

PART 5: WASTEWATER**500 SCOPE**

This part of the Standards sets out the engineering requirements for the containment and disposal of wastewater drainage associated with land development projects, including performance criteria, methods for design and construction, and material specifications. The standards are set out in two Sections; the first covering the more conventional wastewater systems with the second part covering pressure wastewater collection (PWC) systems and reticulation. The latter is sufficiently different and new to require a different set of wastewater engineering standards.

500.1 Strategic Vision

The strategic vision for Rodney District Council with regard to wastewater is:

To protect public health and to provide an environmentally sustainable wastewater system which produces no objectionable odour, does not overflow and does not adversely impact on receiving waters, including analysis of construction loads.

500.2 Performance Criteria

- Meet all standards and criteria of the District Plan and any Regional Plan.
- Remove domestic and industrial wastewater in design quantities.
- Prevent infiltration and exfiltration.
- Cater for the whole of the design catchment.
- Provide for future development.
- Be compatible with connecting networks.
- Be easily maintained.
- Withstand design loads.
- Minimal odours to be produced from the wastewater systems.
- Be easily understood for resident operation where applicable, specifically with pressure wastewater collection (PWC) systems.
- Have a rapid response maintenance regime that also supports resident/property owner operation for PWC systems.
- Land disposal of treated wastewater via irrigation should be in general accordance with the intents and principles of the current version at the time of AS/NZS 1547: On-site Domestic Wastewater Management.

500.3 Documents Referred to in This Section

- Council District Plan.
- "Tables for the Hydraulic Design of Pipes Sewers and Channels" HR Wallingford and D. Bar.
- AS/NZS4058:2007 - Specification for Precast Concrete Pressure and Non Pressure Pipes.
- AS/NZS 1260:2002 – PVC-U pipes and fittings for drains, waste and vent applications.
- NZS 4442:1988 – Specification for welded steel pipes and fittings for water, sewage and medium pressure gas.
- AS/NZS 4130:2003 Polyethylene (PE) pipes for pressure applications.
- AS/NZS 4131:2003 – Polyethylene (PE) compounds for pressure pipes and fittings.

- AS 2032:1977 – Installation of uPVC pipe systems.
- AS/NZS 2566:1998 – Buried flexible pipelines Part 1: Structural design and Part 2 Installation.
- AS/NZS 3725:2007 – Loads on buried concrete pipes.
- ARC Technical Publication 90 “Erosion and Sediment Control Guidelines for Land Disturbing Activities”.
- ZS 7643:1979 Code of Practise for the installation of unplasticized PVC pipe fittings.
- AS 2033:1980 – Installation of Polyethylene pipe systems.
- Council Trade Waste Bylaw Chapter 17.
- Council Wastewater Drainage Bylaw-Chapter 20.
- Other documents as listed in Schedules of Wastewater Drainage Bylaw-Chapter 20
- Council’s “General Requirements for Private Pumping Stations” Unless otherwise approved, all allotments shall be provided with a connection to a sanitary drainage system.
- Council’s “Minor Sewerage Pumping Stations Code For Construction”.
- Council’s “Build Over or Close To Wastewater or Stormwater Pipeline”.
- Council’s Home Owner’s Manual for PWC Applications.
- NZS1546:1 Standards for Tank Integrity.
- WSA – 007: Wastewater Services Association Pressure Sewerage Code to potentially deal with applications not covered by the Council specific documentation.
- WSA 01-2004: Water Service Association Polyethylene Pipeline Code.
- AS/NZS 3500 (1998) Plumbing and Drainage Standards.
- Appendix P PWC System on property installation works.

PART 5: SECTION 1 – GRAVITY BASED WASTEWATER DRAINAGE SYSTEMS

501 GENERAL

- 501.1** The wastewater drainage system shall be designed to serve the whole of the natural upstream catchment area. However, where part or all of the catchment is serviced or will be served by a trunk wastewater pipeline to be constructed at a later date, the **Engineer** may agree to this area being excluded from the calculation. The flow from all portions of the upper catchment within the regional urban boundary shall be calculated assuming complete urbanisation except for those areas permanently set aside for recreation reserves.
- 501.2** Where further development upstream of the area under consideration is provided for in the District Plan, wastewater pipelines will be designed assuming the maximum upstream development permitted by the planning schemes and the wastewater pipeline shall be constructed to the boundaries of the development.
- 501.3** In cases where substantial costs are likely to be incurred in providing extended wastewater pipelines that will not serve the development under consideration, the Council may contribute towards these costs.

502 CALCULATION OF FLOWS
502.1 Domestic Flows

Domestic wastewater flows shall be calculated on the basis of an Average Dry Weather Flow (ADWF) of 200 litres per day per person, with the population figures based on district planning scheme forecast. A minimum wet weather peak factor of 5 is required.

