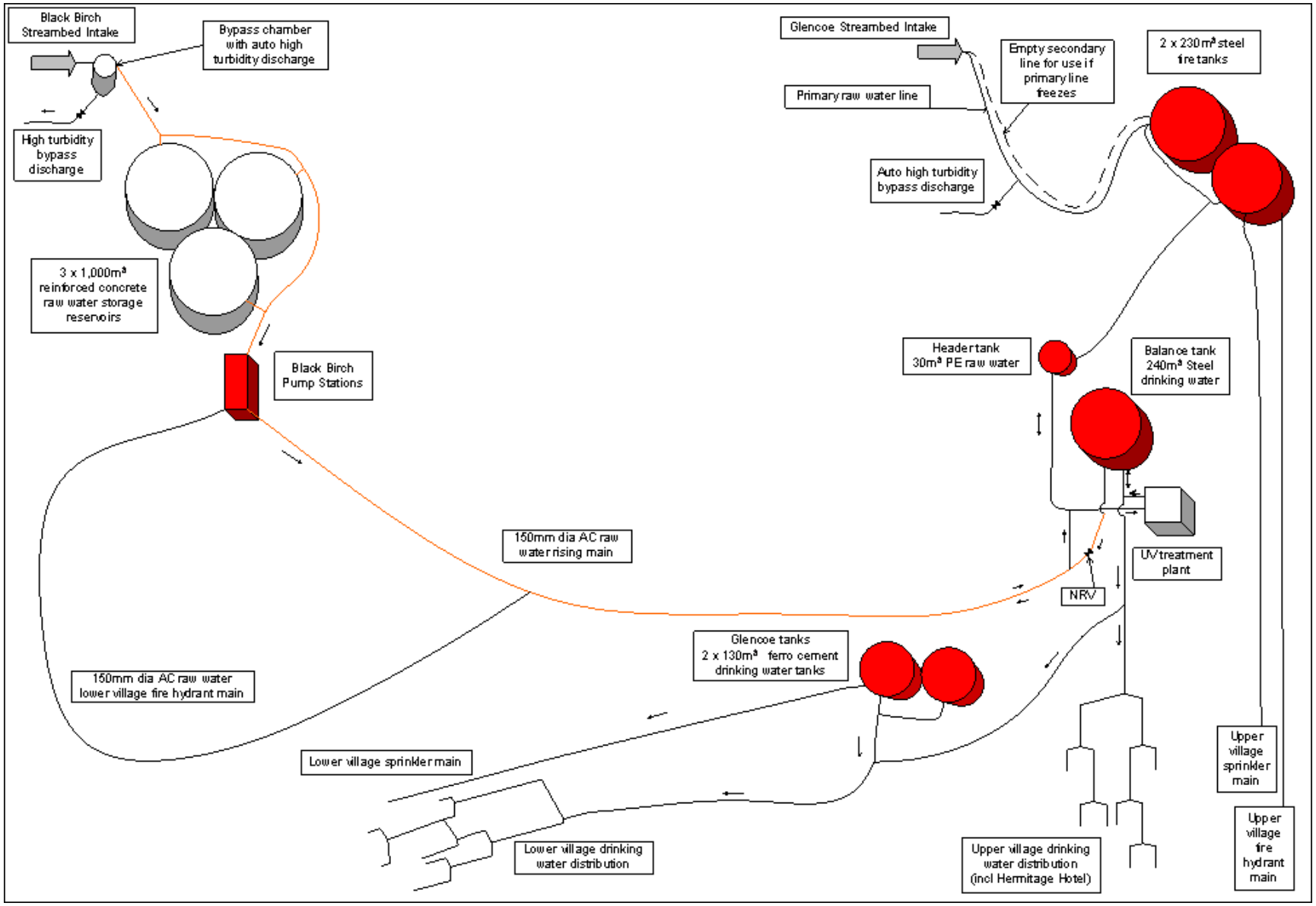


*Figure 7 – Earthquake vulnerability in the water system*

Coloured components are those at highest risk of earthquake damage. Image © Rob Dewhirst 2009

**Significant risks and issues**

The primary risks from water supply are to public health through the quality of water supplied and the reliability of supply; and to life and property through the reliability of supply for fire fighting.

Water quality is controlled at the intakes by measuring turbidity of the water. Intakes are automatically shut off when the incoming water is too cloudy, minimising risk to public health from protozoa entering the water system, and the reduced effectiveness of the UV treatment on turbid water.

