7. WASTEWATER RETICULATION AND ON-SITE TREATMENT

7.1 General

This section covers the Kaipara District Council requirements for the design and construction of wastewater reticulation, on-site treatment and associated structures.

Wastewater reticulation, including pump stations and rising mains and the connection of domestic and trade waste flows shall comply with Council's Wastewater Drainage Policy and Bylaw March 2009 and Council's particular requirements for each wastewater system. The Council is responsible for the strategic planning of the District's wastewater systems.

Design and construction should be in accordance in NZS4404:2010: Part 5 and the following standards and guidelines.

Design and Quality Assurance shall comply with Sections 1 to 3 of these standards and shall aim to minimise operation and maintenance cost.

All stormwater and groundwater shall be excluded from the reticulation system.

Connection of new reticulation to the existing KDC public reticulation shall only be carried out by KDC approved contractors at the land developer's cost. Connection of existing houses shall not be made until the private drainage system has passed a pressure test and all stormwater infiltration has been excluded.

7.1.1 Council Systems

Council operates wastewater reticulation and treatment systems in the following areas:

- Mangawhai
- Kaiwaka
- Maungaturoto
- Dargaville
- Te Kopuru
- Glinks Gully

Generally within these catchments all domestic wastewater shall discharge to the public reticulation.

The following requirements shall be met:

(a) Where subdivision or land development is within the area served by a Council system or an extension to a Council system is proposed, the written approval of Council's Asset Manager shall be obtained and provided with the application to confirm that the Council sewerage system can be extended to serve the subdivision or development. The Council is responsible for the assessment and approval of the Developer's detailed design of proposed extensions to the sewerage system.

Council will advise the Developer's designer of any limitations that may exist to the number of sections, peak flows or timing of flows that may exist.

If the existing network does not have sufficient capacity at the nominated connection location to receive the number of sections or peak flows from the development, the Developer will either need to:

- Design and construct an appropriately sized attenuating storage to reduce peak flows to level compatible with the network.
- Convey sewage to a different location in the network where adequate capacity exists.
- Pay for the required upgrade to the system.

(b) The Resource Consent application shall include a contoured concept plan showing current and future potential development proposals and proposed staging.

(c) Following the granting of the Resource Consent the Developer shall contact Council to obtain information on flow estimation methodology, discharge point and requirement for integrating the proposed new work into the existing system.

(d) The Developer shall undertake the design and construction of the proposed extension to the sewerage system using the services of a CPEng experienced in wastewater engineering, who will certify that the design and construction is in accordance with the standards.

7.1.2 Vesting and Easements

The following requirements shall be met:

(a) All wastewater pipelines, pump stations and rising mains serving more than five single dwelling units shall be vested with Council unless a management entity to own operate and maintain the system has been Approved by Council.

(b) Wastewater systems to be vested with Council that are not contained within roads shall be within reserves vested with Council or easements in gross in favour of Council. The minimum width of the land to vest or easement shall be 3.0m.

(c) Where a private sewer crosses a neighbouring property or properties, an easement shall be provided in favour of the servient lot.

(d) All sewage pump stations servicing more than one property shall be on their own separate lot and vested in Council or, where a management entity has been Approved by Council to serve a number of lots, a separate lot owned by the management entity.

7.2 Design Criteria

7.2.1 Design Flows

The following requirements shall be met:

(a) Domestic wastewater flows shall be calculated in accordance with NZS4404:2010 clause 5.3.5, domestic wastewater flows for reticulated wastewater systems on the following basis:

i. Average Dry Weather Flows – 210 litres / day / person

ii. Number of Persons per Household Equivalent – 4.

(b) Industrial flow and Trade Waste shall be calculated as follows:

i. When the industrial waste and Trade Waste from a particular industry are known, these shall be used for the sewer design;

ii. When this information is not available, the dry weather flow rates shown in Table 7.1 may be used as a design basis for industrial area.

Table 7.1: Default dry weather flows from industrial areas

Minimum Design Flow	Flow Rates (l/s/ha)
Light Water Usage	0.4
Medium Water Usage	0.7
Heavy Water Usage	1.3

Guidance Notes:

1. *For the purposes of treatment and disposal system design these commercial and industrial flows shall be taken to occur for ten hours per day. The design shall take note of any factory with a production cycle more than ten hours.*
2. *For domestic occupancies peak design (wet weather) flow rates shall be advised to the designers by KDC based on site specific circumstances. For non-domestic occupancies peak factors shall be determined by the designers based on site specific assessment.*
3. *Dry weather peak flow should be taken to be 2.0 times average daily dry weather flow. This can be reduced for larger catchments where it can be demonstrated that, because of flow routing effects, these peak flows are not possible.*

7.3 Reticulated (Gravity) Sewerage Systems

The requirements of clauses 7.3.1 to 7.3.7 shall be met in the design and construction of reticulated gravity sewerage systems connected to a Council wastewater system and/or vested with Council:

7.3.1 Reticulation Layout

(a) Wastewater reticulation shall be located within Council Roads and private ways unless it can be demonstrated that this is not possible. Any deviation from this alignment will require approval from the Development Manager.

(b) Where practicable, reticulation shall be located in the Road berms. Where the reticulation lines are located in the front yard of lots, the invert level of the sewer pipes shall be deep enough so as not to interfere with any future driveway construction.

(c) New public sewers shall be located at least 1.5m clear of existing buildings plus any additional setback specified in clause 8.2 of Council's Wastewater Drainage Bylaw March 2009.

(d) Sewerage systems shall drain by gravity wherever practicable. Private wastewater pump stations will be Approved only where there are no practical alternatives for a gravity flow to the public sewer.

(e) Pipeline crossings of rivers shall be via public road bridges. If this is not possible, then Council shall be consulted about alternatives.

(f) All new pump stations, manholes and maintenance structures shall be installed clear of boundary lines and new boundary lines shall be clear of all existing pump stations manholes and maintenance structures.

(g) The designer shall determine the alignment and the diameter of sewers on the basis of the ultimate number of sections that can discharge into the length of sewer under consideration. The ultimate number of sections will include:

- Future stages within the development.
- Future subdivision of sections to the minimal size permitted by Council.
- Flows from existing or future sections from neighbouring or upstream parcels of land (as advised by Council).

In choosing the alignment of the sewers in areas of high groundwater, consideration shall be given to the potential for infiltration of groundwater into the sewers. In such instances Council may direct that either:

- Low pressure sewer systems be adopted or
- Alternative gravity sewer alignments be chosen to reduce the risk of groundwater infiltration.

7.3.2 Hydraulic Design

(a) The hydraulic design of wastewater pipelines shall be based on the Colebrook-White or Manning formulae.

