7.1 EXTRACTS FROM THE DISTRICT PLAN

Refer Appendix 17 Subdivision and Development Standards – Utility Services: Water Supply and Reticulation

7.2 DESIGN REQUIREMENTS

All new reticulation should be designed to last 50 years, an exception may be granted to this requirement in exceptional circumstances (e.g. in geothermal areas).

The system shall provide sufficient water at fire hydrants to comply with the current Fire Services Code of Practice for the class of development proposed plus the daily average domestic demand or any other demands where those in total exceed one third of the appropriate fire demand. For purely residential subdivisions, this shall be 25 litres per second from each hydrant at a minimum running pressure of ten (10) metres head. For the purposes of preliminary design, it may be generally assumed that water is supplied into the reticulation at a minimum running pressure of thirty (30) metres head under conditions of maximum draw-off excluding any fire demand. This should be verified with the Engineer in peripheral and/or elevated areas.

For other than residential subdivisions and developments, the developer shall meet the appropriate level of protection as specified by the Fire Service.

The system shall be designed to provide a minimum thirty (30) metres head at the property boundary under conditions of maximum draw-off excluding any fire demand. In urban residential areas the following demands should be assumed.

- Average daily requirement per person: 240 litres per head per day
- Average number of people per dwelling: 3.1
- Number of houses per Ha (gross): to be the maximum allowed by zoning, may be assumed to be 15 where unknown.
- Peak flow factor: Four (4) times average daily flow.

Rural, commercial and industrial areas shall be worked out on a case by case basis, subject to the approval of the Engineer.

7.3 ADDITIONAL RETICULATION REQUIREMENTS

The Engineer may require an increase in the size or length of pipes used to meet further reticulation requirements or if the minimum running pressure of thirty (30) metres head is not available or where otherwise required to achieve a satisfactory supply pressure within the proposed reticulation. Where reticulation within a proposed subdivision can be altered to improve flows within the wider water network, the Engineer reserves the right to negotiate with subdivider to cost-share in the cost of extra works.

7.4 GENERAL REQUIREMENTS

A water main fitted with fire hydrants and service connections to the street frontage of each lot is required on one side of all streets. A rider main with service connections to the street frontage to each lot is required on the opposite side of the street. Mains and rider mains are to be laid in the grass berm on the standard alignments specified in the standard drawings.
Reticulation shall be designed to minimise pipework passing under road surfaces. Rider mains shall be looped so as to serve the maximum number of lots with the minimum number of road crossings. In the case of cul-de-sacs, the rider main will continue on standard alignment from the end of the larger main around the head of the cul-de-sac and up the other side of the street.

Should an unreasonable length of rider main with no service connections be involved, the Engineer may agree to extra road crossings being involved. In the case of some routes, eg: dual carriageways, industrial developments, the Engineer may require fire mains to be laid in both sides of the street.

7.5 WATER MAINS

In General all mains shall be uPVC in accordance with (AS/NZS 1477:1996) to PN 12 (Class D). No main on which a fire hydrant is installed shall be of lesser nominal diameter than 100mm.

In certain circumstances the following pipes shall be used as an exception to using uPVC.

HDPE (PE100) and MDPE (PE80B) pipe in accordance with AS/NZ 4130:1997 PN12.5 (Class D) can be used when thrusting. This is generally under carriageways. These may also be considered by the engineer for transfer mains.

mPVC may be considered by the engineer for transfer mains.

Ductile Iron in compliance with AS/NZS 2280:1999 (class k9) or Cement Lined Spiral Welded Steel in compliance with NZS 4442:1998 shall be used when pipe is spanning any length or has to be exposed. The pipes shall also either be wrapped with “Polyken Synergy or YG111” or have an external “Black Jacket” HDPE sleeve applied to it in accordance with AS 1518. They may also be considered by the engineer if the cover is less than the minimum specified. The Ductile Iron when underground can be painted with a bituminous coating and wrapped with a loose polyethylene sleeve to AS 3680:1989. The sleeve shall be applied in accordance with AS 3681.

