WHANGAREI DISTRICT COUNCIL

Environmental Engineering Standards

as at September 1998

Table of Contents

Attachments

Form A
Statement of professional opinion as to suitability of land for subdivision.

Form B
Statement of professional opinion as to suitability of land for building development.

Form C
Certificate of Completion of Development Works.

Subdivision `RAMM' Forms
RAMM Data Collection
Drainage
Traffic Facilities and Markings
Pavements
Signs
Crossings, Features, and Minor Structures

Form WA
Application for water supply to a subdivision or development

Form WB
Site inspection and testing of subdivision or development water reticulation

Form WC
Site inspection and approval of subdivision or development water reticulation

Information Sheet
Utility connections and vehicle entrance crossings for all works other than resource consents

District Plan

Applicants are advised to note the requirements of Appendix 7 and 10 of the proposed District Plan which specify additional objectives and design standards.

Discretion

The Chief Executive Officer, authorised representative, or other officer named in these standards, may approve discretions in the case of all activities, applications and designs **except** those subject to resource consents under the Resource Management Act.

A formal application under the Resource Management Act must be made for any variation to standards stated in the District Plan or resource consent requirements.

Where an applicant wishes to take advantage of any discretion referred to in these standards, it must be specifically included in the resource consent application. The individual discretions must be identified separately in the application.

These standards have been prepared in conjunction with Council's draft District Plan as released.

The following comparisons shall be applicable for enforcement of conditions of resource consent approvals until the reviewed District Plan becomes operative and any necessary amendments adopted.

Transitional Plan	Section	Draft Plan - Environment
Airport Industrial Zone	City	Business 5
Civic Centre Development Zone	City	Business 1
Coastal Residential Zone	County	Living 1
Coastal Rural Residential Zone	County	Living 3
Coastal Zone	County	Countryside
Commercial A	County	Business 3
Commercial B	County	Business 3
Commercial C	County	Business 3
Commercial Central Business Zone	City	Business 1
Commercial Central Fringe Zone	City	Business 2
Commercial Garage Zone	City	Business 2
Commercial Licensed Hotel Zone	City	Business 3
Commercial Neighbourhood Zone	City	Business 3
Commercial Suburban Centre Zone	City	Business 3
Commercial Zone	Hikurangi	Business 3
Harbour Channel Zone	City	N/A
Harbourside Development Zone	City	Business 1
Industrial A	County	Business 3
Industrial B (Buffer Zone)	City	Business 3
Industrial C	County	Business 4
Industrial D	County	Business 4
Industrial Heavy Zone	City	Business 4
Industrial Light Zone	City	Business 2
Industrial Zone	County	Business 4
Industrial Zone	Hikurangi	Business 2
Interim Industrial	County	Business 4
Kauri Dairy Factory Zone	County	Business 4
Kensington Park Zone	City	Open Space
Limited Residential and Tourist Accommodation	City	Living 3, Business 3
Manganese Farm Park Zone	County	Countryside
Marae Community	County	Countryside 1
Marina Zone	City	Business 3
Marine Protection Zone	City	N/A
Marsden Point Special Industrial	County	Business 4
Quarry Zone	City	Countryside
Recreation 1 Zone (Local & Scenic Reserve)	City	Open Space
Recreation 2 Zone (Community facilities)	City	Open Space
Recreation Zone	Hikurangi	Open Space
Recreation 3 (Outdoor Sports & Clubrooms) Zone	City	Open Space
Residential A Zone	City	Living 1 or 2
Residential Deferred Zone	City	Living 1

Transitional Plan	Section	Draft Plan - Environment
Residential Landscape Protection Zone	City	Living 3
Residential Zone	Hikurangi	Living 1
Riverside Drive Special Development Zone	City	Business 2
Rural A Zone	County	Countryside
Rural AC Zone	County	Coastal Countryside
Rural B Zone	County	Countryside
Rural H Zone	County	Countryside
Rural Residential Zone	County	Countryside
Rural Scenic Protection Zone	City	Coastal Countryside
Rural Settlement Zone	City	Living 1
Tourist House Accommodation Zone	City	Business 3
Town Basin Development Zone	City	Business 3
William Fraser Memorial Park Zone	City	Open Space

Section 1
General Information and Procedures

1.1 Scope

These Environmental Engineering Standards are approved methods of complying with the policies and performance levels for engineering design and construction approved under the Whangarei District Plan.

They should be read in conjunction with relevant New Zealand Standards and Austroad Manuals, but where requirements differ, the Environmental Engineering Standards will take precedence.

Further mandatory engineering stipulations may also be contained within Northland Regional Council regional plans and the NZ Building Code. Applicants are encouraged to familiarise themselves with these documents.

Acceptance of an alternative means of compliance for meeting the objectives of the District Plan, will be at the discretion of the General Manager. The determination shall be made on the basis of established principles of good engineering and trade practice and objectives stated in this document. In general, the Environmental Engineering Standards will be used as a guide as to the level of performance required by an alternative design. In special circumstances some dispensations may be acceptable. Approval of an alternative design will not confer approval in general by the General Manager to any design criteria, construction technique or material forming part of the alternative design. Any approval is based on an examination of the information provided and shall not relieve the applicant of the responsibility for compliance with Council standards, established principles and carrying out work in accordance with sound engineering practice.

1.2 Applicant's Representative

The applicant shall nominate a specialist representative to liaise with the Council. The applicant's representative would generally be a registered surveyor or registered engineer, but may be a suitably qualified person in a related field, experienced in all phases of resource consent and be available on site within 24 hours of being so requested by the Council.

Responsibilities of the representative include:

Preparation and submission of surveying and engineering reports, documentation and plans. This may include the design and control of earthworks and assessment of site suitability including land stability, hazards etc. to be evaluated under the District Plan.
Supervision of the works required by the approved engineering plans and specifications.
Certification that the works and authorised variations have been carried out in accordance with the approved documents and sound engineering practice.
Submission and certification of "As-built" plans of the completed works.

The Council shall not enter into correspondence with any person other than the appointed representatives on any matter relating to resource consent.

1.3 Drafting Standards

Drafting standards shall comply with NZS / AS 1100 (see Clause 2.5).

All plans shall be prepared on a standard ISO A1, A2 or A3 drawing sheet.
Drawings must be suitable for photo reduction and microfilming. Lines shall not be finer than 0.25 mm on A2 sheets and 0.35 mm on A1 sheets. Printing should be spaced sufficiently to retain clarity when reduced. Capital letters shall be not less than 2.5 mm in height before reduction. Where a mixture of capital and lower-case letters are used, the height shall be not less than 3.5 mm.

Standard symbols shall be used to ensure uniformity. Existing services shall be shown in faint lines (min as above) and proposed services in heavy bold lines (min 0.50 mm).

For long sections of pipelines etc., the ratio of horizontal to vertical scales should be 1 to 5.

All designed reduced levels shall be in terms of Department of Survey and Land Information (DOSLI) Datum where practicable.

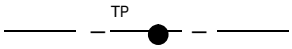
Plans submitted shall include a locality plan of the site.

Symbols

Energy and Communication

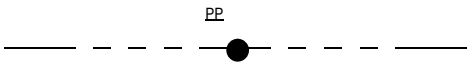
Communication Cable

Communication Pole



Power Cable

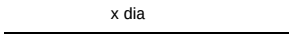
Power Pole



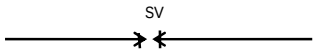
Gas Main

Waterworks

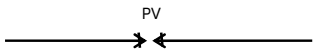
Watermain



Sluice Valve



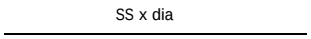
Peet Valve



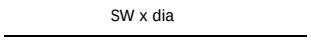
Hydrant

Drainage

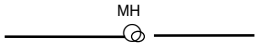
Sanitary Sewer Line



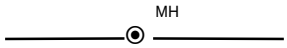
Stormwater Drains



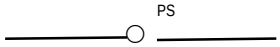
Manholes - SS



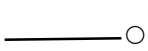
- SW



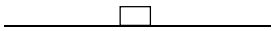
Sewage Pump Station



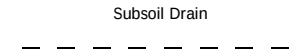
Lamphole



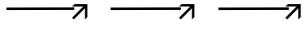
SW Sump



Subsoil Drain



Watercourse

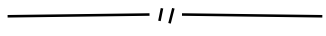


Limit of Catchment Area

Miscellaneous

Position of Service Uncertain

Fence



1.4 Fees and Charges

The applicant shall pay all fees and charges relating to the assessment of the application, review and approval of plans and documents, inspections carried out, legal fees in connection with drainage easements, bonds, etc., and such other fees and charges where applicable.

Engineering plan inspection fees are to be paid prior to plan approval (see Clause 2.2).

All costs for collecting RAMM (Road Asset Maintenance Management) data shall be borne by the applicant (see Clause 5.14).

1.5 Cost of the Work

The applicant is responsible for all costs associated with the application for an approval pursuant to this document and for all construction work required. This includes connection to existing roading and utility services, and miscellaneous items such as signage, road marking, relocation of existing services, etc. The applicant should liaise with appropriate utility service operators prior to submitting an application for approval from Council pursuant to this document and inform themselves of any additional requirements or costs.

In special circumstances Council may contribute towards the cost of work in terms of an applicable policy, or as negotiated. Generally such contributions would cover the provision of services greater than required for the particular subdivision. This may be by an agreed lump sum, a cost estimate based on a schedule of quantities, or the successful tenderer's completed schedule of prices. Any payment agreed to by the Council will be paid out in the financial year following compliance of all approval conditions, unless otherwise agreed with the Council, and must be confirmed in writing prior to commencing work.

1.6 Insurance

Where work is carried out on a dedicated road or reserve, or where public utility services are to be installed over land not owned by the applicant, the following insurance provisions will apply:

- The applicant shall obtain Public Liability Insurance in the joint names of the applicant and the Council for a minimum amount of $1,000,000. The Council may require this value to be increased where it considers that the risk or the value of the work warrants it.