(b) The flow velocity in gravity reticulation shall be not less than 0.65 m/s with 0.75 m/s as the desirable minimum velocity. Unless the catchment has Ultimate Development exceeding 250 household equivalents, and where no flow from a pumping station is involved, 150mm diameter pipes laid no flatter than 1 in 180 (0.55%) will be adequate without specific hydraulic design.

(c) All pipeline construction shall conform to the requirements set out in NZS 2032:2006 (PVC pipe systems) or NZS 2033:2008 (PE pipe systems).

(d) External scour protection blocks, to draining S33 (Steep Pipe Details) or in accordance with a specific design carried out by an Approved IQP, shall be provided along applicable pipelines.

(e) Rising mains shall be specifically designed with flow velocities within the range of 1.0m to 2.0m per second.

(f) Detention times shall be minimised by avoiding the use of pumping stations wherever practical.

(g) Unnecessary turbulence shall be avoided at junctions and changes of grade.

Guidance Notes:

1. Coefficients for use in the Colebrook- White formula are as follows:

Table 7.2 Coefficients for Gravity lines

Material	*Colebrook-White Coefficient K(mm)*	*Manning roughness coefficient (n)*
VC	*1.0*	*0.012*
PVC	*0.6*	*0.011*
PE	*0.6*	*0.011*
GRP	*0.6*	*0.011*
Cement lining	*1.0*	*0.012*
PE or epoxy lining	*0.6*	*0.011*
NOTE: *These values taken into account effects of rubber ring joints, slime, debris etc.* *The K values apply for pipes up to 300mm nominal diameter*		

2. Calculation methods other than the Colebrook-White or Manning formulae will require approval by Council at the initial design stage.

3. All pipelines should be specifically designed to carry all forces and flows expected to be applied to them, in accordance with the manufacturer's recommendations.

4. In potentially unstable ground, filled ground, and in marine locations or where special protection is required, the wastewater pipelines shall be specifically designed. In flat or rolling country every effort should be made in the design to have the gradient of the wastewater pipes as steep as reasonably possible.

7.3.3 Pipe Materials (**Refer also NZS 4404 Table 4.3)**

(a) Gravity Sewer Pipes shall be:

- PVC-U pipe to AS/NZS1260:2009 Class SN 6 (DN 100), SN 8 (DN 150 or larger);
- PE 80 or PE 100 pipe to AS/NZS 5065 SDR17

Pressure Sewer pipes shall be

- PVC-U pipe to AS/NZS1477:2009 (minimum Pressure Rating PN 9), PVC-O to AS / NZS 4441 (minimum Pressure Rating PN 10) or PVC-M to AS / NZS 4765:2007
- PE 80 or PE 100 pipe to AS/NZS 4130:2009 (minimum Pressure Rating PN 10)
- All pressure sewer pipes shall include specific design for dynamic stresses (fatigue)

(b) Low Density Polyethylene pipe (Alkathene) or any PE pipe not fully compliant with AS / NZS 4130 shall not be used.

(c) PVC pipe sections shall be joined by rubber ring joints. PE pipe shall have electrofusion or butt welded jointing. Steel pipes shall be welded.

(d) Steel or DI pipe may be used for sleeving of uPVC or PE pipe.

7.3.4 Minimum Pipe Sizes

(a) The minimum sizes of property connection and reticulation pipes shall be not less than those shown in table 7.3 below.

Table 7.3 Minimum pipe size for wastewater reticulation and property connections

Pipe	**Minimum Diameter (mm)**
Connection servicing 1 Household Equivalent	100
Connection services more than 1 Household Equivalent	150
Connection servicing Business and Residential lots	
Reticulation servicing residential lots	

7.3.5 Minimum Pipe Gradients

(a) All gravity pipes shall be self cleaning. This shall be achieved by providing minimum grades as specified in the following tables.

Table 7.4 Minimum Grades for Wastewater Pipes

Pipe Size DN	Population	Absolute minimum grade (%)
150	Up to 12	1.0
150	60	0.67
150	160	0.55
150	>160	0.50

225		0.33
300		0.25

Table 7.5 Minimum Grades for Property Connections and Permanent Ends

Situations	Minimum Grade (%)
100mm diameter property connections	1.65
150mm diameter property connections	1.20
Permanent upstream ends of DN 150, 225 and 300 pipes in residential areas with populations ≤20 persons	1.00

7.3.6 Minimum Cover over the Pipe

(a) All pipes on private residential property shall have a minimum cover of 750mm from the top of the pipe to the ground level. For non-residential property the minimum cover shall be 900mm. An exception is for concrete Vehicle Crossings where 300mm cover is allowed.

(b) No pipes shall be installed at a depth of greater than 4.0m.

Guidance Note

1. Alternative depths may be approved with supporting documentation. This will be dependent on pipe type and class, location, bedding and length.

7.3.7 Pressure Sewers (Rising Mains)

(a) Rising mains shall meet the requirements for the construction of water supply pipes in NZS4404:2010:2004 Part 6 except that disinfection is not required.

(b) In the case of pressure pipes, any horizontal or vertical curvature to minimise pipe depths shall be gradual and even and shall not result in crests in the pipe where air could accumulate.

7.3.8 Sewers in unstable or slip prone areas

Guidance Notes:

Unstable or slip prone areas have the potential to promote:

- *Opening up of pipe joints with the consequence that groundwater, roots, and soil enter the sewer system.*
- *Movement of pipe to allow backfall to occur with the consequence that putrescent material accumulating along the sewer and generation of odours.*
- *Passage of groundwater may wash away bedding material leading to deformation of pipe.*

Where such conditions are encountered, the Developer should, as appropriate, implement:

- *Pipe jointing systems that ensure that the joint can remain water tight.*
- *Pipe foundations that ensure that the design pipe grade is maintained throughout the live of the pipeline.*
- *Bedding and surround designs that maintain adequate pipe support.*

7.4 Manholes and Maintenance Structures

The requirements of clauses 7.4.1 to 7.4.5 shall be met in the design and construction of reticulated gravity sewerage systems connected to a Council wastewater system and/or vested with Council:

7.4.1 General

(a) Manholes shall be constructed on wastewater pipelines over 200mm diameter to best practice in accordance with Drawings S31 and S32 and the manufacturer's requirements. Sulphate Resistant Cement shall be used. Where surface flooding or surcharging of sewers is possible Council may require bolt down manhole covers to be installed.

(b) Poo Pits (Drawing S34) shall be provided in place of Manholes on wastewater pipelines up to and including 200mm diameter.