All uPVC mains shall be laid using (NZS 7648:1987). Pipe joints shall be of the pipe manufacturer’s “z ring type” flexible joint or similar that seals better with increased pressure as approved by the engineer.

Tapping of mains must be done using approved tapping equipment.

All watermains shall be laid with blue metallic watermain detector tape installed 300mm above the top of the main.

7.6 RIDER MAINS

For normal construction works, rider mains shall be of Medium Density Polythylene Pipe (MDPE) (PE80B) PN12.5 (Class D) to NZS 7610:1991.

Rider mains shall be connected to the supply main by means of a tee or tapped elongated gibault in accordance with the Standard Drawings.
Where possible, rider mains shall be fed from both ends by connection to a larger main and the size of rider mains shall be governed by the following table:

### Table 7.1: Criteria for Rider Mains

<table>
<thead>
<tr>
<th>Size of Rider Main (Internal Diameter mm)</th>
<th>Maximum number of services</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single Feed</td>
</tr>
<tr>
<td>1 – 2</td>
<td>25</td>
</tr>
<tr>
<td>3 – 8</td>
<td>50</td>
</tr>
<tr>
<td>9 – 40</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

If, for any reason a rider main is reduced in diameter, the whole of the length of the rider main shall be assessed as if it was fed from one end only.

In these requirements it is assumed that all service connections will be for normal 20mm internal diameter connections to all lots. Where special provision is made for larger supplies then larger rider mains may be required or special connections made to the principal main in the street. Such cases shall be subject to special approval.

All rider mains shall be laid with blue metallic watermain detector tape installed 300mm above the top of the main.

### 7.7 SERVICE PIPES AND CONNECTIONS

Connections may be installed as part of subdivision development onto new mains only. Connections onto existing mains shall be undertaken by an approved contractor only.

Application shall be made to Council for all new connections and for change of use. The property owner or developer requiring the connection will make application to Council for the connection. The District Council will consider the application and advise the applicant of any conditions necessary. The consent and conditions of the consent will be provided to the applicant with a list of approved contractors able to undertake the works. The contractor is not to undertake any works without having received a copy of the letter of consent and consent conditions.

Where service connections are required, the following standard applies:

- Except for special large connection all lots shall be provided with an internal 20mm service connection connected to the main by means of an approved tapping band (or tee on 20mm and 25mm pipes) and an angle ferrule of approved proprietary type.

- The body of rear lots shall be individually serviced by connection to the street frontage with the connection points located off-set from the right of way and boundaries so as to be clear of the vehicle crossing.

- All service connections shall terminate with an Engineer’s approved manifold. Manifolds shall be enclosed in a box in accordance with the Standard Drawings.

- All urban properties greater than 2000m², commercial, industrial and rural connections are required to be metered, a water meter of a type approved by the Engineer shall be included at the connection. Where the meter is of an approved type that is not a manifold
meter a manifold is not required, however a gate valve is required prior to the meter. Metres and valves shall be enclosed in a box in accordance with the Standard Drawings.

- All rural, industrial and urban properties greater than 2000m² and other developments as required by the Engineer shall be provided with an approved backflow preventor. These shall be boxed in accordance with the Standard Drawings. A test certificate shall be provided following installation.

- Where private firemain connections are required developers should contact the Utilities Operations Section of the RDC for advice.

### 7.8 POSITION OF MAINS AND RIDER MAINS

In new subdivisions all water mains shall be laid in accordance with the alignments shown on Standard Drawing RD02. In established areas new watermains shall be laid as close as possible to the standard alignment.

### 7.9 VALVES

Valves in mains shall be cast iron water works pattern sluice valves conforming to BS 5163:1986 NP 16. All valves shall be anti-clockwise closing unless stipulated otherwise. The use of light pattern valves will not be permitted. All valve joints shall be flanged.

