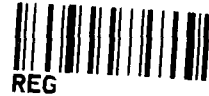


173975-R-E-C193

20 April 2006

MAINTENANCE AND REPLACEMENT PLAN
FOR
PRIVATE STORMWATER AND WATER SUPPLY
FOR
PARKLAND ESTATES
PUKEHANGI RD, ROTORUA
REVISION A



The proposed maintenance and replacement plan for the above infrastructure for Parkland Estates comprise the following:

1.0 **STORMWATER**

1.1 **General**

The subject site is at the head of the catchment of the Otamatea Stream which in turn flows into the Utuhina Stream at Werrina Crescent. The steep hill at the rear of the main housing level is the head of the catchment.

The site is naturally split into six sub catchments A to F by small gullies which naturally discharge directly onto Pukehangi Rd. The sub-catchments are short and have a time of concentration of less than 10 minutes. The large gully to the north of the subject site (sub catchment F), which is part of the rear rural block, does not cross the subject site. However, part of the Development discharges stormwater into this gully.

Sub catchment E discharges in to a small soakage pond located on Lots 32 and 33 as this gully previously discharged directly onto the Right Of Way of the neighbouring site to the north.

The remainder stormwater from the site discharges into the existing Council Stormwater pipe system in Pukehangi Rd

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1.2 EBOP Stormwater Discharge Consent

The development site is covered by a Stormwater Discharge Consent (No. 62986) from EBOP, a copy of which is attached.

The important Conditions of Consent are as follows:

- (a) 7.5 and 7.6 Stormwater discharge structures operate so as to avoid erosion and remedy any erosion that occurs
- (b) 8.2 Prevent discharge of toxic substances
- (c) 9 Stormwater system is operated and maintained
- (d) 10 Monitoring Recording and reporting. 10.1 has been completed. 10.2 requires inspection and reporting every three years (2008, 2011, 2014)
- (e) Consent expires 31 May 2015

1.3 Stormwater System Overview

The stormwater control philosophy for this development is to limit the stormwater runoff from the site to the quantity that is occurring at present, so that there is no off site effects as a result of the development. The stormwater control system is as follows

- (a) Stormwater from the individual houses and paved surfaces on each Lot shall be disposed of via private ground soakage designed to accept a 10 minute, 10% AEP (1 in 10 year) storm event.
- (b) Stormwater from the roads on the common land (Lot 35), where the gradient is less than 10%, flows directly off the road into swales or existing gullies.
- (c) Stormwater from the roads where the gradient is greater than 10% is controlled by mountable kerb and channel, to minimise erosion. Cesspits collect the water from the mountable kerb and channel and where possible are piped to soakholes. The soakholes have been designed accept a 10 minute, 50% AEP (1 in 2 year) storm event. Overflow from the soakholes in extreme events flows into the swales and existing gullies on the site.
- (d) A system of bunds along the Pukehangī Rd boundary prevents stormwater discharging onto Pukehangī Rd
- (e) 2 large shallow stormwater detention ponds have been installed on the lower levels of the site adjacent to Pukehangī Rd to further restrict stormwater flow off the site. The flow from these ponds has been piped into the Council system. These ponds have been design to store water and only overtop in a 1 hour, 1% AEP (1 in 100 year) storm event. Longer duration 1% AEP events are able to be stored in the ponds without overtopping
- (f) There is a small stormwater detention pond on Lot 32 / 33 which collects overland flow from Lots 30/31/32 and prevents it from discharging onto the neighbouring site, which was a regular occurrence before the subdivision was developed. The pond holds the water and disposes the water via soakage. In extreme events (2% AEP or 1 in 50 year) the pond will overflow overland onto Lots 33/34 and also onto the neighbours driveway.

1.4 Individual Lot Soakhole Maintenance

The soakholes on each Lot shall capture stormwater from all impermeable surfaces within each Lot (ie roof and paving).

The owner of each Lot is responsible for the design, installation and maintenance of the stormwater soakholes on their property.