(c) Manholes or Poo Pits shall be provided in the following situations;

- At a change of direction or gradient
- At each branching wastewater pipe line
- At each end of rising mains (unless the main terminates at another pump station)
- At a spacing of not more than 100m

(d) In areas where there is both stormwater and sewage reticulation, stormwater manhole lids shall be painted blue and sewerage manhole lids shall be painted red.

(e) Other maintenance structures shall be manufactured from rotationally molded Linear Medium Density Polyethylene. The product shall have been technically appraised by a New Zealand or Australian Water agency for compliance with AS/NZS 4798 2005 (or similar UK standard). A successful product appraisal by WSAA (Water Service Association of Australia) is acceptable.

The appraisal should state the tests undertaken for each relevant property, QA processes used, field testing results for a range of conditions, and the findings/recommendations of the testing agency. Properties of interest include items such as thermal stability, tensile strength, slow crack growth resistance, creep rate under test conditions versus that predicted by a finite element analysis, capacity of jointing systems to resist tree root intrusion and life expectancy.

7.4.2 Deep Manholes

(a) Where Manholes are more than 5.0m deep they shall be specifically designed and shall incorporate intermediate landing platforms or grills not more than 3.0m from the surface and not more than 3.0m apart. These platforms shall be designed to carry two people with an adequate factor of safety.

7.4.3 Drop Connections

(a) Manholes which have a drop in excess of 500 mm from the soffit of any inlet to the soffit of the outlet shall have a properly constructed drop connection into the base of the manhole. For pipe sizes up to 250 mm diameter this shall be in accordance with Drawing S32. Drops in larger diameter pipelines shall be specifically designed to achieve all performance criteria of this document.

7.4.4 Step Irons

(a) Step irons shall not be provided in sewer Manholes.

7.4.5 Maintenance Shafts and Inspection Shafts

(a) Maintenance shafts shall be located such that they are likely to be accessible by jetting or CCTV equipment.

(b) A separate water tight screw on cap is to be fitted on the vertical riser shaft.

Guidance Note:

The lid and cover design for maintenance shafts and inspection shafts allow the surface fittings to move independently of the vertical riser shaft. In this way, disturbance to the surface fittings will not impact on the vertical riser shaft.

7.5 Construction and Testing

The requirements of clauses 7.5.1 to 7.5.6 shall be met in the design and construction of reticulated gravity sewerage systems connected to a Council wastewater system and/or vested with Council:

7.5.1 Manhole Testing

(a) All Manholes shall be completely watertight including covers, frames, adjustment rings and lids and shall require testing at the Council's direction. The test involves plugging and filling the manhole with water (including time allowed for absorption).

(b) On inspection of the test the level of water in the Manhole shall not drop more than 10 mm per metre depth of the Manhole per hour.

(c) There shall be no evidence of weeping of water into manholes.

7.5.2 Sewer Pipeline Testing

(a) Each separate pipe shall be set true to line and grade and each joint shall be completed before the next section of pipe is commenced. All sewers shall be flushed clear of mud and debris. The Contractor shall ensure that neither the flush water nor the mud/debris enters the operating Council network.

(b) During pipe laying and when each pipe is completed, but prior to testing, the contractor shall check the invert levels of the laid pipes. The following level tolerances apply:

- Maximum deviation per length of pipe from grade: +/-3mm with no backfall at any point.
- Departure from grade between two points 8 metres apart: not more than 6mm.
- Departure from invert level at any manhole, maintenance shaft or inspection shaft: 10mm higher or 50mm lower.

If these tolerances are exceeded, the Developer shall notify Council prior to continuing with construction of the next line and agree with Council on appropriate remedial action.

(c) All wastewater pipes including connections shall be tested before the joints are backfilled. There shall be no water in the trench above invert level. New wastewater reticulation shall be completely and permanently isolated from the "live" sewer reticulation, until all the tests are passed, and authority from the Council to connect to the live sewer is obtained. The pipeline test procedure is as follows:

The use of the standard low pressure air test (to 300mm water head) is not approved.

All sewers are to be air tested as follows:

- 100mm and 150mm diameter sewers tested to 28 kPa pressure for 6 minutes with zero allowable pressure drop.

- 225mm and 300mm diameter sewers tested to 28 kPa pressure for 9 minutes with zero allowable pressure drop.

Testing shall be undertaken using air introduced to the sewer via a compressor. Testing plugs shall be securely positioned and tommed within manholes to safeguard against blowout under pressure. The testing gauge shall be available to Council representatives for examination.

The Developer shall allow Council representatives to witness the filling of the sewer with air, the test pressures achieved and the release of air after testing.

All leaks shall be identified and repaired. Air testing will be repeated until a successful test is achieved.

7.5.3 Infiltration Testing

7.5.4 Adopt field test requirements of NZS 4404:2010 Appendix B 2.1.1

(a) All sewers shall be tested for infiltration. The allowable quantity of water that can enter the sewer per day per kilometer length is:

- Zero for sewers with the free standing groundwater level no more than 1.5 metres above the sewer invert level.
- 5 litres per mm diameter for sewers with invert levels more than 1.5 metres below the free standing groundwater level.

7.5.5 Ovality Testing

(a) No earlier than 14 days after the completion of backfilling of sewer trenches, the sewer line shall be tested for ovality. The maximum deflection is 3% of the internal pipe diameter. This procedure is detailed in AS / NZS 2566.2.

7.5.6 CCTV Testing

(a) All sewers shall be examined by CCTV to confirm:

- All debris has been removed.
- No ponding of water exists in the sewers.
- No defects exist in the jointing or pipes.

7.5.7 Backfill Compaction

(a) All sewer trenches shall be tested to Council's specified compaction standard. Particular care shall be taken to ensure that:

- The specified compaction is achieved around property service connections, manholes, maintenance shafts and inspection shaft.
- The compaction method does not adversely affect the integrity of the structures.

7.6 Reticulation (Low Pressure)

Several areas of the district are or may be serviced by Low Pressure Sewers. This system is also known as a Grinder Pump System. The system operates by way of each property pumping sewage into a small diameter pressure pipe network which discharges either to the downstream gravity sewer network or into a communal pump station.

The requirements of clauses 7.6.1 to 7.6.7 shall be met in the design and construction of low pressure reticulated sewerage systems connected to a Council wastewater system and/or vested with Council:

7.6.1 Design Standards

The design of Low Pressure Sewer systems shall be to the following code:

- WSA – 07 2007 “Pressure Sewer Code of Australia”

References in the code to the “Water Agency” mean Kaipara District Council. The specific requirements, practices and standards of Council are described in the paragraphs below.