- The Policy shall be extended to cover all insurable risks normally applicable to land development work and may expire when all Council requirements have been satisfied.

- The Policy shall have attached thereto either:

  (i) A Cross Liabilities/Joint insured clause;
  or
  (ii) Appropriate wording which states that the policy will be construed as though a separate policy had been issued to each of the joint insured.

The applicant shall provide evidence of insurance cover prior to the commencement of the work.

1.7 Definitions

Unless inconsistent with the context, the following definitions shall apply:

Word	Definition
Council	Whangarei District Council
Network Utility Operator	a) Undertakes or proposes to undertake the distribution or transmission by pipeline of natural or manufactured gas, petroleum, or geothermal energy; or b) Operates or proposes to operate a network for the purpose of

telecommunication or radio communication as defined in section 2(1) of the Telecommunications Act 1987; or

c) Is an electricity operator or electricity distributor as defined in section 2 of the Electricity Act 1992 for the purpose of line function services as defined in that section; or]
d) Undertakes or proposes to undertake the distribution of water for supply (including irrigation); or
e) Undertakes of proposes to undertake a drainage or sewerage system, or
f) Constructs, operates, or proposes to construct or operate, a road or railway line; or
g) Is an airport authority as defined by the Airport Authorities Act 1966 for the purposes of operating an airport as defined by that Act; or
h) Is a provider of any approach control service within the meaning of the Civil Aviation Act 1990; or
i) Undertakes or proposes to undertake a project or work prescribed as a network utility operation for the purposes of this definition by regulations made under this Act,-

and the words "network utility operation" have a corresponding meaning:

Specific Design

A design which may not strictly comply with these standards, but complies with New Zealand Standard specifications and/or other nationally recognised procedure and systems, and prepared by a person suitably qualified with adequate expertise and experience and meets the objectives set out in the District Plan..

Secondary or Overland Flow Path

Refers to the path taken by runoff in excess of the primary design flow and should be capable of preventing inundation of surrounding building sites.

Drainage

Sanitary drainage or stormwater drainage, and "drain" has a corresponding meaning.

Earthworks

means earth moving operations carried out by any means for any purpose and includes:

a) quarrying
b) prospecting and exploration
c) the disturbance of land surfaces by moving, removing, placing or replacing soil or earth, or by excavation, cutting or filling operations
d) contouring
e) road, driveway and other access construction
f) clean fill operations,

but does not include:

a) horticulture
b) gardening for domestic purposes
c) work carried out to provide for effluent disposal systems of pile foundations for residential buildings,
d) trenching work for the installation or maintenance of infrastructure

Footpath

So much of any road as is laid out or constructed by authority of the Council primarily for pedestrians; and may include the edging, berms, kerbing and channelling thereof.

Ground

A general term used to describe the material in the vicinity of the surface of the earth whether soil or rock.

Residential Unit

means a residential activity which consists of a single self contained housekeeping unit, whether of one or more persons, and includes accessory buildings and a family flat. Where more than one kitchen facility is provided on the site, other than a kitchen facility in a family flat, there shall be deemed to be more than one residential unit. For the purpose of this definition a residential unit shall include any emergency or refuge area.

Private Road	Any roadway, place, or arcade laid out within a district on private land by owner thereof intended for the use of the public generally.
Private Way/Private Accessway	Any way or passage whatsoever over private land within a district, the right to use which is confined to intended to be confined to certain persons or classes of persons, and which is not thrown open or intended to be open to the use of the public generally. (See also District Plan definitions).
Soils Engineer	Shall be a registered engineer experienced in soils engineering; or such other person as the Council may specifically approve as being competent.
Drainage Classifications	Areas in which professional advice on flood hazard or stormwater drainage is appropriate prior to further development. Some such areas are merely low-lying and therefore requiring of special care, but also included may be areas which are poorly drained, significant natural depressions, potential overland flow paths and areas possibly subject to flooding from stormwater or ponding due to tidal influences or inadequate stormwater drainage.
Stability Sensitive	Areas in which professional advice on slope stability is appropriate prior to further development. Some such areas are merely sloping ground requiring special care, but also included may be areas subject to actual, suspected or potential slope instability. (See Section 36 of the Building Act 1991).
Road Or Street	Has the same meaning as "road" as defined by Section 315 of the Local Government Act 1974.
Applicant	In relation to any land or interest therein, includes an owner thereof, whether beneficially or as trustee, and his agent or attorney, and a mortgagee acting in exercise of power of sale; and also includes the Crown, the Public Trustee, and any person, local authority, board, or other body or authority however designated, constituted or appointed, having power to dispose of the land or interest therein by way of sale, and may include the subdivider's/applicant's representative.
Applicant's Representative	The person or persons appointed by the owner. (See Clause 1.2).
Urban Area	An area which is used or intended to be used solely or principally for residential, commercial, industrial or any other similar purposes. e.g. Living 1 and 2 and Business 1 - 5 environments.
Rural Area	An area which is used or intended to be used solely or principally for rural or lifestyle living purposes e.g. Living 3 and Countryside Environments.

1.8 Miscellaneous Materials

1.8.1 Unsatisfactory Foundation Material

Unsatisfactory foundation material shall be stabilised by over-excavating and replacing the excavated material with suitable compacted granular material. The depth of this stabilising material shall be sufficient for the intended use and be certified by a suitably qualified person.

1.8.2 Concrete

Weak mix concrete shall contain six parts of volume of combined aggregate to one part of volume of cement. It shall attain a crushing strength at 28 days of at least 10 MPa.

Ordinary grade concrete shall meet the requirements of NZS3108 "Concrete Production - Ordinary Grade" and obtain a crushing strength of 17.5 MPa at 28 days.

1.8.3 Cement Stabilised Bedding And Backfill

(See Sheet 24)

Cement stabilising of bedding and backfill will consist of the addition of 1 part cement dry-mixed with 20 parts of the appropriate aggregate material. Mixing will be done by concrete mixer for a minimum of two minutes.

Section 2
Application Processes

2.1 Following a Council Approval

Conditions of a Council approval may require the applicant to submit engineering drawings, specifications, design calculations and reports covering the following:

- Site earthworks
- Roading and access
- Water supply
- Sanitary sewerage
- Land drainage
- Any other services as appropriate (e.g. electricity, street lighting, telecommunications and gas)
- Report on site suitability, identifying restrictions on site development.

Where this is required, three sets of plans, and one set of specifications, calculations etc. shall be supplied.

The engineering plans, specifications, design calculations and reports will be examined by the Council. On approval, one set of drawings endorsed by Council will be returned. (Note - if preferred, Council will check one set of documents and on approval will receive the additional copies of the plans for endorsement).

Approval of plans is subject to the payment of plan inspection fees.

2.2 Commencement of Work

The applicants representative shall give the Council and affected utility services operators 24 hours notice of the intention to commence construction work and shall not allow any on site work associated with the resource consent unless;

- The Council has granted an approval.
- All other statutory provisions have been met. (e.g. permit to disturb archaeological sites)
- The requirements of the approval, including engineering drawings, specifications, design calculations and reports for the work have been satisfied, and necessary fees paid.
- Any Council contribution toward the cost of work has been approved.

2.3 Inspection of the work

The applicant's representative shall notify the Council and affected utility services operators 24 hours prior to requiring site inspections which are necessary at the following stages of the work:

- Completed earthworks and prepared subgrade
- Finished basecourse prior to the commencement of sealing
- Prior to pouring any concrete

- Testing where appropriate, and verification of as-built plans on-site prior to backfilling piped services and similar.

At completion of all works when as-built plans have been submitted and the site left neat and tidy.

Any work required to be tested should be pre-tested and proved satisfactory by the applicant before a test for approval by the Council is requested. Work shall not proceed until the inspection has been made and the work approved, or approval to proceed has been given.

Where an independent, suitably qualified person has been engaged by the applicant to supervise the work, at the General Manager's discretion that person may carry out some or all of the above inspections. If approved, the following conditions must be met;

- The name and qualifications of the person shall be provided
- A schedule of the proposed inspections and testing shall be submitted.
- At completion of the work, that person shall forward Form C as appended, documenting the inspections and testing carried out, and certifying that the work has been carried out strictly in accordance with the approved plans and these standards.

Council reserves the right to inspect the work and require changes as necessary to comply with the standards, despite the use of an independent supervisor.

2.4 As – Built Plans

(See Clause 1.3)

Where facilities and services have been provided by the applicant and construction work completed, "As-Built" plans relative to property boundaries and adequately labelled, dated, and certified by the applicant's representative shall be submitted showing the following details as constructed:

(NZS/AS1100 Technical Drawings to be used as a guideline)

- Sewerage reticulation - including the measured positions of manholes and other structures (including lampholes, pump stations etc.), inverts and lid levels, measurements to service connections from the centre of the downstream manhole cover, the length and position of service connections relative to property boundaries, the sizes and materials used for all pipes and fittings and pump details where applicable.

- Land drainage - details as (sewerage reticulation) above including drainage and flood path level information, position of all sumps, open water courses and culverts (inclusive of size and length).

- Water reticulation - including the measured position relative to property boundaries and depth of mains, fire hydrants, valves, tees and service connections, and the sizes, materials and classes of all pipes and fittings.

- Earthworks with final contours detailed and showing the total depth of fill including areas of major replacement of unsuitable material relative to property boundaries.

- Position of streetlighting, telecommunications, gas and electrical ducts, lines, poles, cables, transformer cabinets etc.

- Schedule of all manhole, sump, lamphole, valve and fire hydrant lid levels, and manhole invert levels in terms of DOSLI Datum to an accuracy of 10 mm, and the co-ordinates of the centre of the lids and the positions of connections and other structures (including telecommunications and electrical facilities etc.), in terms of New Zealand Mapping Grid (NZMG) to an accuracy of 100 mm and to NZMG co-ordinate system. All measurements are to be presented in metres. In addition, the position and levels of public roading in sufficient detail for use in a G.I.S. system, shall be provided to the above level and position requirements.

- Location of all classes of roads and private ways, together with their names as approved by the Council.

