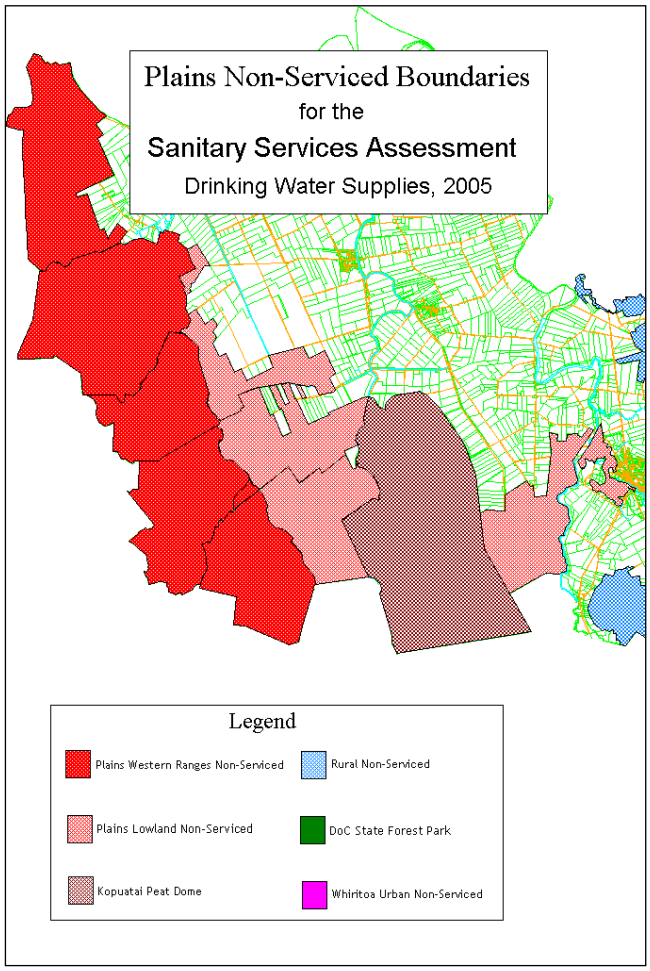
7.9 Plains Non-Serviced

7.9.1 Description

Plains Non-Serviced is best described as residents located to the west of the Waihou River not connected to the Hauraki District Council's water supply network. This community includes two areas that were surveyed separately (see 8.2.4). These areas were described as Plains Western Ranges (Hill) and Plains Lowland (Flat). Both the subsets included areas such as Awaiti, Patetonga, Kaihere, Torehape, Mangatarata and Miranda.



7.9.2 How is Drinking Water Obtained

Individual households provide their own water supply, generally either from wells (bores; 19% of households sampled in a Hauraki District Council survey) or from rainwater tanks (81%).

7.9.3 Risks Attributable to the Absence of a Reticulated Water Supply

Water sources need to provide enough water to meet requirements (normally 200 litres per person per day.). The supply also needs to be of a suitable standard for consumption or good enough to simply treat it to a good quality standard.
The table below shows water sources and compares their general quality[12].

[12] Household Water Supplies, Department of Health, 1992.

RAW WATER SOURCE	BIOLOGICAL QUALITY	CHEMICAL QUALITY	AESTHETIC QUALITY
Mains Supply	Usually good	Usually good	Usually good
Roof Water	Usually poor	Usually good	Corrosive
Shallow Bore or shingle aquifer	Often poor	Can be high in nitrates, iron etc	Variable – can be Turbid & Discoloured
Deep Bore	Usually good	Often high in Iron/ Carbon Dioxide, Manganese and Ammonium	Hard/Corrosive
River	Usually poor	Variable	Can be Turbid & Discoloured
Stream	Variable	Usually good	Can be Turbid & Discoloured
Lake	Variable	Usually good	Usually good

Small drinking water supplies can be at increased risk from contaminants. Contaminants, their sources and the potential problems they may cause are listed in the table below[13].