With a prolonged flooding or rain event resulting in high turbidity at the intakes, there is a risk that the village could run low on treated water for drinking and for hydrant supply in the lower village. The last resort in this instance is to accept the risk from high turbidity water and let water with turbidity levels that are outside the Drinking Water Standard through the system. In practice, this situation rarely occurs, with waters clearing to acceptable levels rapidly following storm events. Flushing valves have recently been installed to enable the whole system to be back-flushed in the event that high-turbidity water enters the system during a storm event.

Fire-fighting water supply comes from both Glencoe and Black Birch streams. Sprinklers and hydrants in the upper village are supplied by the fire tanks at Glencoe Stream which are fed from the Glencoe intake. Hydrants and sprinklers in the lower village are supplied from Black Birch Stream through the rising ring main and from treated water from the Glencoe storage tank. Any overflow from these tanks can be fed into the header tank for treatment and goes into the general village fire-fighting and drinking-water supply.

In the event of a fire in the lower village reducing available water pressure in the fire main, water flow from the balance tank can be rapidly diverted back into the rising and fire main from Black Birch Stream through an automatic, non-return valve. This valve prevents the untreated water in the main entering the balance tank but can open to divert water flow from the balance tank to hydrants.

Mapping of the water mains and reticulation is ongoing. There is poor knowledge of the exact location and condition of some parts of the underground network. The department intends to GPS map and to inspect the pipe network with closed circuit TV by June 2011. There is some risk that pipes have deteriorated. Much of the network is now PVC pipe, which has a longer life than steel but is more difficult to locate. Any repairs to pipes that lie beneath roads should ideally be completed before roads are upgraded.

Some of the older pipes in the ring main are asbestos-cement, or AC pipe. The inclusion of asbestos in the pipe material can cause concern to people. The Department has checked with the Canterbury District Health Board's drinking water assessor who has confirmed that there are no risks to public health from the use of AC pipe in drinking water systems. This question was also considered by the World Health Organisation in its 1993 edition of the Guidelines for Drinking Water Quality, in which a conclusion was made that "There is therefore no consistent evidence that ingested asbestos is hazardous to health and thus it was considered that there was no need to establish a health-based guideline value for asbestos in drinking water."

There is some risk to the water system in the event of an earthquake. Tanks are at particular risk of damage which would leave the village without water until repairs can be made. All tanks are contained within existing flood protection structures, which should divert any spilled water safely.

### Future demand

The 2000 Aoraki Mount Cook Village Asset Management Plan forecasts the peak demand to reach 11 litres per second by approximately 2017, based on an assumption of growth in demand of 6% per annum. Since 2000, there have been several new developments and some significant upgrades to existing businesses in the village, which were not included in the forecast model and are likely to have increased water use beyond the predicted growth rate of 6% per annum.

It's likely that there will continue to be expansion of facilities and development, both commercial and residential, in the village over the next 10 years. Aoraki/Mount Cook village is one of the iconic visitor sites in New Zealand, and it would be unrealistic to expect that the level of development in the village will remain static over this period.

In the event of new development in the village significantly increasing the demand for potable water and fire-fighting capacity beyond the existing level of growth, an earlier upgrade of treatment is likely to be required.

### What we're planning to do

The department expects to upgrade the capacity of the UV water-treatment infrastructure within the next 10 years to cope with expected growth of water demand.

The existing plant, operating at the top of its range, could treat up to 11 litres per second. At the time of writing the village is using 7–9 litres per second at peak times (shown in Figure 8), and it's predicted that the 11 litre-per-second threshold will be reached during the next 10 years.

This current level of peak use of 7–9 litres per second indicates a higher rate of growth than predicted in the Asset Management Plan. The best prediction is that additional capacity will be required to be available between 2013 and 2015. This would require the water treatment capacity to be upgraded in the 2011–2012 period.

Infrastructure is already in place in the water treatment plant at Glencoe Stream in the form of valving for a second UV-treatment unit to be added in parallel with the existing UV unit. This was flagged in the 2000 Asset Management Plan as Stage 2 of the water-treatment plant.