- Completed RAMM Forms (Appended) shall be included where public roads are constructed or altered. (See Clauses 1.4 and 5.14).

- Where utility services are required as conditions of consent, the applicant shall provide written confirmation from the utility service operator that such services have been completed.

NB: It is intended that future as-built information will be submitted in an electronic format, including plans, in an AutoCAD or dxf format, or whatever national survey standard is implemented.

The Council may require individual plans showing separate facilities and services for clarity of information.

In the event of a utility service connection, either not being provided although shown on the "As-built" plans, or not in the position shown, it shall be the responsibility of the applicant's representative to provide or locate the connection for the owner of the allotment, and provide the Council with revised “As-Built” plans.

2.5 Maintenance Period

(See Clause 6.6.2)

The Applicant shall be responsible for the maintenance of all works provided by the applicant which the Council will take over, for a minimum maintenance period of 6 months when requested by the Council. The maintenance period shall commence from the date on which the final inspection is approved, or issue of a resource consent completion or conditions certificate whichever is the latter. Where roading involves a second coat seal, the maintenance period for the sealing shall be for a period of not less than 2 months after the application of the second coat seal.

The applicant shall enter into a bond for 7.5% of the value of the works at the commencement of the maintenance period. The bond will be released on final acceptance at the end of the maintenance period, and payment of any fees.

Prior to final acceptance at completion of the maintenance period, the applicant shall satisfy the following requirements:

- Berm grass to be mown.
- Carriageways and footpaths swept.
- All sumps and piped disposal systems cleaned out.
- Removal of all weeds and noxious vegetation from berms, reserves etc.
- Any outstanding maintenance items completed.
- Written approval from other utility service operators as necessary.

2.6 Variations to Approved Engineering Documentation

Any variation to the Council approved engineering documentation shall be resubmitted by the applicant for reconsideration by the Council. Work shall not proceed until approval of the variation is granted by the Council and affected utility services operators.

2.7 Uncompleted Works Bond

Where agreed to by the Council, the applicant may enter into a bond as security against completion of works outstanding and satisfactory maintenance of the works during the maintenance period. Bonds will normally cover second coat sealing of roads and other minor works. However in special circumstances and at the discretion of the Council, a bond may be accepted at an earlier stage.

The bond shall take the form of an agreed cash deposit, or a formally signed bond supported by a guarantor, or other security acceptable to the Council. The amount of the bond shall be for 150% of the estimated value of the outstanding work plus 10% of the value of the works already completed. All fees and expenses relating to the bond shall be paid by the applicant.

Where compliance with the conditions of resource consent is issued under bond, the balance of the construction work outstanding shall be completed within the period specified by the Council. This will generally be for 3 months, but will not normally be permitted to exceed 12 months.

The bond for outstanding work is refundable upon confirmation of final inspection and acceptance by the Council following completion of the works and payment of all associated fees, and submission of a maintenance bond where appropriate..

The maintenance period for the work shall commence at the completion of the whole of the work, except as otherwise permitted for second coat sealing.

2.8 Damage

Damage caused by the applicant's works shall be the liability of the applicant and shall be repaired on the written instruction of the Council or affected utility services operator. If remedial work is not commenced within 48 hours of the written instruction (or sooner if the circumstances warrant it) and completed as soon as practicable, the Council may carry out the work at the applicant's cost. This provision includes the removal of mud and debris from existing roads and drains, which may be required daily in the interest of traffic safety.

2.9 Emergency Procedure

If during the course of construction, a situation arises which may endanger the security of public or private property or the operation of a public facility, the Council may instruct the applicant to undertake such remedial measures as considered necessary to abate the danger.

Where the Council has to carry out emergency work on behalf of the applicant, the cost of the work will be recovered from the applicant.

2.10 Dust and Silt Control

The applicant shall employ the best practical means to ensure that the problem of windblown dust or soil nuisance or waterborne erosion and siltation is minimised during the course of construction works.

Cut and fill areas shall be re-topsoiled, sown and fertilised as soon as possible after earthworks to keep scour damage and wind-blown sand and soil to a minimum. This work should be programmed to suit seasonal conditions. The batter faces of cuts and fills should be protected by grassing, hydroseeding, tree planting, or suitable vegetative cover.

Silt traps shall be constructed to the design or otherwise accepted standards and regularly cleaned of collected silt to ensure their effective operation during rainfall events.

2.11 “Stopwork” Notices

Any person or persons carrying out `on site' works as part of any Council approved development project shall cease such work, or part thereof, immediately upon receipt of a written stopwork notice specifying restrictions and issued by a Council Officer, or authorised agent.

The developer shall have the right to appeal to the General Manager to override or amend such stopwork notice. A copy of the General Manager’s written decision shall be recorded on Council’s resource consent or project file. Work may recommence when the Council advises in writing.

Noise from any construction works, or similar, shall be controlled to meet the limits specified in NZS 6803P, and be assessed in terms of that standard.

Section 3
Site Suitability and Earthworks

3.1 General Requirements

(See Forms A, B and C as appended)

Where any land development or resource consent involves the carrying out of earthworks, or the land is subject to any hazard, or the suitability of the site for the development needs to be determined, the applicant shall supply a report prepared by a suitably qualified specialist in support of the proposal when requested by the Council. This may need to cover hazards from flooding, erosion, land stability etc. or an evaluation of the suitability of natural ground for the foundations of buildings, roads, utility services, on site waste disposal, or other works as appropriate.

The suitability report should describe the general nature and character of the site and be in sufficient detail to determine the following:

- The stability of the natural ground and its suitability for the proposal for which a resource consent application is being made. (See Section 36 of the Building Act 1991).
- Requirements for proposed earthworks to ensure the stability of the land is maintained when any necessary roads, accesses and utility services are provided.
- Any restrictions on the removal of vegetation or on earthworks.
- The suitability of the site for the disposal of stormwater or wastewater where reticulated services are not available.
- If future building and development needs to be restricted due to specific areas that are unsuitable, noting minimum floor levels in flood prone areas and requirements to maintain overland flood paths.
- The effects of tidal forces and rising sea level, and the requirement for filling where land is below 2.5 Metres Reduced Level to DOSLI Datum
- If any further soils investigations are necessary or specific design required for future excavations or foundations on the new allotments, specifying with supporting evidence any limitations. (NB: Confirm if Building Consents are necessary, for retaining walls, etc).

- Any specific access and water crossing recommendations.

Where a suitability report recommends restrictions be applied to specific areas of a land development proposal, a plan defining those areas will be required to accompany the report. Any restrictions on development contained in the suitability report must be presented in tabular form with definite conclusions and recommendations to enable the report to be easily interpreted . Reports used as the basis of a Consent Notice to be registered against the title of the land affected are required prior to any resource consent. (See Forms A , B and C as appended.)

3.2. Report on Completion of Construction

Where excavation or filling has been carried out, a report identifying the extent of the work and the inspection and test results shall be submitted when requested by the Council on completion of construction and prior to the final inspection of the development. This shall be accompanied by a statement of professional opinion as to the compliance of the filled ground to the specification and the suitability of the area for development. (See Forms A, B and C as appended.)

Section 4
Works or Services to be Provided

4.1 General Requirements

Every development shall be suited to the proposed use and appropriately serviced at the applicant's expense.

The following services will be required where specified in these documents:

- Streets and accessways
- Water supply including pumping stations and storage reservoirs.
- Sewage disposal including pumping stations and treatment facilities.
- Land drainage
- Electricity supply
- Street lighting
- Telecommunications.

Any works contribution or upgrading requirements specified in these documents shall be read in conjunction with the Local Government Act 1974.

Except as provided by a resource consent all lots shall be provided with a connection to each utility service suitable for servicing the "buildable" area. Street lighting shall be provided in all urban roads and in all areas set aside for frequent public use. Where a reticulated service is not available, Council may approve a subdivision provided an adequate level of service can be provided by other means suitable for the proposed development.

The applicant should consult with the various utility services operators prior to submitting a proposal for land development. Transit New Zealand must be consulted for approval of any access or other works affecting state highways. The design criteria and minimum standards outlined in this section reflect Council's requirements. Other utility services operators may impose additional conditions to be met. The Council is currently the utility services operator responsible for water, sewerage, street lighting, and land drainage.

Open Space Environments adopt standards applying to the surrounding Environment, or if there is more than one Environment contiguous to the site, then the more stringent standard applies.

All services including streets shall be extended to the property boundaries where this will provide for the development of adjoining properties and be adequate for the entire upstream catchment, or area to be served by the existing or proposed services.

4.2 Connection To Existing Services

(Also see forms WA, WB and WC for water supply as appended)

The connection of new utility services to existing services is the responsibility of the applicant, and approval may be granted by resource consent. Notice of the intention to connect to Council owned services shall be made to the Council in writing, (following successful testing of the reticulation where applicable). Upon receipt of written approval by the Council the applicant shall then make all appropriate connection arrangements which may only be carried out by contractors authorised by Council. All connections require inspection and approval by an authorised Council Officer/agent prior to backfilling, and as built measurements recorded and certified.

When requested by the Council, the applicant shall provide confirmation of completion and as-built plans of any public utility service connection installed to satisfy a resource consent condition of approval (e.g. service connections installed in conjunction with building consents and similar).

The applicant shall be responsible for the cost of modifying, extending, or removing existing services as required, unless otherwise agreed in writing with the appropriate utility services operators. Where an easement is required by the Council or a utility services operator over utility services or associated access, this shall be created at the applicant's expense unless otherwise agreed in writing.

Where a connection has to be made within private property not owned by the applicant, it is the applicant's responsibility to obtain the approval, and make all necessary arrangements with the property owner concerned. Evidence of that owner's approval will be required by the Council.