The following sections have requirements in addition to those set out in WSA 07:

Pressure Sewer Systems
The Grinder Pump System is the approved pressure system. The system includes three components:

- Grinder Pump:- a pumpwell with macerating pump. Where a development incorporates an existing house, the Developer shall design and install the grinder pump in accordance with these design standards as part of the sewer conditions applying to the development. For vacant sections in a development, the grinder pump will be designed in accordance with these design standards and be undertaken as part of the building consent process. Council will not own or operate the grinder pump.
- On Property pipework:- a small diameter pressure pipe will convey macerated sewage from the grinder pump to a boundary kit located at the property boundary. Council will not own or operate this pipe. The boundary kit will be owned by Council.
- Pressure pipe network:- located in the street terminates with a boundary kit at each property. Together, the pressure pipe network and the boundary kit form the public sewer network.

The use of septic tank effluent pump (STEP) systems is not approved for new developments.

Scope
Council will be responsible for:

- The high level strategic planning of sewer infrastructure for the Mangawhai Community or other Council Scheme
- The assessment and approval of detailed designs for sewer infrastructure
- Undertaking all live sewer connection works (cost of which is to be borne by the Developer)

Council may engage external engineering consultants to carry out these responsibilities.

The Developer is responsible for:

- Undertaking the detailed design, construction and installation of sewer infrastructure for his project (provide the “Designer”)
- Ensuring that the detailed design shall be undertaken by a professional engineer with specific experience in the design of Low Pressure Systems
- Satisfying Council that the constructed sewer infrastructure has been designed and constructed in accordance to the Engineering Standards.
- Defects maintenance

Planning and Design Responsibilities and Interfaces
The Developer shall provide Council with a Concept plan showing:

- Current development proposal
- Potential future development of balance sections
- Approach to staging of development
- Contour plans of the total development area

Council has a strategic plan for the sewer infrastructure required to service the Mangawhai Community Wastewater scheme.

This concept will be modified from time to time as developments proceed. In some instances Council will seek input from Developers to assist in its periodic reviews of its strategic plan.

Council will advise the Developer of the strategic plan for the parcel of land subject to development and will provide the Developer with the following information:

- Flow estimating methodology
- Collection/pump unit type
- Discharge point
- Requirements for integrating the infrastructure within the development into the Council system.

Council will advise the Developer whether Gravity or Low Pressure Sewer systems are required or whether any other Developer has any discretion in the choice of systems for the proposed development.

Low Pressure Sewer systems will be adopted when:

- Council's strategy for the development and abutting areas is for a Low Pressure network to be adopted, or
- Sewage from the proposed development discharges into a Low Pressure Sewer network, or
- Environmental or physical constraints cause trenched gravity sewers to be inappropriate for the location.

In some instances Council may direct that a combination of Gravity and Low Pressure Systems must be adopted.

Sewer Systems Design Approach
In addition to the objectives set out in 1.6.2 of WSA 07, Council requires that its customers receive the following level of service from the sewer system:

- All domestic wastewater is catered for
- All stormwater (groundwater and surface water) is excluded from the sewer system
- Provision of 12 hours of emergency storage with grinder pumps

Design Responsibilities
The Concept plan provided by Council will be of a high level strategic nature.

The Concept design referred to in 1.7.2 of WSA 07 will be prepared by the Developer.

7.6.2 Concept Design

The following sections have requirements in addition to those set out in WSA 07:

Materials Design
The pressure pipe network will be constructed using PE80 and PE100 pipe with a minimum pressure rating of PN12.5.

Isolation valves shall be fusion bonded epoxy coated and resilient seated gate valves.

Septicity Control
The Developer's design submission to Council shall include calculations of the detention time in each pipeline in the Developer's network.

Commissioning Plan

After completion of construction and prior to acceptance of the system by Council the Developer shall:

- Flush all matter from the piped network
- Fill the piped network with water
- Pressure test (using water) the piped network using a testing method that accounts for creep and assesses the rate of pressure decay over time.

The "Poliplex Polyethylene Pipe Design Textbook", Iplex Pipes Pty Ltd describes the required testing procedure.

7.6.3 General Design

The following sections have requirements in addition to those set out in WSA 07:

Design Tolerances
Reference to MGA, GDA and AHD is removed. Horizontal and vertical survey control shall be recorded to NZGD2000.

Environmental Considerations
In addition to meeting these design standards, the Developer's design shall comply with the requirements of Resource Consent conditions and Archaeological requirements

Easements
Pressure sewers shall not be located within private property.

7.6.4 Hydraulic Design

The following sections have requirements in addition to those set out in WSA 07:

Gravity Systems
The designer will ensure that the pressure pipe network does not have any free draining sections in it. When submitting the design to Council for review, the Developer's designer shall include sufficient topographic data to demonstrate that the piped network will remain full at all times.

Design inputs and Outputs
The probability design method is an acceptable method for designing grinder systems unless the limitations noted in section 4.4.4.1 of WSA 07 apply.

During the Developer's design process Council will nominate the interface point on Council's existing system that the Developer needs to convey sewage to, the pressure in the Council's system at the interface point and flow limitations that might apply.

Design Flows and their Variability

Sanitary Flows
For domestic properties each section shall be designed to:

- Accommodate 4 people
- Average daily flow rate of 210 litres per person per day

When estimating flows, allowances shall be made for future subdivision of all lots to the minimum permitted size.

For non-domestic occupancies, the Developer shall provide hydraulic computations to Council justifying the expected flowrate. To provide for future change in occupancy, the assessed flowrate shall be a least equal to the flowrate determined from the flow section of this standard.

Infiltration and Inflows
The grinder pumpwell shall be designed to prevent ingress of infiltration and inflows.

Existing houses will not be connected to the system until all drains discharging into the grinder pumpwell have been:

- Pressure tested to verify that they are water tight
- Separated from any stormwater drainage pipes

Peak flows from houses and required pumping rates
Pumped discharges from swimming pools into the pipe network are not permitted.

For non-domestic occupancies, the Developer shall provide hydraulic computations to Council justifying the expected peak hourly flowrate.

Design Flows
The Developer's design submission to DKC shall include calculations of the design flows adopted for each pressure sewer line.

Sizing of Pressure Sewers
Council may direct the Developer's designer to increase the diameter of pressure sewers to account for adjoining developments or on the basis of its own operation experience.

7.6.5 Pressure Sewer Design

The following sections have requirements in addition to those set out in WSA 07:

Valves
Isolation valves shall be installed at the junction between each pressure pipe.