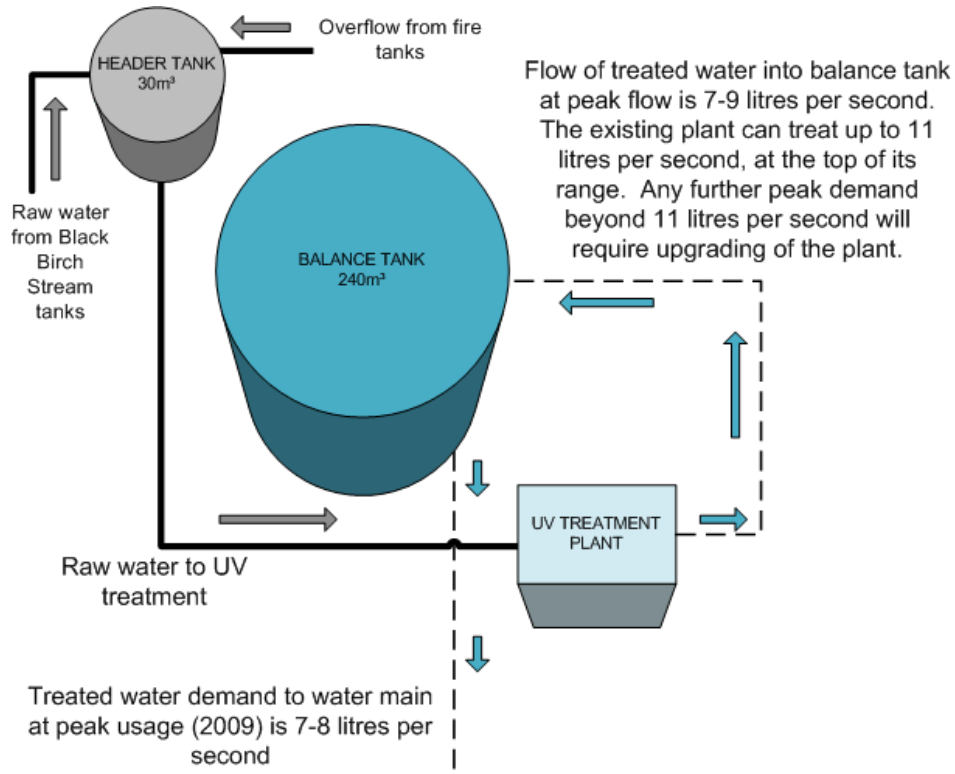


*Figure 8 – Water system head works showing existing treatment capacity.*

The department has obtained a concept plan and indicative costs to increase the capacity of the ultraviolet water-treatment plant from consultant engineer Rob Dewhirst, who has been extensively involved with the design and upgrade of the Aoraki/Mount Cook water system in the past. The concept being considered is as follows:

- A second UV unit will be installed in the existing UV treatment plant to increase the UV treatment capacity, with three potential configuration solutions considered.
- The preferred solution is to add a second UV unit into the existing plant, and an inline pump. One or both UV units would be operating depending on demand, with the pump used to pump water through both units for maximum flow.
- The indicative cost of this proposed upgrade is $75,000.
- Building a new treatment plant was not considered due to the cost. Filtration pre-treatment was also not considered as it appears the turbidity water quality requirement for UV can be met at the present time. If this were required, the upgrade cost would be higher.

Additional storage capacity for water for the lower village already exists with two 136,000-litre ferro-cement tanks. One is connected to the system for treated water storage for the lower village and to reduce the head pressure of the water. The other is presently not connected and both are structurally sound but require resurfacing. These are programmed for upgrade or replacement in 2009, and will both be connected to the reticulation system, giving the lower village a further 136,000-litre storage capacity.

The local body team intend to survey the condition of the water pipes using closed-circuit TV and make any required repairs in the next year. The pipes run beneath Bowen Drive which is due for a major upgrade as part of the

loop road upgrade planned for 2009/2010, so it would be prudent to make any required repairs before the road upgrade is completed. This may require some additional funding for any necessary remedial works.

The local body team will capture as-built information on the water reticulation network in the department's Geographical Information System (GIS).

### Maintenance and operating

The system must be maintained and operated by local body staff to ensure that the agreed levels of service and legal requirements will be met.

The department has obligations as a Drinking Water Supplier under the Health (Drinking Water) Amendment Act 2007 No. 92. The water supply system needs to be managed by staff who have the necessary knowledge, training, and skills to ensure compliance with the Act.