Section 5
Access

5.1 General Requirements

(See Tables 1 And 2)

All properties shall be provided with a legal and practical means of vehicle access. This may be by the provision of private accessways and public roading. Subject to requirements of the District Plan or resource consents, private accessways will serve no more than 8 lots and no more than 8 dwelling units. In rural areas, accessways no longer than 300 m, and with adequate vehicle passing bays, may be approved over existing legal road alignments not maintained by Council if they serve no more than 8 lots. The maintenance of such accessways within the legal road will be the responsibility of the properties served.

a) Where resource consent approval involves the Council accepting on-going maintenance responsibility of any road not previously maintained by the Council, the developer shall:

   i) Construct and/or pay all costs to construct such road, including ancillary services, and vesting land as road necessary to satisfy Council standards along the subject property road frontage, and extending such improvements to the existing Council road maintenance termination.

b) Where resource consent approval involves forming, diverting or upgrading any existing Council maintained road within, or adjacent to the approved development because of new or increased traffic, the developer shall;

   i) Reconstruct the road and ancillary services in accordance with Council standards, and/or pay all costs for such road work which shall extend to not less than the centreline of the improved road wherever such road bounds the development. Where a development bounds both sides of an existing Council maintained road, the applicant shall be responsible for reconstructing and/or paying all costs to reconstruct both sides of the road and associated ancillary services necessary to satisfy Council standards.

      Where improvement works necessitate road intersection construction or amendments, all costs shall be borne by the developer unless agreed otherwise in writing by the Council.

   ii) Contribute a fair and reasonable payment assessed by the Council towards the cost of any road improvements adjacent to the development, or upgrade such road and ancillary services as necessary to satisfy Council standards, or an approved specific design.

The Council may require construction, upgrading, or removal of any vehicle entrance crossing, and sight distance improvements or other works considered necessary as part of a resource consent affecting any road or private way.

When preparing a proposal for land development, the applicant should implement where practicable the design philosophies discussed on pages 29 to 35 of NZS 4404 Code of Practice for Urban Land Subdivision.

The roading, accessway and footpath layout shall take into account the ultimate servicing requirements of the whole of the site, and of adjacent sites. Where practicable, the width of road reserves and accessways shall allow for the potential development in line with the permitted uses in the District Plan. Where an indicative road is shown on the District Plan, the applicant will be responsible for forming or contributing towards the cost of forming it, as required by Council.

The separation of pedestrians and cyclists from vehicles by the provision of overland footpaths and cycle ways is encouraged by Council. The linking of cul-de-sac heads to primary roads and the shortening of pedestrian walking distances by the provision of pedestrian ways will normally be required.

The reservation of strips of land between any road and an adjoining property will not be permitted, except where authorised by resource consent.

When assessing future roading criteria in urban Environments the area of land to be serviced excluding reserves shall be divided by 500 m². Fractions of 0.6 or more will constitute one residential unit.

5.2 Public Roading

(See Tables 1 And 2)

All public roads within a development shall be designed and the construction supervised and certified at completion by a suitably qualified person with road construction experience. The design shall conform to a recognised design standard or method approved by the Council. The applicant's representative shall produce engineering plans for the construction work, and obtain the approval of Council prior to its commencement. On completion of the work, the supervisor shall fully fill out the appended RAMM forms. These shall be forwarded to Council prior to final completion. It is recommended that the applicant discuss the proposed roading with Council staff at an early stage to determine any special requirements.

Acceptable design standards include;

- Austroads Design Manuals.
- NZS 4404:1981 'Code of Practice for Urban Land Subdivision'.
- Land Transport Safety Authority publications.

Note that the requirements of Tables 1 and 2 will take precedence over the above standards.

Calculations supporting the design, including all testing of the subgrade shall be submitted to Council with the engineering drawings. The testing shall be undertaken by a Telac Registered Laboratory.

Specific requirements for roading include;

(a) Batters and Embankments

All batters to roads are to be formed outside the formation width of the road (see sheets 1 and 2). Where possible, batters should not be steeper than 1 in 3 (33%). Steeper batters are subject to specific design, or the use of retaining structures. Batters flatter than 1 in 3 should be topsoiled and grassed to prevent erosion. The formation shall be such that vehicular access onto each lot, including rear lots, shall be able to be formed at a gradient not steeper than 1 in 5 (20%) from the back of the footpath, unless a specific exemption is given by the Council. All necessary stabilisation and retaining works are the responsibility of the subdivider.

(b) Intersection Design

The kerb line radius at intersections should be consistent with likely vehicle and pedestrian usage, but not be less than 8m. Major intersections such as the junction of area roads with principal roads or greater, shall be specifically designed to provide for bus and heavy vehicle usage.

The preferred angle of intersection is 90·. The minimum angle of carriageway intersection should be 80· for non-arterial roads. Carriageway alignment may be offset from the road reserve alignment to improve the intersection angle. Two side roads intersecting the same road (Tee intersections) should be offset at least 40m where practicable. Tee intersections are preferred to cross intersections particularly from minor roads. Acute-angle, wye and multi-leg intersections are to be avoided.

The number of road intersections should be minimised. Intersections on curves, particularly on the inside of curves shall be avoided. The location of the intersections shall take into account the minimum sight distances. Early consultation with Council staff or agents is recommended.

Wherever practicable the gradient within 30m of intersections on local roads should not exceed 1 in 10 (10%) and should preferably be less than 1 in 33 (3%).

(c) Berms

The shape, slope and vegetation of berms shall be satisfactory for stormwater runoff, maintenance, location of services and vehicle crossings to properties. To achieve satisfactory drainage, crossfall should be at least 1 in 30 (3%) but may be varied between 1 in 30 (3%) and 1 in 6 (17%) provided that the sag or summit curves at crossings can be satisfactorily negotiated.

Crossfall may slope towards lots provided that water from the berm will not be concentrated onto any of the lots.

(i) Cul-de-sacs

Residential cul-de-sacs should comply with Sheet 2 (see Table 4 for sealing requirements).

In Industrial and Commercial areas (Business 1 - 5 Environments) "no exit" roads should be avoided except where constrictions of topography or land use zonings support their use. Where they are used in these locations a turning circle radius of 13m minimum will be required.

Hammerhead or "T" cul-de-sacs will be considered in residential areas only, and be subject to specific design.

Table 1 - Rural Road Requirements

Living 3, and Countryside Environments

	-Annual Average Daily Vehicles (Aadv) -Annual Average Heavy Vehicles	Legal Road Width	Min Carri-Ageway Width (Incl. Shoulders)	Traffic Lane(s) Min. Seal Width	Desired Traffic Lane(s) Sealed Width	Surfacing Type
A	1 To 250 Aadv 1 To 80 Heavy Veh.	20.0	7.0	6.0	6.0	Seal
B	250 - 800 Aadv 80 - 270 Heavy Veh.		7.5	6.5	7.0	
C	800 Plus Aadv 270 Plus Heavy Veh.		8.5	7.5	8.0	

Note:

- In general all roads constructed as part of a development will be required to be sealed where the road will service properties which are predominantly urban, lifestyle, horticultural or similar, or which extend or join a sealed road, or where land is vesting as road for a new development. However where special circumstances exist Council may by special approval permit roads to be unsealed. Approval for this shall be requested or confirmed at the time of resource consent application.
- Where new unsealed roads intersect with sealed roads, the seal shall be extended at least 20m along the new road from the intersection.
- The foundation and surfacing requirements for sealed rural roads shall be as for urban roads.

- Legal roads down to 15 m wide may be approved on no exit roads carrying low traffic volumes, subject to contour and alignment constraints.
- Sealing shall be as per clause 5.6.
- Any approved development that is reliant for access off a proposed Council maintained legal road with a gradient steeper than 12.5% (1 in 8) shall surface such legal road gradients with asphaltic concrete at least 25 mm thick.

Table 2 - Urban Area Road Requirements

Living 1 and 2 and Business 1 - 5 Environments.

CLASS		LEGAL ROAD WIDTH	CARRIAGEWAY WIDTH	FOOTPATH WIDTH (EXCL. KERB)	SUGGESTED MIN. HORIZ. CURVE RADIUS	MINIMUM CLEGG IMPACT VALUE	MAXIMUM ALLOWABLE BENKELMAN BEAM DEFLECTION
A	CUL-DE-SAC (Up to 150m)	14	7.5	1.2m (one side only)	15m	40 NB: This value includes areas 100 mm outside the edge of the seal, or equivalent	2
B	SUBURBAN ROADS (Up to 500m)	18.0	8.2	1.5m	45m		1.5
C	SUBURBAN ROADS (Over 500m)	21.0	11.0	1.5m	80m		1.5
D	PRINCIPAL SUBURBAN ROADS	23.0	13.0	1.5m	80m		1
E	PRINCIPAL INDUSTRIAL AND COMMERCIAL ROADS	23.0	13.0	1.5m	80m		1
F	SERVICE LANES	8.0m	6.0m	0.9m	15m		1

Note:

- Any road development not specifically complying with classes shown shall upgrade to the next class. e.g. 200m cul-de-sac becomes class B.

- For Class A - Cul-de-sacs, the following conditions will apply;
  - Provision is to be made for additional parking and/or widening of the carriageway if further subdivision is possible.
  - Widening may be required at an intersection with another road to allow easy entry and exit to the street, with corner splays as necessary.

- All urban roads are to be sealed with kerb and channelling and piped stormwater disposal provided unless specific exemption is granted. (Sealing as per Clause 5.6).

- Any approved development that is reliant for access off a proposed Council maintained legal road with a gradient steeper than 12.5% (1 in 8) shall surface such legal road gradients with asphaltic concrete at least 25mm thick.

5.3 Pedestrian Accessways and Cycle Tracks

Pedestrian accessways shall be paved to their full width, in accordance with the requirements for footpaths including dished channels and sumps where necessary.
Both sides of pedestrian accessways shall be bounded by a fence. (See Sheet 25).

Tracks for bicycle use shall be constructed to standards specified for footpaths. Where used by both pedestrians and cyclists, the minimum paved width shall be 2.5m assuming no side obstructions or walls. Where these are present, additional clearances should be provided. Stormwater disposal, fencing, handrails, and lighting shall be provided as appropriate to the specific situation.

5.4 Private Accessways

The minimum design requirements of accessway pavements shall conform to Sheets 7, 8 and 9.