1.5 Road Cesspit and Soakhole Maintenance

The cesspits in the road trap suspended solids and rubbish in the bottom of the cesspit. Cesspits need regular cleaning out to remain effective. Cesspits shall be inspected and cleaned out as follows:

- (a) Every six months the cesspits shall be inspected and cleaned out or
- (b) If the cesspit is not accepting stormwater / overflowing they should be inspected and cleaned out

The soakholes attached to cesspits are protected from the overflow of solid matter by a 90 degree bend (refer attached detail). When the cesspit becomes full of solid matter up to the outlet, water will not flow into the soakhole and the cesspit will overflow.

The soakholes have been buried and have removeable lids. Soakholes should be inspected every two years for signs of solid build up and if necessary cleaned out with a sucker truck

1.7 Overland Flow System Maintenance

The overland stormwater flow in the swales, existing gullies, culverts and detention ponds will cause scour in heavy rainfall events. The developer has installed a number of erosion control structures in the existing gullies and around culverts to minimise erosion. After heavy rainfall the swales, gullies, culverts and stormwater detention ponds should be inspected for scouring and damage and any remedial works should be carried out as required

In addition, the stormwater detention ponds should be inspected during heavy rainfall to ensure that they are operating satisfactorily

The three stormwater detention ponds may from time to time become filled with sediment as a result from erosion in the upper catchment. The ponds should be cleaned out if they become 20% full of sediment.

1.8 Stormwater System Maintenance Contractor and Consultant

The following companies should be contacted for maintenance of the stormwater system as they were involved with the construction of the subdivision.

- (a) Contractor - Anchorage Contractors – ph 07 349 6970
- (b) Consultant - MTEC Consultants – ph 07 347 7840

2.0 WATER SUPPLY

2.1 General

Until the Council water supply is available, the water supply for the development is via a private water supply system from an existing water bore located on the property in the north western corner on Pukehangi Rd (adjacent to Lot 34).

The water supply is covered by a Public Health Risk Management Plan (refer attached) and a Resource Consent – Water Take form EBOP (No. 63474 refer attached). In addition, there is a Resource Consent – Land Use from the Rotorua District Council for the reservoir (ref 62-05-221)

2.2 Public Health Management Plan

The plan is a living document and should be reviewed as required or at least yearly.

2.3 Resource Consent - Water Take

A Resource Consent (water take) has been obtained from EBOP (No. 63474 refer attached) with the following important conditions of consent

- 5.1 Maximum daily water take 96 cubic metres
- 5.2 Maximum flow rate 1.1 l/sec
- 5.3 Maximum yearly water take 28,908 cubic metres
- 7.3 Weekly recording of water quantity
- 7.4 Records of water meter readings covering a three month period shall be sent to EBOP at the end of March, June, September, and December
- 8.1 EBOP can close the bore for 48 hours for water monitoring purposes

2.4 Bore and Bore Pump Details

The water is pumped from the bore with a down the bore pump. The details of the bore and bore pump when originally installed, which have been obtained from Rotorua Well Drilling, are as follows:

- Bore diameter 100mm
- Depth 39m into Rhyolite (galvanised steel casing to 26m)
- Static water level 26m
- Bore Pump Grundfos SP3A 50 3.7kw (approx 10 years old)
- Bore pump located at 32m
- Drawdown test 3.4m drawdown at 3.6m³/hour with good recovery

In addition, Hi Flow Pumps have tested the bore and bore pump prior to the development being approved and the report is attached.

2.5 Water Quality

The bore water has been tested and the results are attached. All of the tests indicate that the water complies with the Ministry of Health Drinking Water Standard MAV. However the water pH of 6.6 is outside the Guideline values of 7.0 to 8.5 and indicates that the water is slightly acidic and is likely to be classified as slightly aggressive under the Drinking Water Standard. We have discussed the pH value with Steve Gooden of the Ministry of Health and he advised that the bore water will be satisfactory provided the following are carried out:

- (a) There are no copper pipes used for water reticulation.
- (b) The residents are informed twice a year that they should NOT use the first flush of water from taps (500ml - approximately two glasses) for drinking or food preparation, as it will contain heavy metals (lead, nickel and copper) which have been stripped from the brass taps.

2.6 Water Testing

The Public Health Risk Management Plan calls for water quality testing for bacterial and chemical determinands twice in the first year and yearly thereafter with the results sent to the Rotorua District Councils Senior Environmental Health Officer.