CONTAMINANT	SOURCE	PROBLEMS
Bacteria	Septic tanks, bird and animal faeces back flushing from incorrectly connected W.C. bowls, sewage discharges	Diarrhoea Gastroenteritis Other waterborne disease
Carbon Dioxide	Atmosphere and decaying vegetation	Corrosion
Colour	Decaying vegetation	Appearance
Hardness	Dissolved rocks	Soap demand Scale formation in kettles and hot water tanks
Iron	Dissolved rocks, especially in bore water	Taste Staining Clogging of pipes and valves
Manganese	Dissolved rocks	Taste Staining
Nitrates	Fertilisers, Clover, Septic tank soakage	Can cause health problems for bottle fed babies
Protozoan Cysts	Septic tanks Bird and animal faeces Sewage discharges	Diarrhoea Protozoan Infestation
Taste and Odour	Algae	Unpleasant to drink Can be toxic
Turbidity	Dirt	Appearance (usually biologically contaminated as well)
Viruses	Sewage Bird and animal faeces	Gastroenteritis Other waterborne diseases

[13] Household Water Supplies, Department of Health, 1992.

Irrespective of the supply there is a great deal of risk to the water supply once it is caught and stored. Maintenance of these small supplies often falls upon the most practical person available, usually the farmer. Tanks and equipment are usually cleaned and maintained on an as needed basis. This creates a risk in itself by allowing the tank to build up a population of microbiological organisms within the tank that can cause serious harm.

General layout and process of the water supply can also increase the level of risk that these supplies are open to.

Installing a first flush system on the roof water supplies allows for the first portion of a rain event to wash the dust and leaves from the roof and gutters to waste before the rest of the rain water is diverted into the storage tank. This will reduce the quantity of suspended solid material in the bottom of the tank which creates food source for the microbiological organisms.

Risk associated with the Groundwater supply is dependent upon the depth and surrounding catchment. The bore that is in use at one of these sites is of an unknown depth and is situated in a neighbouring farm paddock. The risk to this supply would be that the bore is shallow or has an unprotected well head and there could be rain water runoff from the farm land contaminating the supply with microbiological organisms from the stock effluent.

The surface water supply is also susceptible to the rain events washing the effluent into the streams and into the water supply. This is common with surface water catchments and the site that uses this method for its drinking water has also fitted a water filter and UV system to treat its water prior to use. The filter is used to reduce the dirt and suspended solids before the UV light disinfects the supply protecting the water from microbiological organisms.

7.9.4 Quality and Adequacy of Drinking Water

Given that a large proportion of the Hauraki Plains area is reclaimed swamp that has been drained in the early 1900's, there is little surface water available suitable even for stock purposes let alone for human consumption.

The water quality on the plains is described by Rufus E. Tye in his book "Hauraki Plains Story".

"The early settlers were reliant on tanks for water for domestic use, and bores for watering stock with the exception of farmers living near the rivers and streams in the district. The bores yielded water of varying temperature, and in many cases, the water was brackish and mineralised. Water was also pumped from the Piako River. Owing to corrosion, piping used to reticulate the farms, had to be replaced yearly in some places, and farmers were dependent upon windmills to pump the water. The quality of water varied at each bore, and it was not unusual to see stock waiting at a gate, to return to their favourite drinking place."

Given the historic issues that faced the early settlers, it is then understandable that the results in the survey favoured groundwater as their main water source. Through the survey it is evident that there is sufficient quantity of water for groundwater sources, but with varying quality as indicated by the 20-25% response rate stating that they experience taste and odour issues.

A high percentage of respondents that source their water from rain collection systems reported that they experienced water shortages during the drier months and need to top up their supply with tankered water.

The quality of the water is yet unknown, however four of the respondents are willing to have their water supply sampled and tested.

7.9.5 Current and Future Demands for Water Supply

Generally there is sufficient water available for this community's needs, given that 86% and 94% responded favourably in the Lowlands and the Western Ranges respectively.