Where the minimum subgrade soaked CBR rating is 7, the metal types given below and details given in Sheet 4 may be used. Test results on the subgrade are to be provided to Council.

- The properties of sub-base metal shall comply with the requirements of NZS4404. Generally premium blue/brown quarry run will be suitable.
- Basecourse material for private accessways shall be either GAP 40 complying with NZS 4404 or Transit NZ AP40. Alternatively, lime stabilisation of materials not meeting these specifications may be used, subject to Council approval of a specific design. An application for approval shall include the specification to be used supported by the necessary test results, and certified by a Telac registered laboratory.

Where the minimum subgrade CBR rating is less than 7, the pavement shall be subject to specific design.

Inspection and approval of the subgrade by the Council (or the supervising engineer as agreed with Council) will be required before the placement of any metal course. All weak areas of the subgrade shall be improved by one of the methods described in NZS4404.

Immediately prior to any form of sealing, a strip 600mm wide adjacent to each channel shall be sprayed with an approved ground sterilising weed killer at the manufacturers recommended rate of application.

Standard vehicle crossings shall be provided for private accessways where they join a public road. Forming an intersection, with kerbing continuous between road and accessway will not be permitted.

Resource consent approval will require a schedule of all existing and proposed right of way and/or access lot users for assessing category requirements on sheets 8 and 9.

The applicant shall supply any RAMM pavement data requested by the Council to justify the standard of construction work undertaken. (See Clause 1.4)

Gradients steeper than 1 in 8 (12.5%) in urban areas shall be concrete reinforced with 665 mesh (See sheet 8).

Table 3 – Minimum Privateway Requirements

(All Environments - See Sheets 7, 8 And 9)

TYPE	No OF DWELLING UNITS OR EQUIVALENT TRAFFIC USEAGE	PRIVATE-WAY WIDTH	CARRIAGEWAY WIDTH	FOOTPATH WIDTH	MINIMUM CLEGG IMPACT VALUE
URBAN Living 1 & 2 and Bus 1-5 Environments (See sheet 8)	2 - 4	4.0	3.0	-	40 for 90% of the surface tested at 20 m intervals and not record any value less than 30.
	5 - 8	6.0	4.5	950 mm (one side)	
	No OF PROPERTIES SERVED	PRIVATE-WAY WIDTH	CARRIAGEWAY WIDTH		
RURAL Living 3 and Country-side Environments (See Sheet 9)	2	4	3	-	
	3 - 5	6	4	-	
	6 - 8	10	5.5	-	

Note:

- Adequate turning area and passing spaces shall be provided where the length of the access requires it.
- Minimum inside radius of curves shall be 8 m suitable for truck access. Additional widening shall be provided on curves.
- Stormwater from accesses shall not discharge over the footpath. Provision is to be made at the road boundary, by means of sumps and shaping of the surface to collect this water and discharge it to the stormwater system. Where accesses fall away from the road, stormwater sumps shall be provided as necessary to ensure that stormwater from the access does not run onto any lot. The size of a sump grating shall be adequate for the area draining into it, but shall not be smaller than 300 mm sq.
- Business environments subject to regular heavy vehicle manoeuvring will require specific design, including sealing (see Clause 5.9).
- Sealing as per sheets 8 and 9 for urban and rural privateways.

5.5 Testing Prior to Sealing

Testing of road or private accessway formation is required prior to sealing with a flexible pavement. This will normally be carried out using a Clegg Hammer. Benkelman Beam testing conforming to NZS 4404 shall be used where required by the Council. For rigid pavements, the designer shall identify appropriate test requirements.

Clegg Hammer testing is required at 20 metre centres at the edges and centre of the road and shall be sealed at the first favourable opportunity in terms of adequate weather conditions after acceptance by Council. (See table 2).

5.6 Seal Coat Types

The following tables list acceptable seal coat types for Public roads, Privateways and Parking areas.

Table 4 - Seal Coat Types For Public Roads

(To be in accordance with Transit New Zealand specifications)

FIRST COAT	SECOND COAT
Chip seal	Chip Seal
Chip seal	Asphaltic Concrete
Concrete to Transit New Zealand P13/p Specification for Cement Concrete Highway Pavement	

Note:

Chip Seal Grades

Urban Residential	
First Coat Grade 3	Second Coat Grade 5
Urban Other	
First Coat Grade 2	Second Coat Grade 5

- Some seal coat types noted above may be particularly applicable to specific situations, e.g. where the slope is steep, or heavy vehicles turn. The design engineer shall specify a suitable seal system for the conditions
- The above pavements are subject to specific design
- Cul de sac heads shall be sealed using either;
  - 3 coat chip
  - 2 coat chip plus slurry
  - 1 coat chip plus asphaltic concrete

  Note: RAMM requirements as appended.

- Pavement units to NZS 3116 may be approved for specific projects. Masonry units shall be readily available standard units, complying with NZS 3116. The design of the road shall be carried out by a suitably qualified person. Edges of the paved areas shall be adequately confined, normally by concrete nibs.

5.7 Carparking

Where carparking and/or vehicle manoeuvring is required and not specifically identified or exempt in the conditions of consent the following construction requirements will apply;

5.7.1 Environments

Living 1 and 2 - As per Sheet 8.

Business 1 - 5 - As per Sheet 8 but surfacing with 25mm of asphaltic concrete and increasing the minimum Clegg value in note 4 to 40.

Open Space - As per Sheet 8 or 9 as applicable.

Countryside and Living 3 - As per Sheet 9

5.8 Miscellaneous Requirements

(a) Additional Subgrade Drainage
(See Sheets 1, 3 and 8)

Any permanent wet spot in the subgrade shall be drained to the underchannel drainage system. Where the wet area is below the level of the underchannel drain, it shall be drained using approved filter drain coil connected to the nearest stormwater system.

(b) Batter Drains
(See Sheets 1, 3 and 8)

Batter drains shall be constructed where the topography is likely to cause ground or surface water to concentrate on the road berms, (e.g. at the toe of cut batters). Batter drains shall consist of an approved filter drainpipe 65-100 mm diameter in a trench backfilled with 20/7 “Pages” clean metal. The drains shall be constructed 500 mm outside the legal road boundary or as practicable, and shall be connected to the stormwater drainage system.

(c) Kerbing and Channelling
(See Sheets 1, 3 and 8)

Concrete kerb and channel, either cast in situ or slip formed shall be laid on both sides of the carriageway where urban standards are required. Heavy duty kerb and channel is to be constructed in all commercial and industrial roads, service lanes and commercial rights of ways. Kerb blocks may be used in rights-of-way and access lots.

Mountable kerb blocks or their slip formed equivalent may be approved for road islands, and for service lanes.

(d) Sumps
(See sheet 13)

Sumps with gratings parallel to the water flow, shall be provided as follows:

- In channels draining one lane in such a position that the run of water in any channel is 90m, and for channels draining two lanes, or where properties are falling towards the road, 75m.
- At intersections, at the kerb line tangent points or on the top side of pram crossings.
- At changes of gradient or direction in the channel where there may be a tendency for water to leave the channel.

A double sump shall be provided in the following positions:

- At the lowest point in a sag vertical curve; where the total length of channel draining into the sag exceeds 100m;
- At ends of a cul-de-sac where water falls to the end (specific design).
- On all channels where the gradient is steeper than 1 in 15. The sump grills shall be 50 mm below the adjacent level of the channel.

If the main stormwater drain is of adequate size and a manhole is not conveniently located, a sump lead may be saddled directly to that drain, subject to Council approval (e.g. resource consent or engineering plan approval).

Infill concrete and thin plastering is to be avoided.

(e) Dished Channels
(See Sheet 3)

- Where crossfalls in Parking Bays cannot be a continuation of the road cross-fall, a 600 mm wide dished channel may be used.
- Where a significant amount of surface water will be concentrated by the footpath in a pedestrian accessway it shall be collected by a dished channel and disposed of through a 450 mm x 450 mm sump (see drawings).

(f) Footpaths
(See Sheet 1 and Table 2)

- Footpaths shall be 100 mm thick 17.5 MPa concrete or pavement units as approved Service lane footpaths are to be 150 mm thick and reinforced with 665 reinforcing mesh.
- Footpaths constructed of alternative materials such as asphaltic concrete, masonry blocks or paving units may be permitted in certain circumstances, relating to pedestrian flows, and compatibility with surrounding ground characteristics. Approval will be specific to the project and in accordance with the manufacturer's requirements.
- Construction or repairs that create narrow trenches, irregular patches or similar, cracks, or uneven surfaces, will not be permitted.

(g) Pram and Wheelchair Crossings
(See Sheet 3)

A pram and wheelchair crossing shall be provided in the kerb line at all intersections. The crossing entrance shall be connected to the footpaths and have a maximum gradient of 1 in 8 (12%). Where possible, sumps shall be sited on the top side of the crossing.

(h) Vehicle Crossings
(See Sheets 7, 8, 9, 10 and 11)

A vehicle crossing shall be provided between the kerb line and the boundary at the entrance to all entrance strips to rear lots, privateways and service lanes, and at any other place where the location of the future driveway to a lot can be determined with reasonable certainty.

A level area shall be provided on the accessway at the intersection with the road, with adequate sight distances.

Where an unsealed accessway joins a sealed road, the accessway shall be sealed where necessary, but to not less than the property boundary, to prevent metal migrating onto the road.

Construction or repairs that create narrow trenches, irregular patches or similar, cracks, or uneven surfaces, will not be permitted.

5.9 Road Names
(See Sheets 5 and 6)

The applicant shall select a choice of 3 names for each new public road being constructed and forward them in order of preference to the Council with the application for resource consent. A brief explanation of the reasons for the selection should also be submitted. The Council's decision will be notified to the applicant so that provision of road name signage, etc., can be made.

5.10 Street Signs

(See Sheets 5 and 6)

Road name, walkway and service lane signs shall be erected at all intersections. "No exit" signs are to be erected on all cul-de-sacs or dead end roads.

Street signs are to be made of aluminium with details as shown on Sheets 5 and 6.