The testing is as per the test results by Hill Laboratories attached to the Hi Flo Pumps report (refer attached)

2.7 Water Reticulation System

The water is delivered through a 100mm diameter uPVC rising main from the bore up to a 160m³ Timbertank Enterprises reservoir located on Lot 37, to the south of the development. The reservoir capacity has been sized to provide a minimum of 3 days storage for each household on Lots 1-34, 36 and 37 (ie 36 lots x 1.5m³ per day x 3 days = 162m³).

The bore pump is controlled by a pressure switch which turns the pump off when the pressure is high in the 100mm diameter rising main. When the reservoir is full the double float valve on the inlet pipe to the reservoir closes and the increase in pressure turns off the bore pump.

The internal water reticulation system is gravity fed from the reservoir and has been designed and installed in accordance with RDC RCEIS. The reservoir will have a minimum height difference to the highest building platform of 40m (RL420 to RL 380) which is adequate to supply a minimum pressure of 30m as per the Council requirements. As the height difference between the reservoir and the lower lots is high, a pressure reducing valve has been installed on the connections for Lots 21, 22, 31, 32, 33, 34.

Fire hydrants have been provided on the reticulation system in accordance with the Council requirements.

Water connections for each Lot include a toby (valve), water meter and double testable check valve. The check valve is for backflow prevention / contamination control (ie when water pressure is lost in the supply main the double check valve prevents backflow from houses back into the supply main)

Lots 36 and 37 have been supplied from the main reservoir however they will require their own tank and domestic pressure pump system as there will be insufficient pressure to be gravity fed due to the reservoir and the building platform levels being of a similar height.

2.8 Reservoir

The reservoir is a 160m³ Timbertank Enterprises tank. The reservoir has the following fittings

- 100mm diameter rising main inlet from the bore with a double float valve
- Two 80mm diameter overflow outlets which have built in bird protection and splash boards to both make any overflow visible and to disperse any overflow to minimise erosion
- 150mm diameter outlet pipe to the water supply reticulation system
- 100mm diameter scour valve that discharges onto Lot 37 when the tank requires emptying

2.8 Water Supply Maintenance Contractors and Consultant

The following contractor should be contacted for maintenance of the water supply system as they were involved with the construction of the subdivision.

(a) Piped Reticulation and Connections

Anchorage Contractors – ph 07 349 6970

(b) Bore, Bore Pump, Pressure Switch and Low Water Level Alarm in Reservoir-

HiFlo Pumps – ph 07 348 7516

(c) Reservoir – Timber Tank Enterprises – ph 09 574 6572

(d) Consultant – MTEC Consultants – ph 07 347 7840

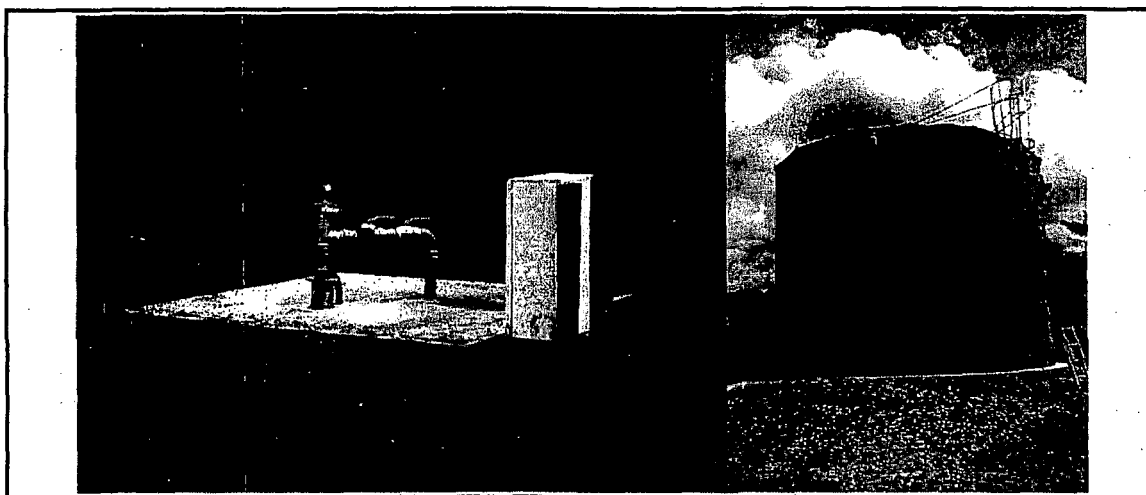
Prepared by
MTEC Consultants



Steve Pittman
BE, MIPENZ (Civil, Struct), CPEng, IntPE

- Encl
1. Site Plan
 2. EBOP Stormwater Discharge Consent
 3. EBOP Water Take Consent
 4. HiFlo Pumps – Pump and Bore Report