7.6.6 On Property Design

The following sections have requirements in addition to those set out in WSA 07:

Property Sewer Service Diagram
The Developer shall provide Council with as constructed records showing:

- Coordinates of each bend in the pipeline network, junction, stop valve, air valve and flushing point
- Offset of each pipeline from the property boundary
- Record offsets at each location where the offset changes
- Pipe diameters, material type and class with limits for each type clearly shown
- Coordinates of each boundary kit
- Location of any Collection Pit installed as part of the Developer's works

Where the pipes are laid in a curve, the tangent points, inflexion points and radius of the curve shall be recorded.

The Developer shall obtain from Council details of its GIS specification to enable Council's laying, line type and text conventions to be complied with.

Design Tolerances
Reference to MGA, GDA and AHD is removed. Horizontal and vertical survey control shall be recoded to NZGD2000.

Vacant Lots
Boundary Kits will be provided at each vacant lot to facilitate connection of new houses to the system after the pressure network becomes live.

7.6.7 Collection/ Pump Units

The following sections have requirements in addition to those set out in WSA 07:

General Design Requirements
The collection tank shall be

- Manufactured from UV stabilised heavy duty polypropylene

- A single piece tank
- Fitted with a lid with a seal capable of resisting water ingress to a flood level of one metre above lid
- Manufactured with pre-set inlet connection points

The pump shall be:

- Progressive cavity / helical rotor type
- Mounted in a dry well recess at the top of the collection tank
- Easily accessible from the surface for maintenance purposes
- Capable of reducing sewage solids to a size of 1 to 2 mm
- Fitted with overload protection via over temperature protection

The pump controller unit shall have the following alarms:

- Over pressure or over current :- to prevent pressure in rising main exceeding its capacity
- Maximum pressure / current trips:- trips when the number of pressure trips exceeds a preset value
- Exceed maximum run time :- to present the pump running longer than its maximum period
- Exceed maximum pump starts per hour: - to prevent the pump from starting more frequently than it is designed for
- High level:- to alert landowner that sewage level has risen above alarm level
- Visible flashing alarm

The boundary kit shall consist of:

- Isolation valve
- Flushing access point
- Check valve
- All valves will be made of stainless steel

Emergency Storage
The collection / pump units shall have a minimum of 600 litres emergency storage between the high level alarm level and the overflow level

Location
Each lot shall have its own collection / pump unit.

Maximum Flows to Collection / Pump Units
The maximum inflow into the collection pit is limited by:

- The duty of the pumps
- The maximum pump run period
- The minimum rest period between pump runs

Over the course of the peak hour, the maximum pump rate shall be 0.5 L/s

For non residential connections, the designer shall provide additional storage to attenuate the peak inflows.

7.7 Wastewater Pump Stations

The requirements of clauses 7.7.1 to 7.7.16 shall be met in the design and construction of wastewater pump stations connected to a Council wastewater system and/or vested with Council. If there is insufficient detail in the Standards in this section the Council will advise of appropriate standards. In the absence of such advice WSA 04 2005 shall apply.

7.7.1 General

All pumping stations shall be specifically designed to the approval of the Council and the requirements of the following sections. Early consultation with Council is advisable to identify any additional specific requirements for the proposed station.

The Developer shall:

- Provide detailed commissioning of the pump station in the presence of Council operations staff prior to handover of the pump station to Council.
- Provide operation and maintenance manuals to Council written specifically for the pump station.
- Pay Council for any costs incurred by Council during the Developer's defects liability period in responding to:
    i. System faults and failures apart from normal operational matters.
    ii. (power supply outages or brown outs excluded).
    iii. (routine maintenance excluded).
    iv. (landowner misuse excluded).

Where it is determined that a pump station is required to service the development, Council will determine the location of the pump station so that it:

- Provides best service to the future staging of the development.
- Provides best service to the surrounding region.
- Accords with Council sewer strategy for the district.

Council will advise the Developer of design details such as:

- The invert level of future incoming gravity sewers.
- The site for the pump station.
- The general requirements for vehicular access.
- Provision for current and future emergency storage.
- Discharge point for rising main into the existing system.

The key performance objectives of the pump station design are

- Compliance with Resource Consents
- Water tightness
- Corrosion protection
- Odour minimisation and mitigation
- Minimisation of maintenance costs
- Design to allow operation to meet a high standard of Health and Safety.

Unless otherwise specified by Council's Asset Manager, the requirements of clauses 7.7.2 to 7.7.16 below shall be met.

7.7.2 Pump Station Site

All sewage pump stations servicing more than one property shall be on their own separate lot and vested in Council or, where a management entity has been Approved by Council to serve a number of lots, a separate lot owned by the management entity.

Where there are multiple inlet sewers they shall be collected in a satellite manhole with a single inlet connection to the pump station. A knife gate valve shall be connected within the wetwell and the inlet pipe shall have a vertical drop pipe designed to control turbulence.

All-weather vehicle access shall be provided to all pump stations. This access shall, as a minimum, include an easement in gross in favour of Council over an area 4.0m in width between the component and the nearest public Road. In addition, all-weather access shall be provided to within 10m of all sewage manholes. A hardstand area shall be provided for maintenance of the pump station including temporary power generation. The surface between the top of the pump station and adjacent shall be landscaped and the station shall be protected with bollards.

7.7.3 Pump Station Services

Pump Station power supply shall be three phase and entirely underground. All power shall be supplied and connected in accordance with the Electricity Act. The pump motors shall be adequately protected from electrical power surges or phase failures.

All pump stations shall have a fresh water supply from a standard 25 mm connection at a minimum static pressure of 300 kPa. If the same water supply is used for drinking, backflow prevention shall be provided in accordance with the NZ Building Code approved Document G12.

7.7.4 Odour Control

The pump station designer shall assess the potential for unacceptable odour to be released at the pump station when in operation and shall provide a satisfactory odour control system as necessary. The system chosen shall be reliable, suitable for a transient population, able to achieve consistent public satisfaction and minimise operator input.

7.7.5 Chamber Design

All pump stations and valve chambers shall comply with the following requirements:

- The chamber shall be circular and sized large enough for ultimate development conditions.
- The chambers shall be constructed with high durability reinforced concrete using sulphate resistant cement with a minimum content of 345 kg/m^3 cement.
- The pump chamber shall be stable under all load conditions likely to be imposed, including when the chamber is completely empty.
- A lockable galvanised steel, stainless steel or marine grade aluminium hinged, water tight lid covering an opening of 600 mm (minimum) clearance and able to be opened by a single person by hand, shall be provided in the top of the wet well and over all storage tanks. The size and position of the opening(s) shall provide for direct and easy removal of the pumps and valves. The opening shall be fitted with a removable grill or other fall hazard protection.
- All pump stations shall have cast iron, stainless steel or marine grade aluminium lids that require a standard manhole key to open them. The lids shall be fitted with neoprene seals.
- The pump well, valve chamber, power box and all control boxes shall be lockable.
- The valve chamber shall have a drain connection to the wet well with a water trap.
- The minimum lid level selected shall be such that inundation of the station will not result from flood waters or sea levels during a 100 year storm (1% AEP).