5.11 Traffic Signs and Road Marking

Traffic signs and road marking shall be provided complying with Transit New Zealand Manual of Traffic Signs and Markings, Parts 1 and 2 unless exempted by the Council as part of the relevant approval being gained. This is to include stop and give-way signs, and roadmarking at intersections, keep left signs on islands, warning signs etc.

5.12 Bridging and Other Structures

Bridges, retaining walls etc, are classed as buildings under the Building Act, and therefore require a Building Consent before construction. All such structures shall be designed according to the requirements of the Building Act, and the construction shall be supervised by a suitably qualified person. The design and supervision of the construction shall be certified by the designer/construction supervisor as complying with the drawings and specifications, and the requirements of the Building Act. It shall be the applicant's responsibility to obtain all necessary consents.

Where any structure will be required to carry cables, pipelines, or similar, provision should be made for such during design.

Bridges and other structures on private accessways shall have kerbs and marking posts as practicable and a minimum design life of 50 years.

Bridges on public roads shall comply with the requirements of the Transit New Zealand Bridge Manual. The minimum design life shall be 100 years. Engineering plans and cost share proposals where applicable are to receive written Council approval prior to work commencing on-site unless otherwise agreed in writing by the Council.

5.13 Street Lighting

(See Clauses 9.1 and 9.2)

Street lighting shall be provided in all urban streets and areas set aside for frequent public use. Cabling shall be taken to the closest pillar box and a fuse shall be provided at this location

Street lighting shall be designed for the functional classification of the road to the illumination criteria specified in NZS 6701 consistent with materials used by the Council.
Lighting columns shall be either reinforced concrete or galvanised hollow steel. Lamps shall be down facing on outreach arms and comply with NZS 6705.

The following guidelines should generally be followed (except for arterial routes);

- Mounting height of 7.5 m
- Standard 70W HP Sodium Lamps
- Approximately 80 m spacing

Alternative proposals are subject to approval by the Council. These must take account of availability of parts, maintenance, and operating costs of the system proposed.

5.14 Completion

On completion of all other works, the berms shall be spread with first quality topsoil and compacted to a depth of 100 mm. The topsoil shall be graded to kerb top and footpath edges, and may be finished 15 mm high to allow for settlement except on the low side of the footpath where the topsoil shall be finished flush to prevent water ponding.

Superfluous vehicle entrance crossings and similar along the road frontage of any development are to be removed and any broken footpaths or other non-complying facilities or services be removed or repaired as necessary at the applicants expense.

After top soiling the berms shall be sown with a seed mixture the generic characteristics of which are such that the grass cover is low growing, with a robust and deep rooting system, and well suited to the soil conditions. An 80% grass strike, must be achieved and the grassed areas shall be maintained free of excessive weed growth and shall be kept mown throughout the maintenance period.

All poles, sign posts, light standards, markers, power transformers, boxes, etc, set in grass berms shall be finished off with a concrete mowing strip surrounding the base, flush with finished ground level, 150 mm wide and 75 mm thick.

Sealed roads and privateways shall be swept, and all sumps shall be cleaned out.
As-built plans complying with Section 2.5 of this Standard shall be provided.

Where Council roads are constructed or altered by the applicant, collection of RAMM data (as appended) shall be carried out by a suitably qualified and experienced person, and submitted to the Council for approval. If such data is not provided, inadequate, or incomplete Council approved personnel may complete the work with all costs being borne by the applicant. (See Clause 1.4).

Section 6
Water Supply and Reticulation

All lots within Living 1 and 2 and Business 1 - 5 Environments shall have water connections to the Council system unless the Council confirms in writing that such requirements are unwarranted, unavailable or unsuitable.

Resource Consent approved in any Environment may require connection to Council's water reticulation system. Conversely, developers wishing to connect in Environments other than Living 1 and 2 and Business 1 - 5 will be subject to availability of water.

The following documents shall be read in conjunction with this section of these standards:

- The Whangarei District Council Water Supply Bylaws 1997
- The Whangarei District Council Water Services Hygiene Code
- The Whangarei District Council Water Services Approved Materials List
- The Whangarei District Council Specification for the Construction of Water Mains
- The Whangarei District Council Specification for the Installation of Water Service Connections.

The most up to date of these publications shall supersede any conflicting requirements of older documents.

6.1 Service Requirements

Where a water supply is available, or where a supply and reticulation system is to be provided as part of a subdivision or development, it shall be adequate for fire fighting purposes and for estimated domestic, commercial and industrial consumption. The design shall conform to the New Zealand Fire Service's Code of Practice 1992 or current revisions, and allow for future land use as set out in the District Plan, assuming complete urbanisation where applicable. Where necessary, Council will investigate the capacity of the existing water supply facilities to determine their adequacy, at the applicant's expense.

At Council's discretion, isolated small subdivisions or similar outside existing reticulated areas may be served by private water supply systems. The applicant is advised to consult with the New Zealand Fire Service, Northland Health and the Northland Regional Council regarding any necessary approvals.

The Council shall have the right to specify the diameters and classes of pipes to be used for all reticulation within the subdivision or development, and will provide on request details of the working pressure or pressures at the point or points of connection to the existing reticulation for design purposes. Where the existing reticulation or a proposed extension can not comply with the minimum flow requirement, the applicant may be required to provide and install elevated storage and/or booster pumping systems to the approval of the Council. Where pressures are likely to exceed recommended levels Council will require that pressure reducing devices be installed to ensure acceptable working pressures.

6.2 Basis of Design

6.2.1 Water Demand

The development shall be reticulated with a piped water system adequate for fire fighting purposes for that class of development. It shall also be designed to supply all domestic, commercial and industrial consumption for the economic life of the development. The design shall provide for annual, seasonal and peak demand utilising the available pressures in the existing mains. The design shall provide for a minimum domestic demand of 300 litres/head/day with a peak flow of at least twice this amount. The water supply system shall be constructed to the boundaries of the approved development at the applicants expense and be capable of serving the entire subdivision or development and any undeveloped land beyond for land use likely to prevail during the working life of the system. The working life shall not be less than 70 years.

The water demands for commercial and industrial areas or for irrigation shall be analysed and specifically allowed for in the design.

The reticulation shall be sized in accordance with the requirements for fire fighting or residential, commercial, or industrial demand whichever is the greater. Where pressures or flows cannot be met directly from the existing reticulation, pumps or reservoirs or both may have to be installed as part of the subdivision or development, at the applicant's expense. The design of these components must be approved by the Water Services Manager or authorised representative. Pumps shall be capable of easily exceeding the pressures and flows required and a standby pump must also be provided. The reservoir shall be sized to provide a minimum of one hour's fire fighting supply or as specified in the New Zealand Fire Service Code of Practice for Fire Fighting Water Supplies. The reservoir shall also have sufficient storage for two days supply at maximum daily draw off rates. A Council approved telemetry link will also need to be provided for control of pumps and reservoir levels. The reservoir site shall be vested in the Council and be large enough to provide for future additional storage as assessed by the Council. An access and water supply easement may also be required where the supply line runs over private property.

6.2.2 Fire Risk Classification

Unless stated otherwise the fire risk classification shall be as follows:

- Class B - Congested industrial and commercial areas containing multi-storey buildings, large department stores, extensive shopping malls, factories, commercial and office property, theatres, cinemas, bulk liquid fuel terminals, etc.
- Class C - Concentrated built up areas not falling within class B, areas of multiple industrial risk, large schools, large colleges, and large hospitals, etc.
- Class D - Business and commercial areas not falling within classes B or C.
- Class E - Any area within a Fire District that has a reticulated water supply and does not have risks that would place it into classes B, C or D including detached and semi-detached residential units.
- Isolated Risks - Any isolated risks within an area with a lower water supply classification should be classed at a level appropriate to the risk.

An isolated risk within a reticulated area that has a significantly higher fire risk category than the surrounding area may use auxiliary water to make up the balance of the water supply required. When this is done the auxiliary supply shall provide the required flow for 1 hour and access to that water shall be available within 90m of the risk. Hydrants, connections and access to the auxiliary supply shall be provided to the standard required by the local New Zealand Fire Service Area Commander.

An isolated risk classified B, C, D or E, within an unreticulated area, shall have sufficient auxiliary water provided to meet the required flow for 1 hour and access to this auxiliary water shall be available within 90m of the risk. Hydrants, connections and access to the auxiliary supply shall be provided to the standard required by the local New Zealand Fire Service Area Commander.

The minimum standard of water supply for fire fighting shall be as set out in the following table. The required flow is to be obtained from the maximum number of fire hydrants as scheduled within 270m of any fire risk.

Table 5

Risk	Flow (Litre / Sec)	Max. No. Of Hydrants
Class E	25	2
Class D	50	3
Class C	100	4
Class B	200	8

6.2.3 Fire Fighting Water Requirements

The minimum fire fighting residual running water pressure should be 100 kPa at any fire hydrant.

The minimum working residual water pressure, in other than fire fighting conditions, should be 300 kPa at the ground level within the building envelope of each lot. The minimum flow for an individual connection shall be 20 litres per minute for a 20mm connection. The maximum static water pressure shall be 700 kPa except where approved by the Water Services Manager. In cases where the static pressure exceeds 700 kPa a pressure reducing value may be required. Pipe working pressure classes are as follows:

Table 6

Class of pipe	Maximum Working Pressure	
	Metres of Head	kPa
D	120	1200
E	150	1500

Approval for dedicated sprinkler and fire fighting watermains will be given at the discretion of the Water Services Manager. All dedicated watermains for sprinkler systems must have a Council approved testable double check valve backflow prevention device together with isolation valves for testing located within, but close to the property boundary together with a detector check valve. All dedicated fire fighting watermains with hydrants connected to them shall have an RPZ backflow prevention device together with isolation valves for testing located within, but close to the property boundary together with an electromagnetic water meter, or combination meter. The backflow prevention device must be mounted above ground level and adequate protection afforded to avoid damage.