503 INDUSTRIAL FLOW

503.1 Where the industrial, domestic waste and trade waste flows from a particular industry are known, these shall be used as the basis for the wastewater pipeline design. When the above information is not available, the following may be used as a design basis:

Table 5.1 Industrial Flows

Industry type (water usage)	Minimum design flow (litres/second/hectare)
Light	0.4
Medium	0.7
Heavy	1.3

The above design flows include both normal wastewater and trade wastes.

Note: Trade Waste – All industries are required to comply with the requirements of the Council Trade Waste Bylaw.

503.2 Unless the long term future occupancy of the land is known with certainty, a minimum design flow of 0.6 litres/sec/hectare shall be adopted.

503.3 The design requirements of any development outside of the zoned areas must be approved by the **Engineer**.

504 THE HYDRAULIC DESIGN OF PIPELINES

504.1 The minimum design capacity shall be the peak flow rate (without surcharge) using the “*Colebrook White Formula*”, or using graphs or other representations of the same or similar accepted method.

504.2 A pipe roughness coefficient of $K_s = 1.5\text{mm}$ shall be used.

504.3 Generally all gravity wastewater pipelines shall be nominal 150 mm internal diameter. A 150 mm diameter pipeline at the minimum gradient of 0.72 % has a capacity of fourteen litres per second (14 litres/ sec), equivalent to approximately 300 dwellings or 1200 people.

Connections to individual dwelling sites are generally 100 mm nominal internal diameter

504.4 Generally the minimum design velocity shall be 0.75m/s (minimum gradient of 0.72%) and the maximum design velocity shall be 4.50m/s. The maximum and minimum may be exceeded under extenuating circumstances particularly to avoid pumping, subject to specific design approval. The absolute minimum gradient of a nominal 150 internal diameter pipeline is 0.55%. The **Engineer** may require a check on service velocity if the upstream catchment to a line on this gradient is such as is likely to cause velocities to fall below the specified minimum. Lines at or near the top of catchments should be steeper than 1% to avoid siltation due to low flows and consequential low velocities. Lines at the top of the catchments should be steeper than 1%.

504.5 Pipelines designated as trunk mains shall be subject to specific design. Trunk mains are 200 mm minimum internal diameter or greater.

The trunk main, including manholes and connections for feeder pipelines, shall be subject to specific design and approval.

Particular attention is to be paid to the connection of 150 pipelines into trunk main manholes. Preference wherever practicable is for such connections to be made via internal drops to preclude tail water effects. Where the deviation angle of the incoming 150 to the trunk flow may result in tail water effects, the 150 may be required to be saddled in downstream of the trunk manhole and a satellite manhole placed over the 150 upstream to facilitate maintenance of the 150.

505 LOCATION OF WASTEWATER PIPELINES AND MANHOLE LIDS

- 505.1** In cases where pipelines are laid within the building area on lots, or at such depth that the influence line, defined in the Council “, will affect building foundations, the Council will require Consent Notices pursuant to Resource Management Act 1991 Section 221 prohibiting the erection of buildings within the minimum distances from the pipeline, and requiring specific design of building foundations.
- 505.2** Preference should be given to locating public pipelines in public land. When a pipeline is located within the road reserve the carriageway is to be avoided for longitudinal pipelines. Pipelines shall be kept clear of building platforms and manholes should be located as close to common boundary lines as possible. The piped system shall generally be located in the lowest point of the property.
- 505.3** Where a piped wastewater drainage system is to be provided it shall serve each allotment with a connection point capable of draining the whole of the potential building site of the allotment. A minimum elevation drop between potential floor level and one metre at the point of connection on the principal pipeline is to be provided to ensure against backflow effects in the event of blockage.
- 505.4** Pipelines shall be sited as not to have other utility services or extensive networks of private drainage laid parallel to and above them. A minimum corridor of one metre must be allowed to permit ongoing clear physical access to the buried lines.
- 505.5** A piped system shall consist of pipelines of a minimum nominal diameter of 150mm and shall be laid straight horizontally and to a constant grade vertically (90% visible bore) between manholes located at each change in grade and direction.
- 505.6** Pipelines shall cross roadways as near to right angles as possible to the centre line of the road with a minimum cover of 1200mm.
- 505.7** For medium and high density developments and for commercial / industrial areas, the wastewater pipeline system may be required to be located in the road reserve as shown in 18000. 3.31. Where the pipeline has to be located away from the road reserve it may be required to be located in a defined services corridor which is kept clear of buildings and obstructions. The corridor shall be defined on title and shall be of a minimum width defined in Appendix P of these standards
- 505.8** Manholes shall be a minimum of 500 mm from outside wall clear of any boundary or fenceline to ensure practicable access to the cover and frame.