All valves shall be enclosed in a surface box set flush with the finished ground surface in such a way that the spindle is not more than 600mm below finished ground level and readily accessible to a standard valve key.

Valves in rider mains shall be either sluice valves as above or gate valves. Gate valves shall be hand wheel operated and enclosed in a surface box flush with the finished ground surface. Gate valves shall have the hand wheel not more than 600mm below the finished ground level. Gate valves shall conform to NZS/BS 5163:1986 Class 150 or higher with non-rising stems.

Valves shall generally be placed on all branches of each tee or cross and shall be sited adjacent to the flanged tee or cross at such other location as may be directed. Valves shall be located clear of the carriageway. The spacing of line valves on principal mains in any street shall not exceed 500m. Where possible, not more than forty (40) consumers on a main or rider main shall be isolated should the supply be shut down for maintenance purposes. Individual branch mains are to be valved at the tee or cross and all sections of interconnecting mains and riders are to be provided with isolation valves at each end. In no case shall more than three valves be required to isolate any section of the reticulation.

### 7.10 HYDRANTS

A main in every street (100mm or greater in diameter) shall be provided with fire hydrants. These shall be clockwise closing the screw-down type and shall be the “tall” pattern and complying with BS 750:1984 or as otherwise approved by the Engineer.

Hydrants shall generally be located at street intersections and near private ways. Hydrants shall be evenly placed between these points so that the maximum spacing does not exceed the requirements of the New Zealand Fire Service Code of Practice for Fire Fighting Water Supplies (135m in most cases). Hydrant locations in the CBD or Commercial areas are
required to have a maximum spacing not exceeding 90m. All urban watermains are required to meet the requirements of the New Zealand Fire Service Code of Practice for Fire Fighting Water Supplies.

In cul-de-sacs or other terminal streets or right of ways, the last hydrant at the end of the supply main shall be not more than half the maximum approved spacing from the head of the street and in no case more than 125 metres from the furthest building site on any allotment when measured along the route of travel.

Hydrants shall be mounted on approved hydrant tees with risers, if necessary, so that the top of the spindle on the valve is between 115mm and 300mm below the finished surface level. A loose lid surface box shall be installed to enclose the hydrant in such a way that a standpipe and key can be fitted and the hydrant operated without obstruction.

Hydrant boxes shall be aligned to show the direction of the main as per WS 02.

7.11 HYDRANT FLOW TEST

Following completion of the pipe test and connection to the main supply, the Subdivider shall provide certification from an independent authority (eg: Fire Service) that each hydrant meets the required minimum flow for 95% of the time.

7.12 AIR RELEASE, DRAINING OF MAINS

At all extreme high points or where excessive amounts of air may be trapped in mains and rider mains, shall be provided with a 20mm air release valve offset to a box above ground as shown on WS16 for the purpose of air release. Scour drains shall be provided at low points for draining purposes and at dead ends where the main is not large enough for a hydrant as approved by the engineer.

7.13 DEPTH OF MAINS AND RIDER MAINS

The minimum depth of mains and rider mains from the finished surface level to the top of the pipe shall be shown in Table 7.2 below:

<table>
<thead>
<tr>
<th>Location</th>
<th>Minimum depth of mains from the finished surface level to top of the pipe (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains under grass berms and footpaths</td>
<td>750</td>
</tr>
<tr>
<td>Under carriageways</td>
<td>900</td>
</tr>
<tr>
<td>Service pipes under grass berms and footpaths</td>
<td>500</td>
</tr>
</tbody>
</table>

NOTE: No service pipe shall be deeper than 500mm nor shallower than 400mm at the property boundary.