6.2.4 Design Requirements

The design of subdivision or development reticulation incorporating the general requirements shown below is to be submitted in duplicate on A3 sized paper if CAD designed or larger if drawn by hand. The design drawings are to include the layout (showing all pipe work including service connections), long sections or contour plan, reduced levels, details of the connection into the existing reticulation and other special connections. Also to be included are engineering calculations confirming that the required pressures and flows can be met from all hydrants and service connections. The drawings and calculations shall be checked by the Water Services Manager or his representative who will complete an **"Application for a Water Supply to a Subdivision or Development, Form WA".** The completed form and the drawings showing any alterations shall be returned to the applicant's representative. If adjustments to the design are required a new set of amended drawings shall be submitted to the Council prior to approval being granted. Only drawings stamped and signed by the Water Services Manager shall be deemed approved drawings. Unless specifically stated otherwise, the approval of drawings does not supersede the requirements of these standards.

6.2.5 Construction Requirements

All work on water assets that will become part of the public system must be undertaken by Contractors who are familiar with this document and suitably qualified to work with the relevant pipe materials. For work with polyethylene pipes (PE80/PE100) of greater than 63mm OD only persons having attended an approved welding course recognised by the NZWWA may undertake jointing procedures. All contractors working on live water mains must be aware of the Whangarei District Council's Hygiene Code and be in possession of their *Blue Card* at all times. Connections to live water pipelines shall only be undertaken by contractors approved to work on live reticulation by the Whangarei District Council.

6.3 General Requirements

The following drawings in Section 10 apply to this section:

- SHEET 18 Water Pipeline Details

- SHEET 19 Multiple Water Connections, Back Flow Preventers
- SHEET 20 Anchor Block and Valve Installation Details
- SHEET 21 Anchor Block Details
- SHEET 22 Air Valve Details
- SHEET 23 Pipe Bedding and Backfill

6.3.1 Minimum Pipe Size

The reticulation is to be sized appropriate to the service being provided over the working life of the development. Minimum sizes acceptable are as follows:

Table 7

Reticulation Hierarchy	Minimum I D (mm)
Industrial Area Main	150
Principal Main	100
Rider Main	50
Service Connection	20

6.3.2 Service Connections

A service connection shall be provided for each single lot or residential unit with individual street frontage. The connection shall be perpendicular to the main or ridermain and terminate 300 mm from the boundary with a gate valve. The valve shall be blanked off with a brass plug and covered with a short length of 100 mm diameter pipe slotted above the connection pipe and protruding 50 mm above ground level. **Meters are not to be installed during subdivision but are to be applied for separately using a Public Utility Service Connection Form.** The exception to this is where a sewer pumping station requiring a connection is part of resource consent. In this instance the correct utility as-built form must be submitted to the Water Services Division as per the specification for service connections.

Connections to a principal main or rider main shall be with a tapping band and a ferrule with the flow of water controlled by a screwed brass plug or ball valve. The tapping band, ferrule and valve shall be covered in a protective wrapping such as “Denso” tape prior to backfilling. The tapping band for each services connection shall be sited at the central point of the front boundary or on the house side, and clear of any driveways or access ways. The position shall be marked on the kerb with a 125 mm square of blue paint; in addition a notch 12mm wide and 12mm deep shall be cut in the top of the kerb before painting. Service connections shall be PE80 PN12 pipe of 20mm internal diameter unless otherwise approved by the Water Services Manager. All fittings used are to be as per the Water Services Approved Materials List.

For private ways and private roads, a single connection, with size determined as for a rider main is to be provided within the legal road not exceeding 500 mm from the road boundary. A peet valve is to be installed at the junction to the main. At the road boundary a multiple meter box shall be provided and sized according to the table on sheet 19. Separate connections shall then be provided to each lot from the box. Where lots are situated up a private way or similar, connections shall split either side where practicable to avoid passing under the roadway and be extended to beyond the shared access. Where appropriate and with the prior approval of the Council, the private way or road may be reticulated with a Council maintained reticulation system. The criteria for granting such approval will be based on the number and length of connections required, or to provide fire cover to meet the requirements of the Fire Fighting Code of Practice. In such cases, an easement in favour of Council over the private way or road will be required and the main laid in a duct.

6.3.3 Rider Mains

All rider mains for residential areas shall have a nominal internal diameter of not less than 50mm with the number of connections limited by the principal main pressure available as shown in the table below:

Table 8

Principal Main Working Pressure	400-600 + kPa		< 400 kPa	
50 mm internal diameter (min)	One-end supply	Two-end supply	One-end supply	Two-end supply
No. of domestic service connections	15	30	7	15

Rider mains shall be constructed using blue PE80, PN12 to BS 6572 and AS 4130 with all joints and fittings as shown on the Water Services Approved Materials List. Connections to the principal main shall be as shown on Sheets 18 and 19. A peet valve is required at the principal main, and where there are more than 15 connections from the rider main an isolating peet valve should be provided in the middle of the rider main. The valve layout on the principal and rider mains should enable the rider main to be flushed through the nearest hydrant. Where this is not possible a flushing point may be required. Air release valves may also be required at high points.

6.3.4 Principal Mains

Principal mains shall be fitted with fire hydrants and shall have a nominal internal diameter of not less than 100mm. The Water Services Manager shall have the right to specify the diameters for principal mains within the subdivision or development. All costs associated with the increased sizing will be met by the developer.

6.3.4.1 Layout, Depth and Location

A principal main fitted with fire hydrants shall be laid on one side of all through streets and one side of every cul-de-sac. The Council may require arterial and dual carriageway streets to have principal mains laid both sides of the street. Principal mains may also be required on both sides of the carriageway in industrial subdivisions. A rider main shall be laid along the road frontage of all lots not fronted by a principal main including the circular head of cul-de-sacs and shall be designed as ring mains.

All reticulation located in areas not subject to traffic loading shall have a minimum of 600 mm of cover between the top of the pipe and finished ground level. Under carriageways this distance shall be increased to 900 mm. In all other circumstances not meeting the minimums stated then special protection of the pipe is to be allowed for subject to Council approval. The Council may specify a greater depth if required. A detection tape shall be laid directly above all new non metallic water mains. This tape shall be blue and have “water” written on it at a depth of between 200 and 250mm below the finished surface level. In addition, a 2.5 mm conduit cable shall be laid directly on top of the pipe and connected to a metallic fitting for the purpose of locating the pipe. The sections of pipe adjacent to a carriageway crossing shall be gradually deepened before the carriageway, to allow the required cover under the carriageway without provision of vertical bends.

Where water lines are laid close to trees or trees planted near water lines the gap between the pipes and the tree must not be less than the drip line of the fully grown tree. Where any pipes or cables are laid alongside existing water reticulation then a gap of at least 1 m is to be maintained where practicable so as not to disturb the existing trench.

All pipes less than 50mm shall have minimum cover of not less than 900 mm in carriageways and be laid in a protective duct. Service connections shall not be less than 600 mm under footpaths and berms terminating at a 225 mm depth at the boundary for connections to the meter.

6.3.4.2 Pipe Materials

All water mains shall be PE80 or PE100 unless otherwise approved by the Water Services Manager. All materials and fittings shall comply with the relevant Standards specified below:

PE80/PE100		to NZS 4130
Ductile Iron	to AS	2280
uPVC/mPVC	to NZS	7648/1477
Steel	to NZS	4442

NB: PVC will only be accepted in isolated cases.

Steel pipes shall have a spun concrete lining not less than 6 mm thick, and an approved external coating. The use of steel pipes is subject to specific approval. Only PE80 pipe may be used for rider mains and service connections of 50mm ID and under.

6.3.4.3 Pipe Laying

Pipe laying and jointing shall be as recommended by the manufacturer, and as required by any applicable Standard for the type and class of pipe. However solvent welding of PVC pipe is not permitted. For PE80/PE100 pipe > 50mm ID only butt welding or electrofusion by a suitably qualified contractor is permitted. Butt welded pipes will require one or more welded joints to be removed for tensile testing. The test sample(s) shall be sent to an approved laboratory for testing at the contractor's expense. If a test weld fails, two additional welds shall be tested. If one of the additional welds also fails the pipe must be removed and condemned and a new line laid. Only persons who have successfully completed a NZWWA approved welding course and are registered to weld polyethylene pipe shall be allowed to do so. The welder must contact the Water Services Division and provide their registration number prior to commencing work..

Where practicable all water mains shall be laid at a higher level than sewers to avoid cross contamination and not be laid in the same trench as sewers or stormwater drains, nor pass through manholes. Where practicable water mains shall have a spacing of at least 500mm or three times their diameter, whichever is the greater, between their outside edge and any other service or as shown on Sheets 1 and 8 where applicable as agreed with the Water Services Manager. During transportation and on site storage temporary capping of all pipes as per the Whangarei District Council's Hygiene Code is required. The pipes shall be inspected externally immediately prior to laying to check for damage in accordance with the manufacturers specifications. An internal inspection should also be carried out and adequate protection against the ingress of debris shall be made as laying proceeds. Temporary caps shall be placed over all open ends during construction.

All pipes shall be laid so that the identification code is uppermost and shall be supported on their barrels only. All mains and rider mains installed by trenching shall be thoroughly bedded and protected by a well hand-compacted granular material. The particle size range of this material shall be as shown on Sheet 23 and shall meet the requirements of the compaction test given in Appendix B of NZS 7643 regardless of pipe material. The bedding material shall be placed in layers of less than 100mm and shall surround the pipe by at least 100 mm in all directions.

6.3.4.4 Joints

Flexible joints are generally required on all pipe to pipe connections unless specified with regard to design requirements (e.g. welded joints on concrete-lined steel pipe). When rubber ring joints are used for PVC pipe care must be taken to ensure they are the correct type for water lines and not those for sewer pipes. Deflection of joints is not to exceed the manufacturer's recommendations. Adjacent " specials" and fittings shall be flanged and bolted together to form a single unit.

Butt welding of PE pipe must be undertaken using a suitably calibrated system with appropriate instrumentation and gauges, and be within a temporary shelter, other than a trench, for protection during the jointing procedure.

Electrofusion welds shall be undertaken using clamps where practicable and the equipment correctly calibrated.