The local body team includes staff who hold, or are in training towards, the National Certificate in Waste Water and Water Reticulation (level 3), and who are also members of the Water Operators Group. There is a requirement for staff to attend seminars and conferences to keep their qualifications valid. This requirement for staff to hold a qualification, professional membership, and attendance of necessary professional events is a further cost on the operation of the water system.

There is not a large candidate pool of people available in New Zealand with this qualification who could step in to work at Aoraki/Mount Cook village to operate the water system. The department therefore expects that any new staff coming into the water or wastewater operation positions will need to be trained. This is an operational cost of running the water system.

Operation of the water treatment and supply system is governed by the New Zealand drinking water standards. These standards contain instructions for regular testing of water, and maintenance intervals for key equipment (such as turbidity meters and the UV-treatment plant). Water samples are tested every two weeks by an accredited laboratory for *Escherichia coli* (*E. coli*) contamination (an indicator of faecal contamination).

The system must also be monitored and any issues attended to promptly. Maintenance must be carried out as required to ensure that the system remains in good working order and no issues are left which will deteriorate, resulting in either risks to public health or unnecessary expense in future repairs.

### How it will be funded

The water supply and reticulation expenditure for the village will be recovered by user pays funding principles. Water meters will be used to measure the usage by the concessionaires and the departments' properties in the village.

The allocation of these expenses to be recovered will be determined by water-meter usage each quarter as a percentage of the total water-meter usage of the village. The share of expenses to be recovered will be invoiced quarterly.

## Financial statements

**Aoraki-Mt Cook Local Body**
**STATEMENT OF FINANCIAL PERFORMANCE**
**10 Year Annual Forecast to June 2019**

**WATER SUPPLY AND RETICULATION**

| | Forecast 2009/10 | Forecast 2010/11 | Forecast 2011/12 | Forecast 2012/13 | Forecast 2013/14 | Forecast 2014/15 | Forecast 2015/16 | Forecast 2016/17 | Forecast 2017/18 | Forecast 2018/19 |
|---|---|---|---|---|---|---|---|---|---|---|
| | $ 000s | $ 000s | $ 000s | $ 000s | $ 000s | $ 000s | $ 000s | $ 000s | $ 000s | $ 000s |
| WATER SUPPLY AND RETICULATION | | | | | | | | | | |
| **Expenditure** | | | | | | | | | | |
| Personnel | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 47 | 48 | 49 |
| Overheads | 36 | 37 | 38 | 39 | 41 | 42 | 43 | 44 | 46 | 47 |
| Operating | 41 | 42 | 43 | 44 | 46 | 47 | 49 | 50 | 52 | 54 |
| Depreciation | 48 | 48 | 49 | 49 | 49 | 48 | 48 | 48 | 48 | 48 |
| Finance | 11 | 10 | 12 | 12 | 11 | 10 | 9 | 9 | 8 | 7 |
| **Total Expenditure** | **$175** | **$177** | **$184** | **$186** | **$189** | **$191** | **$195** | **$198** | **$202** | **$206** |

**WATER ASSETS SUMMARY**

| | Year Capitalised | Expected Life | Cost Value | Accum. Depn | Annual Depn | NBV Jun-09 |
|---|---|---|---|---|---|---|
| | | | $ 000s | $ 000s | $ 000s | $ 000s |
| **LB Assets - Depreciation Levied** | | | 2,698 | 1,120 | 48 | 1,537 |
| **LB Assets - Depreciation Paid by DOC** | | | 283 | 47 | 5 | 231 |
| **Forecast Future Acquisitions** | | | | | | |
| Water Treatment Plant - Stage 2 | 2011/12 | 20 | 75 | | 4 | |

*Refer also to Section 12 for "Assumption and Notes" to financial information*

## 8.2 Sewage reticulation and treatment

**What we do**

The village is provided with a reticulated wastewater service by the department. The reticulation network collects wastewater from 51 domestic and 10 commercial properties as well as nine other buildings, through three kilometres of sewer main pipes that feed directly by gravity into two treatment ponds on Black Birch Fan.

*Figure 9 – Sewage treatment ponds, Black Birch Fan.*

**Why we do it**

Sewage outflows from development within the park must be disposed of in an appropriate manner, for cultural, aesthetic, and public-health reasons. Sewage treatment and disposal must be appropriate for the size and scale of the village, balanced with the need to treat effluent to a standard appropriate in a national park.