PARKLAND ESTATES



PUBLIC HEALTH RISK MANAGEMENT PLAN

JEFF BOOTH CONSULTING LTD

March 2006

JEFF BOOTH CONSULTING LTD

PARKLAND ESTATES

**PUBLIC HEALTH RISK
MANAGEMENT PLAN**

<i>Consultant:</i>	Jeff Booth Consulting Ltd		
<i>Author:</i>	Vicki Pacey		
<i>Checked by:</i>	Jeff Booth	<i>Date:</i>	28/03/2006
<i>Authorised by:</i>	Steve Pittman	<i>Date:</i>	17/03/2006

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P.O.Box 2380,
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Participating Small Drinking-water Supply Compliance

Public Health Risk Management Plan

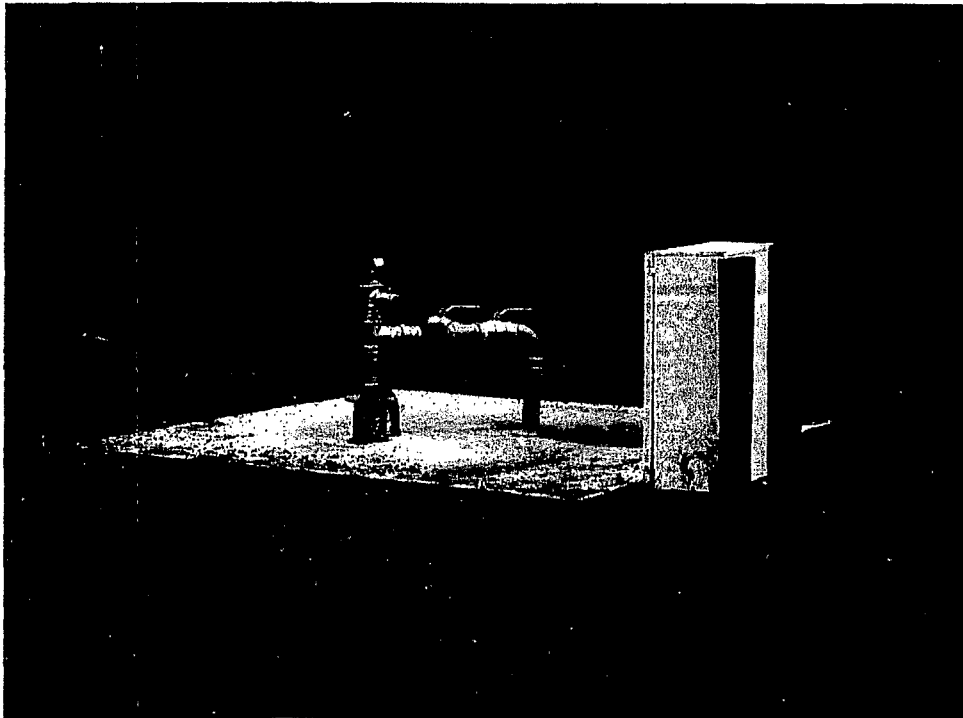
Supply Name:
Parkland Estates, Pukehangi Road, Rotorua

Introduction to Parkland Estates Supply

Source

Water is sourced from an existing 100mm diameter bore on the north-western corner of the development. This is near the intersection of Pukehangi and Sunset Roads.

The bore is 39m deep into Rhyolite soil. It has a galvanised steel casing to a depth of 26m. The static water level is also 26m. A drawdown test on the bore determined that a 3.4m drawdown occurs at a pumping rate of 3.6 m³/hour. The well has a good recovery. The bore pump is a Grundfos SP3A 50 with a 4kW motor. This pump is approximately 10 years old and is located 32m down the well.