Currently there is 19-31% demand to reticulate the Plains Non-Serviced areas with the Plains council supply, with 13% unsure and stating the cost of the project being their main concern. At the present moment the supply is approximately 5-10km away from the District Boundary giving a total land area of 28,500 hectares that is un-serviced in the Hauraki Plains area. Supplying water to this area will cause delivery issues with the current system and the cost of this will be considerable.

7.9.6 Options Available to Meet the Demands and their Suitability

Council reticulation into the area could be a feasible option with the installation of a reservoir to allow for the daily demands. However, there maybe the need to investigate the development of another water treatment plant in this area to utilise the possible sources in this area and to help offset the current Plains Water Supply.

Alternately the rainwater supplies could install another tank to increase their storage capacity and fit a first flush system to reduce the leaf litter and dust entering the system. Also installing a point of use treatment system will offer a greater level of security to the users. Installation costs for treatment would be approximately $2,500 with an annual operating cost of $1,000. Cost for the extra 22,500 litre tank would be $3,000 including installation. A first flush system would be approximately $1,000.

7.9.7 Hauraki District Council's Involvement in Meeting the Demands

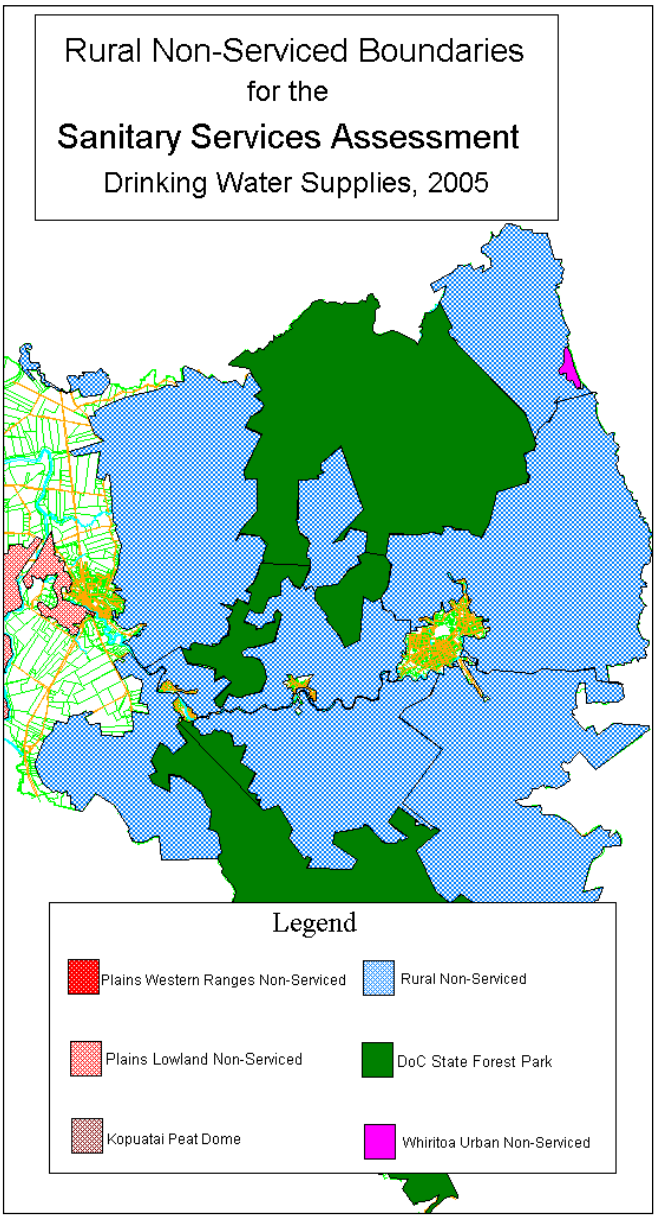
The Hauraki District Council will be investigating the practicalities and costs of extending the existing Plains water supply and/or the development of new treatment plant into the non-serviced areas during the next reporting period.