Aoraki/Mount Cook National Park is of high significance to Ngāi Tahu with a tōpuni over Aoraki/Mount Cook. Although the tōpuni does not cover the village, Ngāi Tahu considers waters that flow from Aoraki to be tapu/sacred. The department must therefore take all practicable steps to minimise the chance of waste entering waterways.

The department must comply with the Resource Management Act 1991 requirement that resource consents are held for the activity of waste disposal. Consent has been obtained from Environment Canterbury for the disposal of treated human waste.

### Managing the impacts of the activity

Treatment and disposal of sewage has high potential to impact upon the environment and public health if not done properly. The local body team must ensure that sewage from the village is disposed of in a way that will meet resource consent requirements and is culturally appropriate.

There is a balance to be met between the level of treatment given and environmental protection and the cost of infrastructure and operation of the system. Communities around the country have had to dig deep over recent years to cover the costs of upgrading ageing sewage-treatment systems to meet resource consent conditions.

It's important that the system at Aoraki/Mount Cook is sophisticated enough to comply with resource consents and to protect the environment, but not over-engineered such that stakeholders pay for a standard of treatment that is over and above what is required.

The department holds a resource consent from Environment Canterbury as follows:

**CRC054829 To discharge effluent onto land**: expires 24 August 2042.

Authorises the discharge to land up of to 610 cubic metres per day of treated domestic sewage effluent.

The system at the Aoraki/Mount Cook village is appropriate to the size and scale of the community and the landscape and the national park values that it protects from the effects of sewage disposal.

The oxidation ponds have just been upgraded and refurbished, with pond two yet to be commissioned. The village now has a system that meets current best practice for sewage treatment of this scale, and will allow the conditions of the resource consent to be met.

The resource consent requires that the department measure all inflows to the system and outflows to land. This is done through flow meters on the intake of pond one and the outlet of pond two.

**Levels of service**

The minimum level of service is imposed upon the village and department by the requirements of the Resource Management Act 1991 and the resource consent which is held.

The department will provide sewage treatment and disposal services to the village to the service standards outlined below:

| Function | Level of service | Performance standards | How we will measure this |
|---|---|---|---|
| Reticulation system (reticulated system). | Sewage is conveyed away from each property. | Maximum outage length: 48hrs.<br>Maximum outage: 1/yr/consumer.<br>Response time: 18 hours. | Monitoring and recording of all outages. |
| Treatment and disposal (reticulated system). | Sewage is treated and disposed of in a manner that meets all resource consent conditions in a culturally sensitive manner. | All conditions of resource consent CRC054829 are met. | Compliance with resource consent conditions will be monitored by Environment Canterbury and internally by the local body team. |
| Information about assets. | As-built plans are up to date, and all infrastructure is mapped. | Water system information is maintained up to date and stored in the department's Geographic Information System (GIS). This will be completed by 30 June 2011. | Measurement of GIS information against actual assets. |

## Asset information

***Summary***

- Two ponds for treatment of sewage to resource consent conditions, including measurement of flow in and out of the ponds.
- 3,000 metres of reticulation pipes from sewer connections to ponds.
- Maceration pump, and control, monitoring and alarm systems at the Chalets.

***Description of assets***

Most businesses and residential dwellings are connected to the village reticulation and treatment system. Sewage is collected from connections at each building, and conveyed through a three kilometre reticulation network of 100mm asbestos-cement pipe and 100mm earthenware pipe to the oxidation ponds for treatment. Sewage from the Chalets is pumped to the main line via a maceration pump.

The sewer reticulation network has recently been pressure cleaned and resurveyed using closed-circuit TV, and most of the network is in good condition. Some necessary repairs have been made near the visitor centre and the last 200 metres to the ponds beneath Kitchener Drive by slip-lining the pipes. Work done on pond upgrades and pipe repairs is now shown in the financial statements in this LTCP.

One department residential property off Bowen Drive is on a standalone septic tank system due to its location being too low for gravity feed. Management of this system is the responsibility of the department and is not included in the local body function or levied to stakeholders.

The sewage ponds have been substantially upgraded over the last two years at a cost of $1.134 million in order to meet the standards required in the resource consent issued by Environment Canterbury. This work has just been completed and the second pond is still to be fully commissioned. Pond One settles and oxidises the waste, using aerators to help with oxidation. Pond Two contains a rock filtration system and native wetland plants to further treat effluent before discharge.