- The top surface of the station, and its electrical equipment and switch board, shall be located above all possible flood water levels and shall be raised at least 500 mm above the surrounding ground level. Alternatively, the entire station shall be bunded to prevent flood water reaching it or the wells shall be made completely water-tight and the electrical controls located in a remote location above all possible flood levels.
- All pipes and fittings shall be thoroughly cleaned inside before use. Temporary open ends of laid pipes shall be closed with plates or flanges whenever work is discontinued to prevent foreign matter from entering the pipes.
- All fittings shall terminate with a flange on both sides, including fittings which are joined to other fittings. Where fittings are located in on-line positions flexible (gibault) joints subject to approval of the Council may be permitted. Flanges shall be in accordance with AS/NZS 433 1.
- The maximum velocity through a valve which is used for permanent flow control shall be 3 metres per second.
- Mass concrete benching shall be installed in the base of the well to direct solid material towards the pump inlets and to reduce the detention time in the well. The slope of the benching shall be 1:1. Where the benching interfaces with the wet well wall, the wall will be scrabbled to ensure sound bonding of the mass concrete with the wall.
- The lid opening for the valve chambers shall be sized to allow all valves to be removed and lifted directly out of the chamber

7.7.6 Emergency Storage Design

Emergency storage shall be provided in accordance with the controlled activity rules of the Regional Water and Soil Plan for Northland for the Ultimate Development of the station catchment. The design requirements of pump stations shall also apply to emergency storage.

All pump stations shall have a gravity storage chamber capable of holding at least twelve hours average dry weather flow (based on full catchment development) in the case of an emergency. Storage within the pipe system is not considered part of the twelve hour storage requirement.

Emergency storage tanks shall be self draining back into the wet well by gravity.

Key points in the design are:

- The overflow structure within the pump station include a vertical tee so that sewage enters the overflow through the bottom opening of the tee. This allows:
  i. Floatable matter to continue to rise, outside the tee, to the overflow level and
  ii. Minimises the amount of floatable matter being drawn into the emergency storage.
- The vertical tee on the overflow structure shall have its top opening open, so that in the event that the bottom opening become blocked, sewage could still escape into the storage.
- The inlet structure within the storage shall include a vertical tee, drop pipe and bend to direct sewage onto the invert of the storage and reduce turbulence.
- The return pipeline from the emergency storage back into the pump station shall be:
  i. Set at the invert level of the emergency storage to ensure all matter in the storage can be washed back into the pump station.

ii. Fitted with a stop valve which will normally be closed, but will be opened when emergency storage is being drained.

- The storage shall be fitted with manhole openings and covers to allow inspection and insertion/manoeuvring of cleaning hoses into the storage.
- The manhole covers are to be standard or heavy duty covers of the type used for sewer manholes. They shall be greased to seal them from ingress of water or egress of sewer gases.
- The storage shall be graded towards the return outlet to prevent water ponding permanently in the storage.
- Manhole openings on the storage will be provided over:
  i. The storage outlet.
  ii. The other end of a piped storage.
  iii. The far side of a tank storage (for the purpose of providing ventilation and light during cleaning).
- A sump will be provided at the storage outlet to allow a temporary pump to assist in the removal of all water.
- Sufficient area (as agreed with Council) will be set aside at the site to enable the storage to be increased in size in the future if:
  i. Future development occurs in upstream gravity catchments.
  ii. In service system performance demands additional storage.
- If a piped storage option is chosen it shall be either the Hynds Retention Tank system with Mul-T-Level outlet or similar style approved by Council.
- Consideration shall be given by the designer to where the system overflow point will be, in the event that the emergency storage fills completely. The objective is to ensure that in the extreme event that system overflow does occur:
  i. The location is not within private property or environmentally sensitive areas.
  ii. Does not escape into the storm drainage system.
  iii. Can be contained within a small region where it can be cleaned up without causing an uncontrolled nuisance.
- The emergency storage will be fitted with level control monitoring that will report to the central telemetry communications center that the emergency storage is approaching full storage.

7.7.7 Emergency Storage Overflow

The maximum level at which the overflow shall operate is a minimum of 500mm freeboard to the lowest manhole lid within the pumped catchment under peak flow conditions.

7.7.8 Pump Design

All pumps shall comply with the following requirements:

- The pumping equipment shall be Flygt submersible pumps or approved equivalent with non-clogging impellers that have a minimum 76mm outlet orifice.
- Each pump shall:
  - Provide a minimum pumping velocity of 0.9m per second in the rising main;
  - Deliver the design peak flows from the ultimate catchment development;
  - Be self seating. Dry mounted pumps shall be free-standing on concrete plinths.

- Be removable and re-installable from above, by hand, by a single person. If each pump weighs more than 20 kilograms, guide rails and a rotating winch shall be included;
- Have macerating impellers for rising mains less than 80 mm diameter;
- Have backflow prevention and isolating valves on their outlets. The isolating valve shall be a screwed gate valve installed downstream of the backflow prevention valve. Both valves shall be located outside the chamber in a concrete valve box that has a lockable stainless steel, galvanised steel or aluminium chequered plate lid. One set of valves shall be provided for each pump. Valve chamber shall drain back to wet well.

- One standby pump shall be provided per station.
- Pumps over 5kW should be soft start or have a variable speed drive. The electricity supplier should be consulted about the specific requirements for each pump.
- Both pumps shall be automatically controlled as specified in clause 7.6.8.
- All steel connections shall be Grade 316 stainless steel fastenings.
- Float cables and lifting chains shall have hook plates.