Photograph 1: Bore head and surrounds

Photograph 1 shows the bore head and power box. The bore head and piping are new. There are plans to improve the power supply enclosure in the near future.

A concrete pad has been laid around the bore head to secure it and prevent runoff pooling around the top of the well. The casing also extends above the ground for further protection. It is understood that there are plans to fence the bore area off.

Resource consent has been obtained to take water from the bore at a rate not exceeding 1.1 litres/second or 96 m³/day.

The water is pumped from the bore through a 100mm diameter pipe to the reservoir.

Reservoir

The reservoir is a new timbertank that has been constructed on a lifestyle property at the back of the estate. The reservoir is at an elevation of 420m. The reservoir is 5.0 metres high.

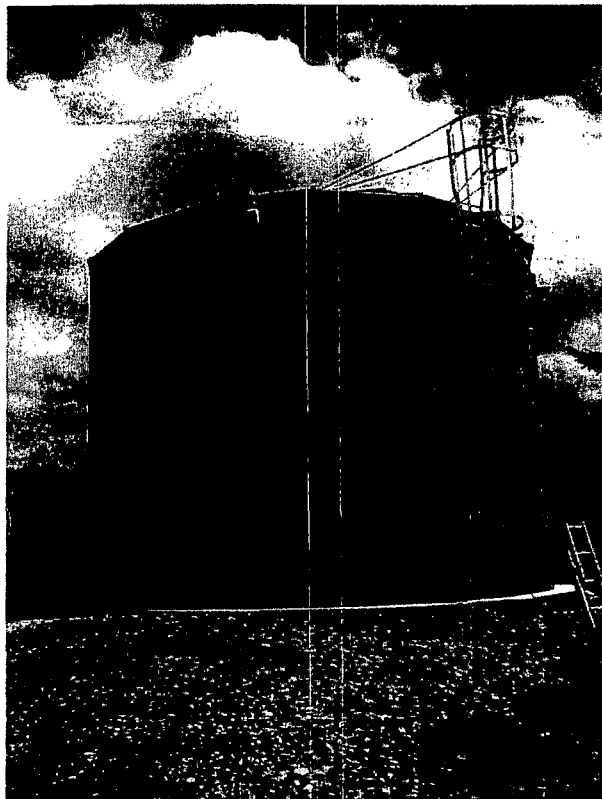
The volume of the reservoir is 180m³. This allows for at least three days storage for 37 properties using 1.5 m³/day.

Water enters the top of the reservoir through a 75 mm diameter inlet controlled by a float valve. There are also two level floats within the reservoir for controlling the pump.

The outlet pipe leaves from the base of the reservoir 1.8 metres in from the wall. Both the inlet and the outlet pipe have sluice valves to enable isolation of the reservoir.

The overflow pipes have a 90 degree bend and water falls onto a board so that it will splash. This is to make the overflowing water more visible from the lifestyle blocks. There is also a visual water level indicator on the side of the reservoir. There are mesh barriers in the overflow pipes to prevent birds entering the reservoir.

The reservoir is shown in the following photo.



Photograph 3: Parkland Estates Reservoir

There is power available at the reservoir site so treatment can be provided if the water quality deteriorates and it is required.

Reticulation

The reticulation has been constructed from Marley PVC pressure pipe DN150 PN12. This is an adequate pressure rating as the maximum pressure achievable in the reticulation is approximately 105m.

All connections to the reticulation have a meter and a double testable check valve.

Water Quality

The bore water has been tested in 2004 and found to comply with Ministry of Health Drinking Water Standards 2005 in regards to all determinands tested except for pH.

The pH of the bore water is 6.6 and the guidelines recommend a value between 7.0 and 8.5.