With the information gathered from the surveys particular sites will be involved in an education programme raising the awareness of drinking water safety and efficient use the water resource.

7.10 Rural Non-Serviced

7.10.1 Description

Rural Non-Serviced can be described as all rural properties to the east of the Waihou River not connected to a Council Water Supply, excluding the Whiritoa Urban Community. This community has similar requirements as the Plains Non-Serviced with the exception to the availability and demand for water is different. Given the nature of the land formations that make up this community there is more water available to this community than the Plains Non-serviced.



7.10.2 How is Drinking Water Obtained

The majority of the rural properties in the Hauraki District Council obtain their potable water supply mainly from groundwater (46%), surface water (31%), and roof rainwater collection systems 19%. These supplies are generally small and can only provide for individual households. 4% of the people surveyed sourced their water by other means such as bringing container drinking water from other locations. This was in the case of holiday homes or small businesses.

The majority of water is sourced from farmland (70%) catchments with the remaining 30% taken from native bush catchments.

7.10.3 Risks Attributable to the Absence of a Reticulated Water Supply

Water sources need to provide enough water to meet requirements (normally 200 litres per person per day). The supply also needs to be of a suitable standard for consumption or good enough to simply treat it to a good quality standard.

The table below shows water sources and compares their general quality[14].

RAW WATER SOURCE	BIOLOGICAL QUALITY	CHEMICAL QUALITY	AESTHETIC QUALITY
Mains Supply	Usually good	Usually good	Usually good
Roof Water	Usually poor	Usually good	Corrosive
Shallow Bore or shingle aquifer	Often poor	Can be high in nitrates, iron etc	Variable – can be Turbid & Discoloured
Deep Bore	Usually good	Often high in Iron/ Carbon Dioxide, Manganese and Ammonium	Hard/Corrosive
River	Usually poor	Variable	Can be Turbid & Discoloured
Stream	Variable	Usually good	Can be Turbid & Discoloured
Lake	Variable	Usually good	Usually good

Small drinking water supplies can be at increased risk from contaminants. Contaminants, their sources and the potential problems they may cause are listed in the table below[15].

CONTAMINANT	SOURCE	PROBLEMS
Bacteria	Septic tanks, bird and animal faeces back flushing from incorrectly connected W.C. bowls, sewage discharges	Diarrhoea Gastroenteritis Other waterborne disease
Carbon Dioxide	Atmosphere and decaying vegetation	Corrosion
Colour	Decaying vegetation	Appearance
Hardness	Dissolved rocks	Soap demand Scale formation in kettles and hot water tanks
Iron	Dissolved rocks, especially in bore water	Taste Staining Clogging of pipes and valves
Manganese	Dissolved rocks	Taste Staining
Nitrates	Fertilisers, Clover, Septic tank soakage	Can cause health problems for bottle fed babies
Protozoan Cysts	Septic tanks Bird and animal faeces Sewage discharges	Diarrhoea Protozoan Infestation
Taste and Odour	Algae	Unpleasant to drink Can be toxic
Turbidity	Dirt	Appearance (usually biologically contaminated as well)
Viruses	Sewage Bird and animal faeces	Gastroenteritis Other waterborne diseases

[14] Household Water Supplies, Department of Health, 1992.
[15] Household Water Supplies, Department of Health, 1992.

Irrespective of the supply there is a great deal of risk to the water supply once it is caught and stored. Maintenance of these small supplies often falls upon the most practical person available, usually the farmer or manager. Tanks and equipment are usually cleaned and maintained on an as needed basis or never at all. This creates a risk in itself by allowing the tank to build up a population of microbiological organisms within the tank that can cause serious harm.

93% of respondents had a storage tank. Those without a storage tank took their water straight from their bore, spring, or stream.

100% of those with tanks had them securely covered so that birds or animals and their wastes could not get in.