506 WASTEWATER PIPE MATERIALS

- 506.1** The following pipe materials may be used for gravity wastewater drainage provided they comply with the relevant ANZ standard specification. Rising mains from pump stations and siphons shall be subject to specific design in respect of pipe material and joint design and construction.
- (a) Rubber ring jointed concrete pipes to AS/NZS 4058 with or without sacrificial lining as directed by the **Engineer**.
 - (b) PVC plain wall elastomeric seal jointed (unplasticised or modified) to ANZS 1260:2002 and having a stiffness rating of SN 16.
 - (c) Concrete lined spiral welded mild steel to NZS 4442: 1988 Coating appropriate to environment.

(d) Polyethylene minimum SDR 17 to ANZS 4130:2003 manufactured from materials complying with ANZS 4131:2003 PE 80B. These pipes are for trenchless methods of installation only. They are not permitted to be used in trenched construction without prior approval of the **Engineer**.

- 506.2** In potentially unstable ground or where special protection is required, the wastewater pipelines shall be specifically designed.
- 506.3** Steel pipes shall conform to NZS 4442 and shall have a wall thickness of 4.2mm for 150mm nominal id pipe. Pipes shall be wrapped in black or blue jacket polyethylene (for in ground use) or epoxy/enamel coated (for out of ground use) or wrapped with Denso Petrolatum System (or similar approved protection system) should ground conditions require.
- 506.4** All bolted systems and exposed surfaces shall also be wrapped with Denso Petrolatum System.
- 506.5** Pipe sizes shall conform to Council Standards.
- 506.6** Asbestos cement pipes shall not be used.
- 506.7** Pipes used in approved trenchless application shall be polyethylene complying with section 506.1 (d) above. All joints shall be made by a computer controlled butt welding process carried out by a certificated operator. The internal bead formed in the welding process shall be removed prior to final installation. Refer to Appendix "M", Council's "PE Welding Standards".

507 JOINTS

- 507.1** All pipes except polyethylene shall have flexible joints of an approved type and complying with the relevant New Zealand or Australian Standard. Steel pipes may be either flange jointed or flexible (gibault or approved rubber ring). Gibault joints shall be long barrelled of approved manufacture, and shall have galvanised steel bolts. All gibault or flanged joints shall be wrapped or taped with rust preventative materials.
- 507.2** Other methods of flexible jointing shall be to the specific approval of the **Engineer**.
- 507.3** Manhole shorts to provide a flexible joint shall be provided at all manholes for concrete, PVC, and steel pipelines. In the case of polyethylene pipelines a sliding joint shall be provided at the downstream manhole and a puddle flange fusion welded to the pipeline shall be cast into the upstream manhole base. These joints shall be not more than one metre from the external wall of the manhole.
- 507.4** PVC (uPVC and mPVC) pipe shall be laid with a sliding joint to the manhole.
- 507.5** A range of approved jointing method for Polyethylene pipes are shown.
- 507.6** Mortar joints and solvent glue joints shall not be used.
- 507.7** Joints and repairs to existing lines shall be made with approved shear band couplers. Stainless steel components shall be 316 Grade.
- 507.8** Where polyethylene pipes are butt welded, welding to be carried out by a certified welder, and the testing procedure to be as per Council's PE Welding Standards. Refer to Appendix "M".

508 POLYETHYLENE PIPE WELDING

- 508.1** The **Engineer** must approve the test weld results before commencement of further welding or any pipe installation can occur. Acceptance or rejection of the weld test results will be available within 3 working days of the results being given to the **Engineer**.
- 508.2** Polyethylene pipes must be jointed to the manufacturer's recommendations, in compliance with NZS/AS 4131 and as specified below.
- 508.3** Butt-fusion welding is the primary methodology and must be used to join polyethylene pipes. In some situations the **Engineer** will approve/allow the Contractor to use Electrofusion welding to join polyethylene pipes. The Contractor must have the **Engineer's** approval before using Electrofusion welding.