7.7.9 Pump Station Controls and Telemetry

All pump stations shall comply with the following requirements:

- The pumps shall be automatically controlled by float switches or other Council approved or required methods compatible with other pump stations in the areas. The volume between the pump-on and off levels shall be a minimum of 6% of the design peak hourly flow rate. Probe-type water level controls are not acceptable. A manual override of the automatic controls shall be provided by means of a clearly marked switch on the switch board;
- An automatic changeover between the duty and stand by pumps shall be installed so that the standby pump is run at (maximum) weekly intervals and/or if the duty pump breaks down. A clearly marked switch shall be provided on the switchboard that manually switches control between pumps while not overriding the future automatic changeovers.
- Pump controls shall include
    a) Duty standby system
    b) One ammeter per pump
    c) One hour meter per pump
    d) One reverse switch per pump
    e) Inhibit system
- Audible and rotating re-light alarms shall be provided and activated by float controls at a level 100 mm above the normal pump-off level. The emergency storage shall be provided above this alarm activation level.
- Pump stations serving 3 household equivalents or more shall be connected to Council's telemetry network. This shall monitor pump hours, high and low water levels and pump failure. Council shall be consulted about the means of connecting to the Telemetry, and it shall be compatible with existing systems.
- The pump controls will include locking out when a downstream receiving pump station fails, to prevent downstream overloading of emergency storage capacity.
- Pump station telemetry in the Mangawhai Community sewerage system shall comply with the ‘Communication Standard Pump Stations’ requirements included in Appendix B

7.7.10 Pipework

Pipework shall be designed to accommodate the shut off head of the pumps, water hammer forces resulting from sudden pump stop, fatigue loading caused by pump operation over a minimum of sixty year life. The use of DICL is preferred.

Valves shall have an O ring seal on the stem with resilient seat. Interior coating will be thermal bonded, polymeric or approved equivalent.

Check valves will be swing check type with an access hatch for removal of debris by maintenance operators.

Bolts, nuts, bracing, fixings, anchors shall all be grade 316 stainless steel.

7.7.11 Pump Station Electrical

The switchboards shall be housed in a marine grade aluminium cubicle. The location of the cubicle shall be determined in consultation with Council with the objectives of:

- Allowing operators to attend to the cubicle and observe pump operation simultaneously.
- Being sufficiently remote from wet well openings that operators cannot step back from the cubicle into the well.
- Out of the way of maintenance vehicles.
- Unobtrusive to the general public.

The switchboard design shall have:

- Capacity to deliver the ultimate power requirements for the pump station based on duty/stand by operation of the pumpsets.
- Space for telemetry facilities (described in a separate section).
- Battery backup for telemetry facilities to allow continuous communication with the central communications centre.
- Lighting within switchboard.
- Switchboard heater.
- Ventilation fan.
- Connection to operate odour control facilities.
- Spare poles.
- GPO.
- A plug/socket for connection to a mobile emergency generator.

The switchboard design shall make provision for:

- Future lighting within the wet well.
- Flow meter (Council may direct that the Developer is to install a meter in major pump stations).

7.7.12 Rising Mains

The following requirements are in addition to those set out in WSA 07. Rising mains will be designed using normal sewer design practices with:

- Minimum diameter being 80mm.
- Adequate capacity for ultimate requirements of the pumped catchment.
- Pipe friction calculated using a Colebrook-White k factor obtained from the “Wallingford Hydraulics Research – Charts for the hydraulic design of channels and pipes” in accordance with the relevant pipeline velocity and normal conditions.

- A desirable minimum velocity of 0.9 m/s in order to strip sulphide producing slimes from the pipe walls.
- Water hammer assessment required to determine pipe class.
- Fatigue analysis to verify that the pipe material is suitable to achieve a life of at least 100 years for the expected number of pump cycles.
- A return pipeline shall be installed to allow the rising main to bypass pumps and drain into the wet well.

Particular care will be taken to ensure that:

- No section of the rising main is free draining.
- Sewage air release valves are installed that achieve Water industry standard performance.

7.7.13 Design Certification

Prior to the commencement of construction the Developer's designer shall submit to Council documentary evidence that:

- Structural design of all structures is fit for purpose.
- Floatation of pump wells and emergency storage facilities have been assessed.
- The required storage volume has been achieved in the system.
- Pipe class is adequate for the 100 year design life of the pipelines.
- Odour management has been assessed and risks mitigated adequately.
- All other aspects of Council's design criteria have been incorporated into the design.

In order to allow Council to provide operational comment on the design proposal and finalise detailed operational requirements, the Developer's designer shall submit to Council, prior to the Developer commencing construction, the following documents:

- Hydraulic computations to show the system curve for the rising main in conjunction with the pump curve.
- All design drawings for all elements.
- Technical schedules for the pump sets.

7.7.14 Commissioning

Prior to Council accepting any assets as being fit to receive raw sewage and connect to the system the Developer will need to provide Council with evidence that all works have been constructed in accordance with the approved design plans and that the following commissioning activities have been completed:

Structures

- Visual inspection to verify:
  - All structures are watertight (test for leakage into and out of well).
  - All structures are vertical.
  - All mud, construction debris and foreign objects are removed from the wells.
  - All water is removed from wells after testing
  - Concrete surfaces are free of defects

Pumps

- Visual inspection to verify:

- Pumps operate without excessive vibration.
- Pumps can be removed from well and re-engaged successfully.

- Test to verify:
  - Pump draw down test undertaken to verify that pumps deliver the specified pump duty current and power drawn during operation match expectations.
  - Manual and auto run for each pump is operational.
  - All levels sensors and alarm are functional.
- Receive copies of factory test certificates as supplied for each pump

Pipework

- Visual inspection to ensure:
  - Leakage does not occur at any joint during pump operation.
  - All pipework is adequately braced.

Electrical

- Visual check that:
  - Switchboard is fully functional.
  - Electrical conduits and gas tight compartments are fully sealed.
  - Doors closed and lock.
  - Insulation is provided between dissimilar materials.
  - Receive test certificate to verify that works have been undertaken to the required electrical standards and is electrically safe.
  - Receive verification that all requirements of the energy suppliers have been complied with.
  - Demonstrate that the emergency generator connection is operational.

Telemetry

- Test to verify that all telemetry signals are being sent to the central telemetry communications centre.

7.7.15 Operation and Maintenance Manuals

The Developer shall provide Council with 3 copies of manuals which shall contain sufficient information for the installation, operation and maintenance of the equipment supplied.

Each copy of the Manual shall be adequately bound or contained in three (3) ring, hard cover binder. The page format shall be A4, and printed in a clear typeface with a 35 mm margin for binding. Alternative methods of binding and page size format can be submitted, but acceptance of these would be subject to approval. The contents shall be presented as follows (alternative compilation would be subject to approval):

Title Sheet – containing:

(1) Name of Scheme and of each pumping station.

(2) Contract Details.

(3) Name of Supplier.

(4) Address for Service Calls.