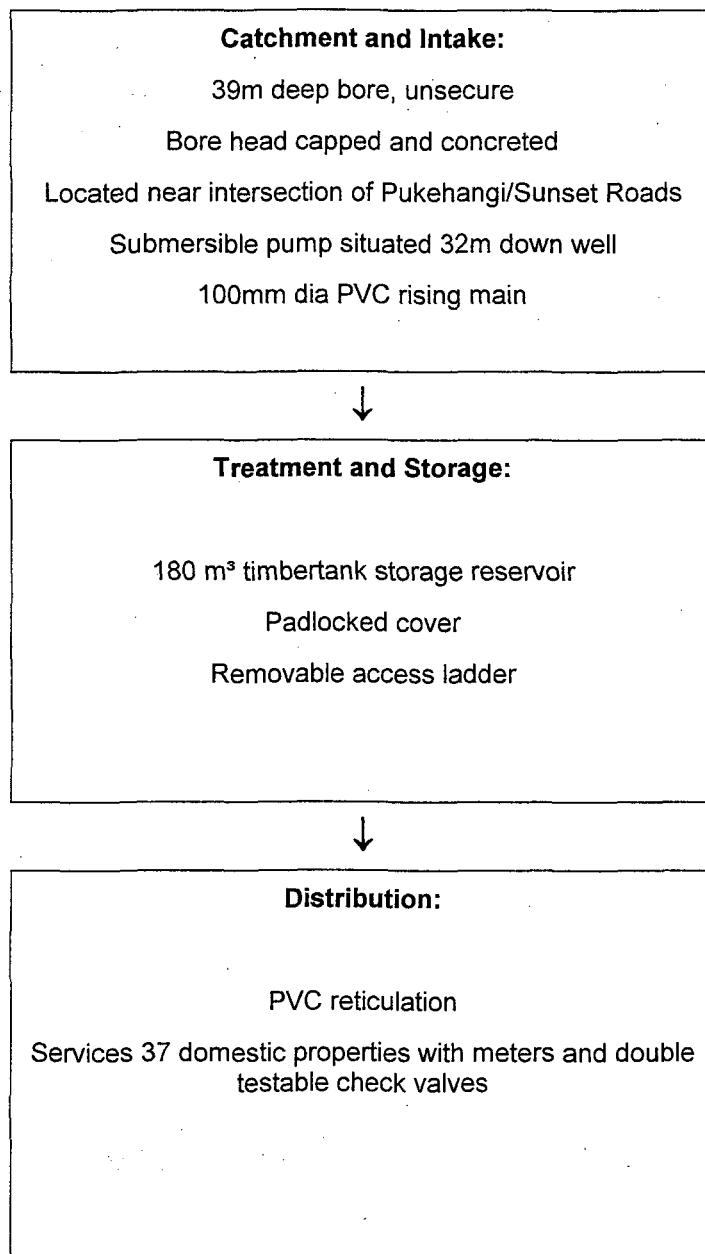
Monitoring locations have been provided at the outlet of the bore and the reservoir.

Management and Operation

The owners association will manage the supply and they will appoint a person to be responsible for organising repairs and maintenance.

It is probable that Anchorage Construction will be responsible for the reticulation and Hi Flo pumps will maintain the bore and pump.

Step 1: Flow chart



Step 2: Worksheets

Catchment and Intake

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)	Is this under control?	If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.
1. Contamination of bore water through bore head and casing.	No. The existing bore head has some of the recommended protective elements, but it is not fenced off to prevent vandalism or access.	Yes.
2. Contamination of bore water from nearby surface activities.	No. The condition of the casing and joints is unknown but there is an obstruction 20m deep that prevents level sensors being lowered into the bore.	Yes.
3. Contamination of the aquifer.	No. Very little is known about the source recharge zone.	Yes.
4. Not enough water can be drawn from the bore to meet demand.	Yes. The bore pump is capable of pumping at 4 m ³ /hour and the expected demand is 2.3 m ³ /hour. There is also an 180m ³ reservoir to cover peak demand periods.	
5. Not enough water available to meet demand.	Yes. Resource consent for 96 m ³ /day has been approved and pump tests show that at the flows required there is very little drawdown.	

Supply Name: Parkland Estates

Treatment and Storage

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)	Is this under control?	If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.
6. Not enough water in storage to meet demand.	Yes. There is plenty of storage available and the reservoir is in good condition.	
7. Contaminating material enters reservoir	Yes. There is a padlocked lid to prevent access and the overflows are protected so birds cannot enter the reservoir.	