Some department facilities for visitors outside the village amenity area (Visitor Assets) are connected to the sewerage reticulation and treatment system, or make use of the oxidation ponds for disposal of waste. These are the public toilets in the day shelter in the village, and the campground and shelter at White Horse Hill (including a facility for climbers to empty 'poo pots') which are both connected into the sewerage pipe network. The pipeline from White Horse Hill (not shown in Figure 10) is managed by the department until it connects to the main sewer network.

The pond complex includes a facility for emptying and cleaning toilet drums, which are flown out from the high mountain huts in the Park. The department pays into the local body funding pool to cover the costs of all visitor assets using the waste-water treatment system.

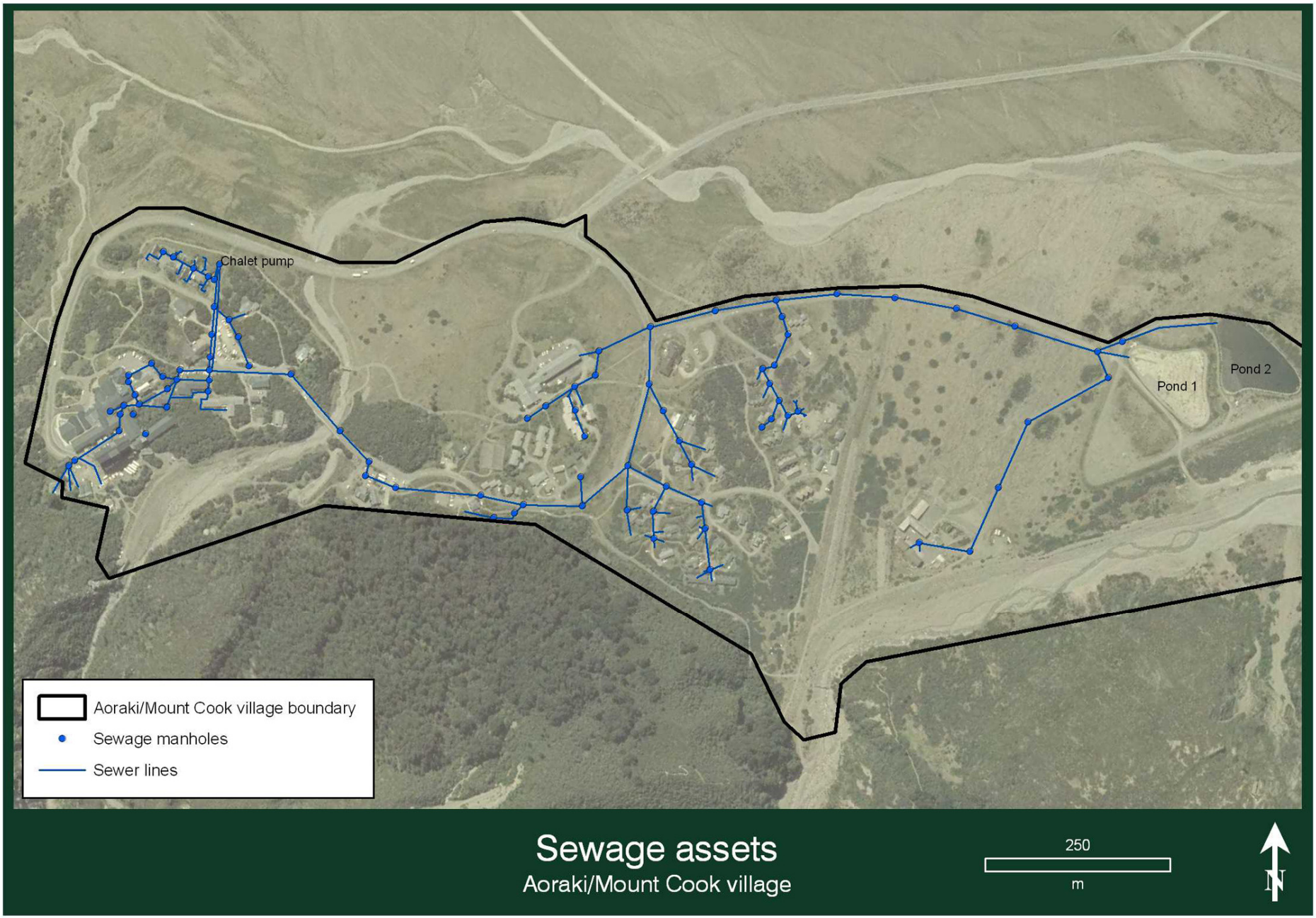


*Figure 10 – The sewerage system*

### Significant risks and issues

The treatment pond upgrade has just been completed but has not yet been commissioned and tested. Pond two is currently empty and will remain so until pond one fills and settled effluent begins to flow into the second pond for treatment.