28% of respondents never clean their storage tank, with approximately another third cleaning it when it seems necessary. 12% clean their tanks regularly.

General layout and process of the water supply can also increase the level of risk that these supplies are open to.

Installing a first flush system on the roof water supplies allows for the first portion of a rain event to wash the dust and leaves from the roof and gutters to waste before the rest of the rain water is diverted into the storage tank. This will reduce the quantity of suspended solid material in the bottom of the tank which creates food source for the microbiological organisms. 27% of all roof water users have a first flush system installed.

Risk associated with the Groundwater supply is dependent upon the depth and surrounding catchment. The bore that is in use at one of these sites is of an unknown depth and is situated in a neighbouring farm paddock. The risk to this supply would be that the bore is shallow or has an unprotected well head and there could be rain water runoff from the farm land contaminating the supply with microbiological organisms from the stock effluent.

A large proportion of all groundwater sources (96%) in this community are fenced off and isolated from stock contamination.

The surface water supply is also susceptible to the rain events washing the effluent into the streams and into the water supply. This is common with surface water catchments and the site that uses this method for its drinking water has also fitted a water filter and UV system to treat its water prior to use. The filter is used to reduce the dirt and suspended solids before the UV light disinfects the supply protecting the water from microbiological organisms.
Of those who use rain water collection systems, 27% clean their gutters when the gutters get blocked and 55% clean their gutters more often than once a year. The remaining 18% have never cleaned their roof and gutters.

64% of the supplies have some form of treatment or point of use system, leaving the rest with a high risk.

The majority of people with treatment systems maintained them more often than annually, or less than annually but regularly.

7.10.4 Quality and Adequacy of Drinking Water

15% had experienced taste or odour problems with their drinking water. These were usually experienced after heavy rainfall or when the water level in the tank decreased significantly. One person even had new paint from his roof end up in his water supply from a contractor or product error.

44% had not had the quality of their water tested which raises issues to whether or not their treatment system is the correct one for their source water. 76% of the respondents agreed to let the council sample and test the quality of their water.

83% suggested that their water supply provided sufficient good quality water all year round. Reasons water supply was not seen as sufficient or not of good enough quality included: that the water ran out in summer and that there were mineral deposits present, although these owners had installed a filter system to deal with this problem.

7.10.5 Current and Future Demands for Water Supply

Generally there is sufficient water available for this community's needs, given that 83% responded saying that they had enough water throughout the year to meet their needs. With the respondents that source their water from rain collection systems a high percentage of them reported that they experienced water shortages during the drier months with the need to top up their supply with tankered water.

80% of surveyed individuals said that they would not like the council to develop a water supply system in their area. Those unsure stated that it depended on the cost of the system. One in six said they were willing to pay higher rates for a council supply, while the others were unwilling or unsure of whether they wanted to pay for a council water supply.

7.10.6 Options Available to Meet the Demands and their Suitability

Council reticulation into the area could be a feasible option with the installation of a reservoir to allow for the daily demands with areas close to current council supplies. However, there maybe the need to investigate the development of other water treatment plants in these areas to utilise the possible sources in these areas and to help offset the current Water Supplies.

Alternately the rainwater supplies could install another tank to increase their storage capacity and fit a first flush system to reduce the leaf litter and dust entering the system. Also installing a point of use treatment system will offer a greater level of security to the users. Installation costs for treatment would be approximately $2,500 with an annual operating cost of $1,000. Cost for the extra 22,500 litre tank would be $3,000 including installation. A first flush system would be approximately $1,000.

7.10.7 Hauraki District Council's Involvement in Meeting the Demands

The Hauraki District Council will be investigating the practicalities and costs of extending the existing council water supplies and/or the development of new treatment plants into the non-serviced areas during the next reporting period.

With the information gathered from the surveys particular sites will be involved in an education programme raising the awareness of drinking water safety and efficient use the water resource.