Supply Name: Parkland Estates

Distribution

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)	Is this under control?	If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.
8. Contamination introduced by pressure fluctuations.	Yes. Pipes are sufficiently large that significant pressure fluctuations should not be experienced.	
9. Contamination introduced to reticulation during repairs.	Yes. It is expected that an approved contractor with training in water supply operation and maintenance will carry out repairs.	
10. Contamination enters the reticulation due to backflow issues.	Yes. All properties have double testable check valves installed.	
11. Low pH leads to corrosion of plumbing fittings and introduction of heavy metals to water.	No. The pH is less than 7.0 and the water is plumbosolvent.	Yes.

Supply Name: Parkland Estates

Other

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)	Is this under control?	If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.
11. Poor staff training leads to introduction of contaminating materials.	Yes. Contracted staff will be used to maintain the supply. It is expected that they would be appropriately trained.	
12. Inadequate monitoring of water supply allows contamination to go unnoticed.	Yes. The water supply is to be monitored for bacterial and chemical determinands twice in the first year of operation and yearly thereafter. Results are to be provided to council's Senior Environmental Health Officer.	

Step 3: Plan to Manage the 'Needs Urgent Attention'

Supply Name: Parkland Estates

Catchment and Intake

Copy the 'Needs Urgent Attention' from the worksheets. Expect no more than 3–5 in each worksheet.	IMPROVEMENT SCHEDULE: How can you remove or reduce or remedy the cause and by when? Indicate clearly where additional resources are required.	Until remedied, how will you know when this is actually causing deterioration towards unsafe drinking-water?	What contingency management plan is in place until the cause is removed or reduced or remedied? Who needs to know and how quickly? Who can help?
Contamination of bore water through bore head and casing.	The bore head needs to be protected in the following manner: Construct a secure lockable shed around the bore head.	Bacteriological monitoring (<i>E.coli</i>) Possibly chemical determinands present at shallower depths	If <i>E.coli</i> is present carry out the procedure outlined in the NZDWS 2005 (Figure 4.1 pg 37).
Contamination of bore water from nearby surface activities.	The bore head needs to be protected as above. Check casing and repair any damage.	Bacteriological monitoring (<i>E.coli</i>) Possibly chemical determinands present at shallower depths	If <i>E.coli</i> is present carry out the procedure outlined in the NZDWS 2005 (Figure 4.1 pg 37).
Contamination of the aquifer.	Carry out a sanitary survey of the aquifer recharge zone.		

Treatment and Storage

Supply Name: Parkland Estates

Copy the 'Needs Urgent Attention' from the worksheets. Expect no more than 3-5 in each worksheet.	IMPROVEMENT SCHEDULE: How can you remove or reduce or remedy the cause and by when? Indicate clearly where additional resources are required.	Until remedied, how will you know when this is actually causing deterioration towards unsafe drinking-water?	What contingency management plan is in place until the cause is removed or reduced or remedied? Who needs to know and how quickly? Who can help?

Distribution

Supply Name: Parkland Estates

Copy the 'Needs Urgent Attention' from the worksheets. Expect no more than 3–5 in each worksheet.	IMPROVEMENT SCHEDULE: How can you remove or reduce or remedy the cause and by when? Indicate clearly where additional resources are required.	Until remedied, how will you know when this is actually causing deterioration towards unsafe drinking-water?	What contingency management plan is in place until the cause is removed or reduced or remedied? Who needs to know and how quickly? Who can help?
Low pH leads to corrosion of plumbing fittings and introduction of heavy metals to water.	Monitor pH and if it drops too low consider treatment options.	Monitoring of heavy metals in the water supply.	Inform residents twice yearly that they should not use the first flush of water from taps for drinking or food preparation, as it will contain heavy metals. This can be done at the residents meetings.

Other

Supply Name: Parkland Estates

Copy the 'Needs Urgent Attention' from the worksheets. Expect no more than 3–5 in each worksheet.	IMPROVEMENT SCHEDULE: How can you remove or reduce or remedy the cause and by when? Indicate clearly where additional resources are required.	Until remedied, how will you know when this is actually causing deterioration towards unsafe drinking-water?	What contingency management plan is in place until the cause is removed or reduced or remedied? Who needs to know and how quickly? Who can help?

Notes

This PHRMP can be used to determine the supply's compliance with New Zealand Drinking Water Standards 2005 as long as the supply is registered as a small water supply.

The PHRMP should be reviewed on a yearly basis.