- 508.4** Only automatic or semi-automatic butt-welding machines will be acceptable for polyethylene welding. Manually operated welding machines are not permitted. All butt welds must be performed by equipment that is specifically designed for welding a range of pipe sizes.
- 508.5** Experienced and suitably qualified personnel must undertake the welding procedure. It is required that the pipe welder will have a recognised PE welding certificate from Unitec or an equivalent. A copy of the certificate is to be provided to the **Engineer** before any welds are made.
- 508.6** Weld test, Quality Assurance and acceptance shall be carried out in accordance with Council PE Welding Standards. Refer to Appendix "M".
- 509 STRUCTURAL STRENGTH OF PIPES AND BEDDING**
- 509.1** Pipe bedding will be designed to meet the requirements of the class of pipe used under the design loading condition including construction loads. The **Engineer** may require copies of pipeline design to be provided with the engineering drawings and form part of the contract documentation.
- 509.2** The class of bedding for concrete pipes will generally be H2 as per NZS 3725. The pipe class shall be computed using this bedding class unless specifically approved in writing at the time of Engineering Plan approval by the **Engineer**.
- 509.3** The installation of PVC pipes shall be in accordance with the requirements of ANZS 2566 parts 1 and 2. Depth of bedding and surround materials must be in accordance with the Council Drawing Number 18000 Sheet 4.4.
- 509.4** PVC pipes shall be bedded in, and covered by a minimum 100mm of, compacted approved granular bedding as per Council Drawing Number 18000 Sheet 4.4.
- 509.5** Under normal ground conditions, wastewater pipelines shall be bedded with fine granular material as in relevant standard except that in lieu of the construction of a specified depth of selected compact fill, the granular material may be haunched up to a height level with the mid height of the external diameter of the pipeline.
- 509.6** Where the gradient of the wastewater pipeline is steeper than 10%, or where, in the opinion of the **Engineer**, conditions merit the need, sufficient cement shall be added to the granular bedding material to provide a weak concrete with a strength of not less than 7 MPa.
- 509.7** Pipeline gradients greater than 20% shall not be used except with the approval of the **Engineer**, and then subject to the provision of anti-scour blocks located at 4m intervals constructed in accordance with the Council Drawing Number 18000 Sheet 4.3.
- 509.8** Pipeline gradients steeper than 33% for any length greater than 3m will only be permitted with the specific approval of the **Engineer**.
- 509.9** The trench width at the top of the pipe shall be kept to the minimums for the respective pipe material. Trench widths in excess of this minimum shall result in the pipe being deemed to be laid in embankment condition which will impact on the pipe class and bedding. In extreme circumstances this will result in the pipe being re-laid in the class appropriate to the bedding condition.
- 510 SOFT GROUND CONDITIONS**
- 510.1** Where a pipeline is to be laid in soft ground the **Engineer** may require a geotechnical analysis of the site to determine the most appropriate bedding design and backfill material and process. Any such requirements shall be strictly adhered to and the **Developer's Representative** shall be required to confirm this in writing to the **Engineer**.
- 510.2** Alternatively, such other means of providing a satisfactory foundation and support for the pipeline, as may be approved by the **Engineer**, shall be adopted. (Refer to Council Drawing Number 18000 Sheet 4.4, 4.4A & 4.5).
- 511 TRENCHLESS INSTALLATION OF PIPES**
- 511.1** These include guided boring, directional drilling, impact moling and ramming, pipe-jacking and micro tunnelling.

- 511.2** The only pipe materials approved for use in this methodology are polyethylene and reinforced concrete. The method of constructing pipe joints must be approved by the **Engineer**.
- 511.3** Diameters of thrusts and horizontal bores shall be as close as possible to the outside diameter of the pipe. If the thrust or horizontal bore diameter excessively exceeds the diameter of the pipe, the cavity around the pipe shall be filled with a sand and cement slurry.
- 511.4** Where trenchless installations will pass under the drip line of specified trees an arborist's report on the installation may be required to ensure that the design cover over the pipe within the drip line will not injure the tree. Any conditions from the report or consequential resource consent must be strictly adhered to.
- 511.5** Deviation from gradients is not acceptable. Deviations from horizontal alignment are permitted on the following basis:
- pipe diameter not exceeding 250 DE deviation 1.5D
 - pipe diameter not exceeding 400 DE deviation 1.0D
 - pipe diameter not exceeding 600 DE deviation 0.75D

Where it is found that the line has deviated from the design gradient the **Engineer** shall request a CCTV analysis of the pipeline to include assessment of vertical deviation and an assessment of the suitability of the pipeline for the purpose. If it is found that the line is not suitable for the purpose by virtue of requiring more extensive maintenance than otherwise would be the case the **Developer's Representative** may either remedy the fault or pay the cost of additional maintenance assessed over the life cycle of the pipeline to Council.

- 511.6** In general these methods will be acceptable for covers of one metre or greater for pipe diameters up to 300 DE. For pipe diameters larger than 300 DE or covers less than one metre specific design and construction controls may be necessary to ensure against damage to surface features and structures.

512 PIPELINE CONSTRUCTION

- 512.1** All pipes shall be designed for load bearing capacity in relation to their installation condition in accordance with AS2566: 1982 "Plastic Pipe Laying Design".
- 512.2** All pipes shall be bedded and haunched in accordance with Council Drawing No. 18000 sheet 4.4, & 4.5. The bedding material shall be SAP 7 for flexible pipelines and GAP 20 for concrete pipelines.
- 512.3** Construction with Polyethylene pipelines shall be carried out in accordance with AS 2033 and AS/NZS 2566.
- 512.4** Construction of PVC pipelines shall be carried out in accordance with AS 2032 and AS/NZS 2566.
- 512.5** Trenched pipelines under carriageways, private ways, or other trafficked areas shall be backfilled with approved compacted hardfill to subgrade level.
- 512.6** The maximum deviation from the specified line and level shall be 20mm for pipelines laid in trench.