7.14 THRUSTING

Unless impractical or unsafe, thrusting shall be required under all carriageways and vehicle crossings; at intersections where there is a large number of existing services; and in areas with any extra-ordinary high quality paving surface.
The minimum depths for thrusting are as follows:

<table>
<thead>
<tr>
<th>Location</th>
<th>Thruster Size</th>
<th>Minimum Depth to Top of Pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under carriageways</td>
<td>All sizes</td>
<td>1 metre</td>
</tr>
<tr>
<td>Under footpaths &amp; verges</td>
<td>House Connections 50mm – 110mm</td>
<td>600mm</td>
</tr>
<tr>
<td></td>
<td>Over 110mm</td>
<td>750mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 metre</td>
</tr>
</tbody>
</table>

Water jetting shall not be permitted in Road Reserve area. A detection wire shall be wrapped around all thrust pipe.

7.15 INDICATION

The policy for hydrant marking shall be in accordance with NZS: 4501:1972, except for the area of the CBD/Government Gardens, which may have special aesthetic requirements. There may also be requirements for raised pavement markers (RPM’s) where deemed appropriate by the Utilities Section of the Rotorua District Council. The policy for marking hydrants and valves is set out below.

Hydrant Marking

- All paint should comply with TNZ M/7-Y for Hydrant marking.
- All paint shall comply with TNZ M/7-W for Isolation/Sluice Valve marking.
- Scour valve box lids shall be painted pacific blue.
- All hydrants are to be marked in accordance with NZS 4501:1972 4.3.1 by an isosceles triangle painted on the road surface (where the road is sealed) adjacent to and pointing in the direction of the hydrant. The triangle is to have a base of 450mm and side of 600mm long, refer to Standard Drawing WS 04.
- All Valves are to be marked by an isosceles triangle painted on the road surface (where the road is sealed) adjacent to and pointing in the direction of the Valve. The triangle is to have a base of 400mm and sides of 450mm, refer to Standard Drawing WS 04.
- Where access to the hydrant may be obstructed, i.e. Parked Vehicles, a circle must be painted around the hydrant in accordance with NZS 4501:1972 4.2.1, 1200mm outside diameter with the line 100mm in width.
- Kerbs are to be marked with paint 450mm wide adjacent to the hydrant location and with paint 250mm wide adjacent to Valve location. No kerb marking is to be carried out on coloured kerbing.
- Painted marker posts are to be located where there is no seal for marking or where there is no kerbing. All rural areas shall require marker posts. They shall also be placed in any situation where hydrants may prove difficult to find. The marker posts are to be set vertically in the ground within 200mm of the street boundary.
- Raised Pavement Markers (RPM’s) are to be used in Mamaku, CBD, industrial areas and by schools to mark the location of the hydrants. The RPM’s are to be located on the hydrant side of the centreline.

In the CBD, Lakefront and Government Gardens – Special Requirements

The following conditions apply for the marking of hydrants and valves in these areas:

- No markings on kerbing or paving.
- All hydrant covers to be painted yellow.
- Valve covers are to be painted white in the road seal and grasses areas only.
- Yellow triangles are to be painted in seal to indicate hydrant location.
- Blue RPM’s to be located at the base of all yellow triangles.
- Where median strips exist, yellow triangle markings and RPM’s will be located in both lanes.
- No white triangles indicating Valve locations on seal in the CBD or Government Gardens.

7.16 PIPE FITTINGS

Pipe fittings such as tees, hydrant tees, tapers, crosses, hydrant risers, caps, plugs and bends shall be as approved by the Operations Engineer, Water in the “Approved Fittings and Materials List” They shall also be to the general requirements of the relevant Standard. All pipe fittings shall comply with the dimensions of the line in which they are to be used. Flanges shall be drilled to BS 4504:1989 Table D.

All fittings for use with uPVC pipe shall be moulded Ductile Iron fittings as produced by the pipe manufacturer to a pressure rating equal to at least that of the pipe used.

In the case of specials, the Engineer may approve fabricated units of welded steel pipe complying with the specification for pipes of like material. All specials shall be of appropriate dimensions for fitting to the pipe line in which they are to be.