The following information shall be provided and listed as follows:

Chapter	(1)	:	Description
Chapter	(2)	:	Technical Data
Chapter	(3)	:	Principles of Operation
Chapter	(4)	:	Occupational Health & Safety Issues
Chapter	(5)	:	Operating Instructions
Chapter	(6)	:	Installation and Commissioning Instruction
Chapter	(7)	:	Routine Maintenance
Chapter	(8)	:	Periodic Maintenance
Chapter	(9)	:	Repair and Overhauling
Chapter	(10)	:	Test Data and Troubleshooting
Chapter	(11)	:	Spare Parts List
Chapter	(12)	:	PLC Program
Chapter	(13)	:	As-Installed Electrical & Mechanical Drawings

The information on Chapters 1 to 6 must be included for each item supplied, while the extent of information in Chapters 7 to 10 may vary with the complexity of the equipment.

The information to be supplied in each Chapter shall be as follows (where applicable):

Chapter (1) : Description – a full description of the equipment with a tabulation of dimensions and performance ratings.

Chapter (2) : Technical Data – a completed copy of Technical Data of the equipment and as constructed drawings.

Chapter (3) : Principles of Operation – a basic working description, including novel features and any automatic control.

Chapter (4) : Occupation, Health and Safety – issues and procedures that are required to be undertaken.

Chapter (5) : Operating Instructions – a step-by-step procedure organised into sections, entitled:

- Checks before Starting
- Starting
- Continuous Operation
- Stopping
- Emergency Stopping
- Abnormal Operation as Applicable

Chapter (6) : Installation and Commissioning Instructions – details of Standards and procedures for mounting or erecting, wiring and lubricating the equipment. The commissioning instructions shall include step-by-step procedures for checks before the first start, first start, checks after starting and operational tests. They should be coordinated with Chapters 3 and 8 and may refer to both.

Chapter (7) : Routine Maintenance step-by-step procedures for preventative maintenance work carried out at intervals of four (4) weeks or less.

Chapter	(8)	:	Periodic Maintenance step-by-step procedures for preventive maintenance carried out at intervals in excess of four (4) weeks, involving replacement of consumables only.
Chapter	(9)	:	Repair and Overhauling step-by-step procedures for fault correction and preventative maintenance, involving parts other than consumables. A list of any necessary special tools should be included.
Chapter	(10)	:	Test Data and Troubleshooting – instructions to qualified Tradesman for assessing the operational performance of the equipment.
Chapter	(11)	:	Spare Parts List – illustrations and Schedules for identification and specifications for all items in the equipment. Exploded diagrams are preferred. The recommended spare parts stock must be indicated.
Chapter	(12)	:	PLC Program – the full ladder logic program complete with hard copy and disk format.
Chapter	(13)	:	As-Installed Electrical & Mechanical Drawings shall include • Up-to-date changes at the time of commissioning. • Schematic and circuit diagrams. • Cable entry details. • Full construction details of switchboard, pump set installation and all associated equipment and • Schedule of equipment installed in switchboard and associated field equipment.

7.7.16 Handover

After acceptance of commissioning of the pump station and prior to handover of the asset to Council, the Developer shall undertake a training session with Council to ensure that its operators are fully conversant with the equipment and its operation.

The Developer shall undertake a training review session with Council two months (or as negotiated) after the first sewer inflows are received.

7.8 On Site Treatment and Disposal Systems Guidelines

7.8.1 General

On Site Treatment and Disposal Systems should be investigated and designed using accepted design practice, documented and/or local operational data and wastewater characteristics, for which extensive literature exists.

Where more than two dwellings are being proposed within a subdivision development consideration should be given to utilising a community wastewater treatment and disposal system in accordance with AS/NZS1547:2008 Onsite Wastewater Management Standard. A community system servicing multiple lots should be installed if determined to be the best practicable option.

Detailed design guidelines are not given here, but the following is a list of factors which should be considered in design.

- *Scope of land disposal*
- *Proximity to dwellings / development*
- *Potential for offensive odours*

- *Site and land availability*
- *Sensitivity and quality of receiving waters*
- *Scope for future extensions*
- *Value of site to the community*
- *Landscape effects*
- *The ease, convenience and required frequency of system maintenance.*

All on-site wastewater systems should dispose of treated wastewater to land.

New on-site sewerage systems for individual properties should be designed in accordance with AS/NZS1547:2008 Onsite Wastewater Management Standard. In addition to the requirements of these guidelines, proprietary effluent filters such as Innoflow "Biotubes" should be installed in all septic tanks. These filters should be designed and installed strictly in accordance with the manufacturer's instructions.

New septic tanks should have a minimum diameter riser of 600 mm between the tank top and ground surface, with a watertight lid. Their inlet pipes should be vented outside the tank. The tanks should be completely watertight and be designed to:

- *Withstand all soil loads and the load of a light vehicle running over the top of them*
- *Be stable when empty under winter groundwater conditions*
- *All tanks should meet the minimum design and installation requirements of AS/NZS 1546:2008 Septic Tank Standard*

7.8.2 Plant Capacity

Where the specific flows from the catchment areas are known these should be used as a basis for the treatment plant design.

When the above information is not available the design flows provided in AS/NZS 1547:2008 should be used. The plant should be designed for a minimum life of 50 years except for electrical and mechanical components which should have a design life of at least 15 years and telemetry equipment 10 years.

The plant should be designed to cater for all flow rates throughout the design life of the plant. Staged construction/upgrades over the plant life should also be defined assuming Council agreed growth rates.

7.8.3 Effluent Discharge

Any discharge should be in accordance with the permitted activity rules of the Regional Water and Soil Plan for Northland or the condition of the relevant resource consent obtained from the Northland Regional Council.

Council will not take control of any treatment plant until all consent conditions are met for a minimum continuous period of 12 months.

7.8.4 Treatment Process

Only treatment systems that comply with AS/NZS 1547:2008 and any relevant NRC requirements should be used.

7.8.5 Operations and Maintenance

Wastewater treatment plants should have documented control and operational procedures including maintenance, health and safety and renewal plans.

Renewal documentation should account for the expected life of each part of the plant and show a planned component replacement schedule together with replacement cost valuations.

A schedule for the correct disposal of all by-products of the treatment process and emergency procedures is required should the plant not be able to treat waste for reasons of failure, emergency repairs or planned upgrade/maintenance.

Maintenance of wastewater systems should be in accordance with the Regional Water and Soil plan for Northland and the manufacturer's requirements.

7.8.6 Monitoring

A monitoring programme should be used to meet consent conditions and to monitor the efficiency and effectiveness of the plant.

Should sampling or monitoring piezometers be required, the pipes are to be a minimum of 100mm in diameter, have a lockable cap, have filter cloth around the outside and be surrounded by 100mm of drainage metal. An identification plate is also required on the outside.

The monitoring programme will be actively enforced under the Resource Management Act 1991, the Building Act 2004 and any future standard required by the Ministry for the Environment to ensure all on site treatment and disposal systems are appropriately maintained.