513 MINIMUM COVER OVER PIPES

513.1 Private Property

- 513.2** The minimum cover over flexible pipelines in private property shall be 600 mm. The **Developer's Representative** is to confirm that the pipe class and bedding class is appropriate for all design loads likely to be imposed during and post construction.
- 513.3** Where the reticulation pipelines are laid in the front yard of lots and the lots are elevated above the carriageway the minimum cover on the pipelines shall be 1200 mm to avoid damage when building platforms and/or driveways are subsequently excavated.

513.4 Under Carriageways

513.4.1 Pipelines in carriageways shall be specifically designed. Where pipelines cross carriageways and where cover is determined as being minimal, i.e. less than 900mm, then the pipeline may be required to be laid inside a reinforced concrete pipe designed in accordance with NZS 3725 with H2 bedding.

514 MANHOLES

514.1 General

Manholes shall normally be provided at each change of direction or gradient, at each change of pipeline diameter, and at each branching wastewater pipeline and at a spacing of not more than 100m. Manholes will generally be pre-cast concrete. New connections to manholes shall be effected by the use of power drills or saws. The practice of smashing holes in the liner using hammers is prohibited. All entry points shall be kept to a minimum diameter to accommodate the incoming manhole short and all holes shall be restored using epoxy mortar not ordinary sand cement mortar.

Note that manholes on trunk mains are not considered standard as described above and will be subject to specific design considerations such as :

- a) trunk pipeline diameter;
- b) deviation angle through manhole or trunk pipeline;
- c) number of feeder pipes connecting either at or near soffit level of the trunk pipeline or by way of internal drop;
- d) connection of rising main into trunk pipeline or near proximity of siphon or pump station.

Any or all of these criteria may require the use of a larger diameter manhole to ensure best hydraulic efficiency and maintenance facility.

514.2 Standard Manholes

514.2.1 Standard Manholes shall be constructed from minimum Class 1 concrete pipes, 1050 internal diameter, complying with ANZS 4058 with externally flanged pre-cast bases. Provision is to be made for step irons and holding clamps at joints. Manholes up to 2700 depth to invert shall be constructed using a single riser and precast base. Manholes deeper than 2700 and less than 4000 shall be constructed using a 2400 riser with pre-cast base and a further single riser to finished ground level. Refer to Council Drawing Number 18000 Sheet 5.4. The throat shall be formed to the maximum tolerances shown on Sheet 5.4 using Formathroat or similar, the use of pre cast rings is prohibited.

514.2.2 **Note that manholes on trunk mains are not considered standard as described above and will be subject to specific design considerations such as:**

- Trunk pipeline diameter
- Deviation angle through manhole of trunk pipeline
- Number of feeder pipes connecting either at or near soffit level of the trunk pipeline or by way of internal drop
- Connection of rising main into trunk pipeline or near proximity of syphon or pump station

Any or all of these criteria may require the use of a larger diameter manhole to ensure best hydraulic efficiency and maintenance facility.

514.2.3 Wastewater drainage manholes shall be epoxy mortared on both sides. A rubber/bitumen sealing strip shall be applied between the concrete faces. The joint between the wall and concrete lid shall be sealed with Bostick Titan Seal or equivalent as approved by the **Engineer** based on manufacturer's recommendation. The mixing and application of the epoxy mortar shall be in conformity with the manufacturer's directions to provide a watertight and rootproof structure to the satisfaction of the **Engineer**.

514.2.4 Cast in-situ bases shall only be used on specific approval from the **Engineer**. Where an in-situ concrete base is used, the manhole must penetrate a minimum of 75mm into the wet concrete. The

concrete shall be mechanically vibrated around the precast riser. The riser shall be supported on a minimum of 3 concrete spacers at a minimum height of 100mm.

514.2.5 Lids shall be pre-cast concrete with 600 openings to accept approved ductile iron covers and frames appropriate for their location. This shall be mandatory post 1 April 2009 and on a voluntary basis prior to that date for standard 1050 manholes.

514.2.6 Manholes with depths to invert greater than 750 mm and less than 1200 m shall be constructed using a centrally placed opening rather than the offset version.