Gibaults, tapping bands etc shall be of approved type and material.

All valves, Tees and crosses shall be flange jointed. All bends adjacent to other fittings shall also be flanged. Isolated bends may be rubber ring jointed. Where hydrant Tees are adjacent to other fittings they shall be flanged. Where not adjacent to other fittings they may be rubber ring jointed.

The arrangement of interconnected flanged and flexible jointed fittings is to be the approval of the Engineer.

7.17 SURFACE BOXES

Hydrant boxes shall comply with NZS/BS 750:1984 and shall be Grade A. Hydrant boxes shall be loose lid type, cast iron and mounted on concrete sections supported on a firm foundation in accordance with the Standard Drawings so that no load can transfer to the pipe. Surface boxes shall be set flush with the finished surface level and aligned to show the direction of the main.
Valve boxes shall be surrounded in concrete and mounted over the valve in accordance with the Standard Drawings and aligned to show the direction of the main, i.e. the longer side of the surface box shall be parallel to the main.

7.18 THRUST BLOCKS

Cast-in-situ thrust blocks shall be provided at all bends, sluice valves, tees and crosses. All thrust blocks shall be poured against trimmed natural ground and placed in such a way that access to and removal of bolts on adjacent fittings is unimpaired.

All sluice valves shall be provided with anchorage in accordance with Standard Drawings. Special requirements apply to the anchoring of uPVC lines and subdividers should refer to the manufacturer’s specifications.

7.19 PIPE LAYING

Pipes shall be laid on straight grades or lines or on smooth curves without exceeding the manufacturer’s recommended deflection of the joints or, in the case of polyethylene pipe, the recommended curvature of the barrel.

Where greater deflections are needed, formed bends shall be separated by one full pipe length unless flanged joints are used. A series of flexible joints in close proximity to each other will not be acceptable.

The method of pipe laying and jointing shall be as recommended by the manufacturers for the type and class of pipe in use. All pipes shall be evenly supported over their entire length on suitable bedding material placed before the pipe is laid. Collars shall be placed in appropriate grooves in the bedding material so that the pipe is evenly supported over its full length. The open ends of pipes shall be kept covered to prevent the ingress of foreign matter and all pipes shall be inspected and cleared as laying proceeds.

uPVC pipes shall be laid in conformity with the requirements of NZS 7643:1979.

7.20 BACKFILLING

Cover material placed over each pipe for anchorage during testing shall be evenly spread along the trench length and compacted before backfilling commences.

The backfill material around and to 150mm above the pipe shall be sand or 10mm down well graded gravel with no sharp edges and containing no plastic material.

This initial layer shall be laid evenly along and around the pipe to a minimum of 150mm depth over the pipe and compacted by hand. Backfilling shall proceed in layers not exceeding 150mm depth with each layer being fully compacted as it is placed. Any unsuitable material removed from the trench shall be removed from the site and not used for backfilling. Any settlement of backfill shall be made good until the completed subdivision has been accepted by Council. Backfill in roadways shall conform with the appropriate requirements for roading.

Blue watermain detector tape shall be installed 500mm above the top of the pipe.

Refer to NZS 7643:1979 for the requirements for backfilling of uPVC lines.
7.21 ORDER OF COMMISSIONING

Watermains shall be commissioned in the following order in accordance with 7.22, 7.23, 7.24 and 7.24.

Where house connections are to be installed, they shall be installed first, then the watermain must pass the test as prescribed below. It shall then be “pigged” and disinfected before being connected to the live network.

7.22 TESTING

Once service lines are installed, all new pipe work shall be slowly filled with water to remove all air and allowed to stand for twenty-four (24) hours under a static head of up to the intended working pressure. Any leaks found by visual inspection shall be repaired and the process repeated before testing commences.

a) uPVC Pipelines to be tested shall be less than one kilometre in length and shall not include any air valves. Testing against shut valves is not acceptable unless the open end of the valve can be observed. When the pipeline is ready for a pressure test the Engineer shall be given not less than twenty-four (24) hours notice in advance.