### Future demand

The treatment plant is now upgraded to a national best practice standard. The capacity of the treatment plant is expected to last beyond the term of this plan without further upgrade being required.

### What we're planning to do

The new sewage treatment system will be fully commissioned as the ponds naturally fill up. No further major work or upgrade to the sewage system is anticipated over the period of this LTCP.

### Maintenance and operating

The sewage disposal system must be maintained and operated by suitably qualified local body staff to ensure that the agreed levels of service are met.

The local body team contains staff who hold, or are in training towards, the National Certificate in Waste Water and Water Reticulation (level 3), and who are also members of the Waste Water Operators Group. There is a requirement for staff to attend seminars and conferences to keep qualifications valid. This requirement for staff to hold a qualification, professional membership and attendance of necessary professional events is a further operational cost on the operation of the water system. The department has an expectation that, although all attempts will be made to recruit qualified personnel, any new staff members coming into this role will require to be trained, and this is a budgeted operational cost of operating the sewerage system.

Key components, such as pumps and flow into and out of the ponds, are monitored at all times by a centralised control system. This system will alert local body staff in the event of an issue, e.g. a blockage of the Chalet pump.

### How it will be funded

The sewerage reticulation and treatment expenditure for the village will be recovered by user pays funding principles. Water meters will be used to measure the usage by the concessionaires and the department's properties in the village.

The allocation of these expenses to be recovered will be determined by water meter usage each quarter as a percentage of the total water meter usage of the village. The share of expenses to be recovered will be invoiced quarterly.

**Aoraki-Mt Cook Local Body**
**STATEMENT OF FINANCIAL PERFORMANCE**
**10 Year Annual Forecast to June 2019**

**SEWAGE RETICULATION AND TREATMENT**

| | Forecast 2009/10 | Forecast 2010/11 | Forecast 2011/12 | Forecast 2012/13 | Forecast 2013/14 | Forecast 2014/15 | Forecast 2015/16 | Forecast 2016/17 | Forecast 2017/18 | Forecast 2018/19 |
|---|---|---|---|---|---|---|---|---|---|---|
| | $ 000s | $ 000s | $ 000s | $ 000s | $ 000s | $ 000s | $ 000s | $ 000s | $ 000s | $ 000s |
| SEWAGE RETICULATION AND TREATMENT | | | | | | | | | | |
| **Expenditure** | | | | | | | | | | |
| Personnel | 12 | 12 | 12 | 13 | 13 | 13 | 14 | 14 | 15 | 15 |
| Overheads | 9 | 9 | 9 | 9 | 10 | 10 | 10 | 11 | 11 | 11 |
| Operating | 7 | 7 | 7 | 8 | 8 | 8 | 8 | 9 | 9 | 9 |
| Depreciation | 40 | 40 | 40 | 40 | 40 | 39 | 39 | 39 | 39 | 39 |
| Finance | 43 | 42 | 41 | 40 | 39 | 37 | 36 | 35 | 34 | 33 |
| **Total Expenditure** | **$110** | **$110** | **$110** | **$109** | **$109** | **$108** | **$108** | **$108** | **$108** | **$108** |

**SEWAGE ASSETS SUMMARY**

| | Year Capitalised | Expected Life | Cost Value | Accum. Depn | Annual Depn | NBV Jun-09 |
|---|---|---|---|---|---|---|
| | | | $ 000s | $ 000s | $ 000s | $ 000s |
| **LB Assets - Depreciation Levied** | | | 2,246 | 552 | 38 | 1,606 |
| **LB Assets - Depreciation Paid by DOC** | | | | | | |
| **Forecast Future Acquisitions** | | | | | | |
| Stage 2 - Oxidation Ponds | 30/06/09 | 40 | 536 | | 13 | |
| Village Sewage Piping Part Upgrade | 2009/10 | 40 | 74 | | 2 | |

*Refer also to Section 12 for "Assumption and Notes" to financial information*