514.3 Deep Manholes

514.3.1 Any manhole in excess of 4000mm deep shall require specific approval of the **Engineer**. All such manholes shall be a minimum of 1200mm diameter, fitted with step irons and holding clamps, and 600mm opening lids, ductile iron covers and frames. The cover may be required to be fitted with an approved locking device. The opening shall be fitted with an approved safety curtain which may be removed prior to entry into the manhole. This shall be fitted with approved 316 10 mm pin anchors with chemical set into the concrete lid not the haunching. The benching shall be so arranged as to permit easy access off the bottom step and into the invert of the pipe by maintenance staff. Where the diameter of the outgoing pipeline exceeds 450mm diameter steps and hand-holds may be required to be provided to access the invert of the pipe.

514.4 Mini Manholes

514.4.1 Where the depth to invert of the wastewater pipeline line does not exceed 600mm, the upstream grade does not exceed 10% and not more than two lines or connections enter the manhole (i.e. three including the discharge) the **Engineer** may approve of the use of mini-manholes.

514.4.2 Mini-manholes shall be constructed from Class 1 600mm dia pipes complying with ANZS 4058, flush joint with the socket uppermost. The cast iron cover and frame shall be carefully epoxied into the socket. The invert of the manhole shall be fully benched as per standard manholes.

514.4.4 Subject to approval by the **Engineer** the following Inspection Chambers may also be allowed. Other non man-entry access points manufactured from PVC, polyethylene and polypropylene will be approved but not for use in public carriageways, trafficked areas or in kerbside footpaths.

Plastics Shallow/Multi-base Inspection Chambers conforming to BS 7158:1989 and BS EN 124:1994 may be used on DN 100 and DN 150 drains at invert depths of up to 0.6m

Plastics Universal Inspection Chambers conforming to BS 7158:1989 and BS EN 124:1994 may be used on DN 100 and DN 150 drains at invert depths of up to 1.0m.

514.4.5 Note, where mini-manholes are permitted they must be adequately anchored to avoid flotation.

514.5 Manhole Covers and Frames

514.5.1 Standard manhole covers and frames shall be a nominal 510mm opening and shall be of a design approved by the **Engineer**, manufactured from a strong and durable material. Typical examples of heavy duty and light duty cover supplied in high quality grey iron, coated with a bituminous protective compound are illustrated in Council Drawing Number 18000 Sheet 5.4. Heavy duty lids and frames are to be used in all trafficked areas, including driveways. Lids shall not rock.

From 1 April 2009 the lid opening shall be a minimum of 600 mm and the cover and frame shall be an approved ductile iron model. There will be restrictions on the variety of covers and frames to facilitate maintenance and logistic requirements for the network operator.

514.5.2 Where a 600mm opening is required the cover and frame shall be approved by the **Engineer**.

514.5.3 The throats of all manholes shall be painted red with a suitable paving paint. The cover can remain unpainted.

514.6 Drop Connections

- 514.6.1** Internal drop connections shall generally be used. In new manholes the internal diameter shall be increased by 150mm for each drop connection installed. See Council Drawing 18000 sheet 5.3.
- 514.6.2** A maximum of 2 drop connections will be permitted per manhole.
- 514.6.3** The number of drop connections retrofitted to existing manholes is limited to one.

514.7 Manholes in Soft Ground

- 514.7.1** Where a manhole is to be constructed in soft ground, the area under the manhole shall be undercut down to firm ground (minimum depth 300mm) and backfilled with suitable hardfill to provide an adequate foundation for the manhole bases.

Where the trench subgrade proves to be particularly difficult the Engineer may require specialist advice from a geotechnical engineer on the most appropriate means of excavation, trench support and backfill procedures and materials. Additional measures may be needed for smaller diameter pipes in respect of the provision of flexible joints in such situations. The use of a rocker type joint at the manhole may be called for.

514.8 Minimum Drop

- 514.8.1** In addition to the normal pipeline gradient all manholes shall have a minimum drop of 20+ 5mm per 10° of the angle of change of flow within the manhole. Manholes on pipelines greater than 1m diameter shall have the drop through the manhole designed to compensate for the energy lost due to the flow through the manhole at the design radius.
- 514.8.2** Specific design may be required for situations where pipe velocities are high and where manhole depths are relatively shallow.

515 CONNECTIONS

- 515.1** Each lot on the development shall be provided with a gravity wastewater connection at the lowest point of and within the main body of the lot at such a level as to provide a minimum elevation difference of one metre between projected floor level and the invert of the private drain at the point of connection to the principal pipe. The connection must be capable of serving the whole of the building platform site. Where the connection is inside the body of the lot to be served the distinction between private and public line shall be the inspection at the end of the ramped riser. Where the connection to the principal pipeline is outside the body of the lot the whole length of connecting pipeline is deemed public and shall be laid in SN 16 uPVC pipe.