All uPVC pipes shall be tested in accordance with NZS 7643: 1979 the code of Practice for the Installation of Unplasticised PVC Pipe Systems, Clause 9.3 using Procedure B.

The Contractor shall slowly increase the pressure by means of a pump, and an approved pressure gauge (capable of accurately reading pressure changes of 1% of the test).

Test pressure shall be 1½ times the maximum design working pressure of the line under test -

But not less than: 110m head at the highest point along test pipeline

and not more than: Class D – 150m at the lowest point along test pipeline

For uPVC pipelines a successful test will be obtained when a visual inspection shows no evidence of leakage and the pressure drop does not exceed 10 percent of the test pressure after one hour, with allowance being made for pressure loss due to expansion and temperature change. These allowances shall be 4 kPa per hour for expansion and 3.5 kPa per 1°C increase in temperature.

If a test is unsatisfactory the leakage must be found, eliminated and a satisfactory retest obtained before connection to the public supply.

b) Testing of MDPE Pipelines

The selected test pressure for uPVC shall be applied to the test area and this pressure shall be maintained by additional pumping as required for thirty minutes.
The pressure should then be reduced by rapidly bleeding water from the system to a nominal pressure of 300 kPa at the test gauge. Close the bleeding valve.

The pressures shall then be recorded and plotted at the following intervals.

- 0-10 minutes @ 2 minute readings (5 readings)
- 10-30 minutes @ 5 minute readings (4 readings)
- 30-90 minutes @ 10 minute readings (6 readings)

The pressure should be seen to initially rise. After the initial rise the pressure should either continue to rise or plateau due to the visco-elastic response of the MDPE. This shall then be considered a pass.

If after the initial rise in pressure, the pressure falls, then this is indicative of a leak and shall be considered as failed.

MDPE pipelines may be tested together with uPVC. If they meet the requirements as set out above for the testing uPVC pipes the test shall be considered a pass. Should the MDPE pipe fail the uPVC test, the MDPE test described above shall apply.

7.23 PIGGING

Prior to connection to the existing reticulation all mains (50 IDmm or greater) must first be pigged to remove any loose debris.

The pig or swab is to be loaded into the main and forced along at velocities not exceeding 1.5 metres per second. It is envisaged that the mains can be purged through suitable hydrants and the drain valves.

This work shall be repeated until all detritus has been removed from the mains, to the satisfaction of the Engineer. Providing care has been taken to keep the pipe interior clean during laying, one pass along the entire length of the main should be sufficient.

7.24 DISINFECTION

All mains shall be fully disinfected prior to flushing in a manner approved by the Engineer.

Chlorinated solutions used for disinfecting water pipe-lines shall be disposed of in the nearest sewer pipe-line after approval by the Wastewater Authority. Alternatively, the chlorinated solutions, may be disposed of at the Waste Water Treatment Plant septic tank holding tank after obtaining the approval of the Waste Water Treatment Plant Manager. Concentration of chlorine in the solution shall not exceed 30 parts per million at the time of disposal.

The new reticulation shall be thoroughly flushed through a standpipe or other suitable tapping to remove all debris and any remaining chlorinated water. Flows through hydrants shall be measured to ensure that no obstruction remains in the pipelines. Where such obstruction is considered present, the lines shall be dismantled and cleared through fully open ends.

Other alternative disposal methods may be approved in accordance with the “Rotorua District Council Hygiene and Disinfection Code of Practice for Water Supply Pipework” or at the discretion of the Utilities Operations Manager.
7.25 CONNECTION TO EXISTING RETICULATION

After the system has passed the pressure test and been pigged, disinfected and flushed a connection to the existing distribution system can be made. Application for this connection shall be made, and once approved the work shall be done by an approved contractor in accordance with Rotorua District Council’s specifications for connections.