- 515.2** A connection is defined as being a 100 nominal dia pipeline:

- (a) Not more than six metres long
- (b) Passing not more than five metres through an adjacent lot measured from the point of connection on the main pipeline
- (c) Terminating one metre inside the boundary of the lot to be served
- (d) At a maximum depth not greater than 1200 mm and a minimum depth not less than one metre
- (e) Serves one household lot only

- 515.3** Where a connection exceeds any of the above requirements it must originate from a manhole and be laid in nominal 150 dia pipe.

- 515.4** Where the connection is taken through an adjacent lot it shall be deemed public line and shall be laid in SN 16 uPVC pipe in accordance with AS/NZS 1260.

- 515.5** Dwellings in medium and high density residential developments and one into two lot infill developments may be served by a single 100 dia connection on a dry chamber with a maximum of two dwellings per dry chamber.

- 515.6** Connections shall generally be made to manholes.
- 515.7** Each commercial industrial allotment shall be served by a 100 dia connection unless given prior approval for a trade waste discharge requiring a larger diameter connection pipe. Where the latter applies it shall be a direct connection to a manhole not an on-line connection.
- 515.8** All connections shall be extended to within finished ground surface level as set out in section 515.2 (d) using a ramped riser.
- 515.9** Connections to main line shall be permitted only where the crown of the main pipeline is not deeper than 2500 mm.
- 515.10** Connections shall terminate with a screw on blank cap. The use of solvent welded caps is prohibited. Connections shall be marked with a 25 mm pvc duct painted red and projecting 600 mm above ground level. The end of the duct shall be sited over the blank cap.
- 515.11** The position of the blank cap shall be fixed by survey by a Registered Surveyor and he/she shall provide a certificate to the Council that the caps are one metre inside the main body of the lot in accordance with section 515.2 (c).
- 515.12** Connections from sites served by private pump stations shall be made to manholes or where this is not practicable to a standard on line Wye or London connection via an approved chamber. Direct on line connections are not permitted.
- The manhole connection should preferably be made using an internal drop as detailed on Council Drawing 18000 5.3 modified by use of a level invert of appropriate diameter in allow connection of the incoming rising main.
- Where the connection is to a dry chamber the level invert shall be sited upstream of the inspection cap.
- 516 RAMPED RISERS**
- 516.1** Unless required otherwise by the **Engineer**, a ramped riser shall be constructed to allow the connections to be brought up to ground level.
- 516.2** Ramped risers shall be constructed as shown in Council Drawing Number 18000 Sheet 5.5.
- 516.3** Where an extended connection is to be taken from a pipeline to the boundary of another lot a ramped riser need not be used, and the extended connection may be sloped up at the continuous gradient from the principal pipeline to terminate at least one metre inside the lot to be served, at a minimum depth of one metre or sufficient depth to drain the whole of the building site.
- 517 CONNECTIONS TO DEEP LINES**
- 517.1** Where an existing or proposed wastewater pipeline is more than 5m deep to the top of the pipe, connections shall not be made directly to it, but a new shallower branch pipeline shall be laid from a manhole on the deep pipeline and connections provided to the lots to be served.
- 518 TESTING**
- 518.1** All wastewater manholes, principal and branch pipelines, including extended connections, shall be cleansed and flushed prior to acceptance testing and inspection. On completion of all other engineering works within the development and on production of a certified As-built plan refer Section 103.19 there shall be a series of inspections and tests on all pipelines as follows:
- Closed circuit television inspection using pan and tilt equipment to check connections and branch lines.
 - All manhole to manhole pipelines lamped for trueness of bore.
 - A leakage test as determined by the **Engineer** and appropriate for the pipe material installed.
 - For pipelines constructed by trenchless methods the **Engineer** may require particular testing. The type and extent of this will be determined at the time of engineering plan approval.
 - In the case of flexible pipelines the **Engineer** may require a proof of compliance with deflection as set out in AS/NZS 2566.2:2002 Buried flexible pipelines Part 2: Installation.

- 518.2** All pipelines 150mm and greater internal diameter shall be inspected internally with CCTV using pan and tilt cameras and results recorded on DVD. This shall be done in accordance with the current version of NZ Pipe Inspection Manual. A copy of the DVD is to be provided to Council along with the as-builts in accordance with Council's requirements. Pipelines of 1200mm and greater internal diameter may be inspected manually, at the discretion of the **Engineer**.
- 518.3** No visible infiltration through manhole roof, walls or floors will be permitted. The total infiltration in any portion of a wastewater drainage system shall not exceed a rate of 600ml per 25mm of pipe diameter per 1,000m of pipe in 5 minutes
- 519 PUMPING STATIONS**
- 519.1** The pumping of wastewater shall be permitted only when gravity options are not feasible. Pumping of wastewater shall require the specific approval of the Water Services Manager.
- 519.2** The station is to be located on land that is vested in Council and with reasonable vehicle access to a public road formed and provided by the **Developer**.
- 519.3** The type of pumping station shall be a wet well containing submersible pumps where the electric motor's maximum output power is less than 30kW and the rising main does not exceed 150mm diameter.
- 519.4** The size of the subdivision served by the pumping station would be less than or equal to 300 lots.
- 519.5** The pumping rate is to be between 3/s and 50/s
- 519.6 General requirements**
- 519.6.1** The pumping station is to be fully automatic and shall have provision for remote monitoring by telemetry. Plant and equipment shall be capable of operating between the manufacturer's recommended service intervals without attention or inspection. An operating Manual to current Council standard is to be provided with any new Pump Station facility.
- 519.6.2** The station is to be located such that wastewater flooding does not occur at or upstream of the pumping station during plant or power failure. Emergency storage should be provided. A minimum emergency storage of four hours for average dry weather flow is required. This will be evaluated on case by case and must be discussed with the **Engineer** and shall require specific approval (also see 519.6.4). Emergency overflow pipes can be laid to the storage tank.
- 519.6.3** New pump stations shall be provided with:
- (a) A standard 1800mm high three rail wooden perimeter fence or approved alternative.
 - (b) A 2500mm wide concrete driveway, 200 mm thick with one layer 665 mesh.
 - (c) Water connection, tap and back flow preventer.
 - (d) Power supply.
 - (e) Separately titled lot.
 - (f) Where the length of the accessway exceeds fifty metres a turning area shall be provided by the wet well to allow movement on and off the site by service vehicles including pump-out trucks.
 - (g) The wet well shall be provided with a suitable lifting arm for servicing the pumps.
 - (h) Lighting to illuminate the wet well covers and control cabinet.
 - (i) Suitable low maintenance landscaping around the wet well area.
 - (j) Walls wash down facility.
 - (k) Approved odour control facility.
- 519.6.4** The location, site layout, emergency overflow, wet well, valve chamber, access, pump and motors, electrical, telemetry and maintenance schedule must be discussed with the Water Services Manager

and shall require specific approval of and comply with specific requirements as provided by Rodney District Council.

- 519.6.5** Require location of new pump stations in areas where any overflow will be directed to land, where possible, so that potential for the discharge to enter natural water is minimised.

520 RISING MAINS

- 520.1** The location, route, position of valves and air valves, meter (and telemetry) and maintenance schedule of rising mains must be discussed with the Water Services Manager and shall require specific approval of and comply with specific requirements as provided by Rodney District Council. Rising mains shall meet the requirements as set out in AS 2032. Rising mains in private property shall be sited clear of building sites.

- 520.2** Rising mains should be a minimum of 100mm diameter and pumps shall be sized such that the minimum velocity during the pumping cycle is 1.0 m/sec.

521 PRIVATE PUMP STATIONS

- 521.1** Typically private pump stations are only permitted in exceptional conditions where it is not possible to obtain a gravity connection to the Council wastewater drainage network within the prescribed distance under the Local Government Act. Attention is drawn to the minimum floor level requirements for gravity connections set out in the definitions to these standards. Where the defined minimum floor level cannot be achieved the site is to be pumped.

The general requirement for a private pump station is one per individual property.

521.2 Alternatives

Private pumping stations are not to be confused with Pressure Wastewater Collection (PWC) systems which are covered in Part 5 Section 2 of these Engineering Standards. An approved PWC product (on-site grinder pump installation) may be used outside a designated PWC reticulated area as a private pump station.

521.3 General Requirements for Private Pumping Stations

The volume of emergency storage above the alarm level shall be a minimum of 1,000 litres for a household unit containing no more than four bedrooms. (This allows for approximately 24 hours storage in emergency.)

- An approved high water level alarm shall be fitted. (A red light located in the kitchen is an approved alarm). The alarm is to activate when the water level in the pump chamber exceeds the pump start level by 25mm.
- Generally one submersible pump is required for pump stations serving one household unit, and two pumps (duty and standby) in one pump chamber for stations serving commercial premises.
- Levels of the pump station, the sewer to which it is to pump, the pump specifications and the pump characteristics (capacity v's lift) are required with the permit application.
- The pump station is to be built to ensure that no stormwater enters, either through the wall or the roof and lid. The lid is to be a minimum of 100mm above the ground level, and the surrounding ground graded away from the station.
- If a gravity connection is at any time in the future made available the owner will be required to connect to that connection at their expense.
- The property owner shall enter into a contract with an appropriate service provider who shall be responsible for maintenance of the pump station on a minimum six monthly basis or in accordance with manufacturer's recommendations. All maintenance records shall be kept on the site and made available for Council inspection as required.

521.4 Specification for a Private Pump Station, (other than an Approved PWC Product), permit application and information required must comply with Council's "General Requirements for Private Pumping Stations". Refer to Appendix "O".

522–528 NOT USED