6.3.4.5 Special Measures in Saline Soils and Other Aggressive Ground Conditions

Where aggressive or saline soil conditions are likely to be encountered only Approved Water Services Materials are to be used.

6.4 Reticulation Components

Where practicable, pipe fittings shall be ductile iron. They should be fully thermoplastic polyamide powder coated to WIS 4-52-01 or polymeric coated to AS/NZS 4158.

Flanges shall be to NZS/BS4504:Table D. Fittings laid adjacent to other fittings shall have flanged joints. Where fittings are located in on-line positions flexible (gibault) joints may be permitted subject to approval of the Council.

All bolts and nuts shall have washers and be fully coated as above or hot dipped galvanised in accordance with BS4772:1988, plus protective wrapping. This shall be “Denso” primer paste covered with “Denso” tape wrap , followed by “Denso” MP/HD tape or “Greensleeve” over wrap, or approved alternatives complying with the same standards.

Gaskets or flanged joints shall be to NZS/BS5292.

6.4.1 Fire Hydrants

All mains of 100mm diameter or greater shall be provided with hydrants.

Type

Hydrants shall be ductile iron, clockwise closing, screw down type to B.S. 750:1984, and shall wherever practicable be tall pattern. Hydrants and hydrant risers are to be fully polymeric coated to AS/NZS 4158.

Position

Hydrants shall be fixed opposite the common boundaries of lots and spaced at intervals not exceeding 135m within residential areas and 90m within commercial and industrial areas. The terminal hydrant shall be within 135m of the furthermost portion of any building site. In a cul-de sac or other terminal street the last hydrant shall be as per sheet 18 and not be more than 65m from the end of the street. Where a private way is more than 65m long a hydrant shall be provided at the street end of the private way or on the other side of the street immediately opposite the entrance. The Council may require a 100 mm diameter principal main with hydrant to be constructed within a private way or private road to ensure fire coverage. In this instance an adequate turning and parking area for fire appliances in the vicinity of the hydrant shall be provided and the access designed to take heavy vehicles.

Where an isolated risk is identified such as a school a private fire line may be constructed onto that lot. No reticulation shall be taken off this line. Meter and backflow requirements shall be as specified in paragraph 6.2.3.

Hydrants must be readily accessible for fire appliances and should generally be positioned near street and private way intersections and at least 6m from any building. Hydrant risers shall be used where necessary to ensure that the top of the spindle is not less than 75 mm or greater than 250 mm below finished surface level. Hydrants are required at all dead ends, high points for the purpose of air release, and low points to enable mains flushing if a normal washout cannot be fitted. Refer also to Air Release and Scour Valves.

Marking

The location marking of fire hydrants shall be to NZS4501:1972. Yellow plastic marker posts to the Council's approval shall be fixed 225 mm from the street boundary at the closest point to and facing the

hydrant, with the top of the post 600 mm above finished ground level. A concrete mowing strip 150 mm wide shall surround the post when it is set in the grassed berm. The hydrant name (top number), correct main size in millimetres (middle number) and the distance between marker and hydrant in metres (bottom number) shall be stencilled in black paint at the top of the post. The hydrant name shall be allocated by the Water Services Manager.

6.4.2 Valves

All valves shall be in accordance with the Whangarei District Council's approved materials list, the main points of which are summarised below. All valves are to be ductile iron and fully polymeric coated to AS/NZS 4158.

Type

Sluice Valves shall be used on principal mains. They shall be Resilient Seated valves with 'Levasint' or equivalent coating. They shall be Class 1 to NZS/BS5163:1986 but shall be anti-clockwise closing, and shall be provided with cast iron spindle caps.

Peet (Gate) Valves used on rider mains shall be to BS5163:1986 and shall be resilient seated, clockwise closing with a ductile or cast iron handwheel.

Butterfly valves shall only be used with the specific approval of the Water Services Manager. They shall be anti-clockwise closing, and fitted with travel stops, and shall be fitted with a special type of spindle or cap dolly, which differs from those for sluice valves.

Air Release and Scour Valves shall be located as required by the Water Services Manager. Air release valves shall be the combination type as per the approved materials list. They shall be installed in a fully draining box as per Sheet 22. A connection to the stormwater system shall be provided for all scour points where practicable.

Position

The location of valves shall be so arranged that in the event of a shut down of any section of water main, the supply shall not isolate more than 30 consumers and/or a water main distance of more than 500m. Valves located at intersections shall be fixed on all legs of a tee or cross installation and shall where possible be located in the berm areas free of the carriageway. On a rider main valves shall be located such that the rider main can be flushed through the nearest hydrant. Where a rider main has more than 15 connections a peet valve shall be inserted at the midpoint of that main.

Marking

The position of all valves on water mains shall be indicated by a white plastic indicator post to the Council's approval bearing the inscribed letters 'SV', 'AV', 'BV' or 'PV' in black to indicate either sluice valves, air valves, butterfly valves or `peet' (gate) valves, respectively. The name of the valve shall also be stencilled on the top of the marker post in black lettering along with the size of the main on which it is situated. The name can be obtained from the Water Services Manager.

There shall also be a rectangle painted on the kerb in a direct line between the valve and the marker post. This rectangle shall be white unless the valve is to be normally closed in which case it shall be red. In all cases the colour of the marker post and valve box lid shall match the rectangle.

6.4.3 Surface Boxes

All valves and hydrants shall be accessible via surface boxes, details of these are shown on Sheets 18 and 20 . All boxes shall be cast iron or ductile iron and be directly above the valve or hydrant. The longer side of the boxes shall run parallel to the water main. The box shall be supported on concrete risers sized to provided unobstructed access to the valve or hydrant. In the case of hydrants this shall include easy access for standpipes and installation of data logging equipment. Care shall be taken to ensure loading from traffic is not transmitted via the box and surrounds to the pipe or fittings.

6.4.4 Tapping Bands

Tapping bands on PE80/PE100 (and PVC) pipes shall be LG2 Gun Metal to BS1400 with ball valves or self-tapping ferrules at the point of connection and wrapped with "Denso" tape. Any other materials must be approved by the Water Services Manager and comply with the manufacturers recommendations.

6.4.5 Backflow Prevention

In accordance with the Water Supply Protection Regulations 1961 backflow preventers are required on all connections where, in the event of a pressure loss in the system, water other than wholesome drinking water may be drawn back into the public mains. Backflow preventers are installed on the consumers side of the point of supply and therefore not normally part of subdivision requirements. However, when required they shall be appropriate to the level of contamination risk. The minimum requirement being a double check valve device. All backflow preventers must be installed with isolating valves and be fully testable. The general layout for the installation of a backflow preventer is shown on Sheet 19. More details of where backflow preventers are required can be found in the Whangarei District Council Specifications for the Installation of Water Service Connections and the Whangarei District Council Water Supply Bylaw 1997.

6.4.6 Thrust and Anchor Blocks

Concrete anchor blocks shall be provided at all bends, tees, reducers and dead ends, on all mains exceeding 50mm diameter. The size of the bearing surfaces shall be specifically designed. Sheets 20 and 21 give guidelines for shape and size for a soil with a bearing pressure of 100 Kpa and a design pressure of 1800 Kpa. The concrete shall be plant batched from a graded plant, unless otherwise approved by the Water Services Manager, and have a compressive strength at 28 days of 17.5Mpa. All anchor blocks must be poured in adequate formwork and against an undisturbed soil surface with a protective wrapping provided between the pipe and concrete. For PE80/PE100 pipes thrust and anchor blocks may not be required, however approval is first to be obtained from the Water Services Manager.

If reticulation is being extended from the end of existing pipe work where a blank cap and thrust block are presently located, the thrust block shall be removed and the new pipe continued in the same alignment as the original pipe.

6.5 Disinfection and Testing

6.5.1 Pressure Testing

On completion of the pipe laying and jointing, sufficient backfill materials shall be placed over the pipes to prevent movement during pressure testing, leaving joints and fittings and anchor blocks visible.

No connections of a permanent nature between existing mains and the new work will be allowed at this stage. PE80 rider mains are not to be connected to the mains of a different material before testing, they are to be tested separately. To flush out and complete the preliminary test, all valves on the new main shall be fully opened and all hydrants, stop taps and valves on the consumer end of the service pipes shall be shut. Water for all tests may be obtained from the existing system provided prior Water Services Division approval is obtained and a metered standpipe with a check valve is used. Standpipes are available from the Water Services Division.

Using temporary supply, the new reticulation system shall be flushed out and any air eliminated. A visual inspection of the line including joints and fittings shall be made and any apparent flaws and leaks shall be remedied. The pipe shall be left full overnight before pressure testing.

After flushing out has been completed the system shall be pressure tested. Pressure tests shall be carried out by means of an approved pressure pump at a steady rate without shocking loading. Pressure gauges used shall be accurate and read to a minimum of 10kPa intervals. The specified test pressure is that to be applied to the lowest point in the section and if the pressure gauge is not located at the lowest point a correction shall be made for the difference in levels. Pressure testing against valves will not be permitted.

For all pipe except PE80 the following are the test pressures for the class of pipe used:

Class D	1800kPa
Class E	2250kPa
Class F	2700kPa

The test period shall be one hour. Test sections shall not exceed 500m in length.

For PVC pipe the test is acceptable if a visual inspection shows no evidence of leaks and if the rate of pressure drop does not exceed 10% of test pressure per hour when allowance is made for any pressure change due to temperature change.

For PE80 pipe the type of test will depend on the length and diameter of pipe to be tested. The Contractor shall confirm with the Water Services Manager which test is required in accordance with the manufacturer's requirements and the "Whangarei District Council specification for the construction of water mains." The minimum test pressure for PE80 pipe shall be 1600 kPa. The Contractor shall supply a graph or data logger printout of the pressure test and show calculations n_1 and n_2 where applicable.

The Contractor shall give the Water Services Manager 24 hours notice before carrying out the above testing. The test shall be carried out in the presence of a Council representative.

6.5.2 Disinfection

After backfilling and before being put into service, all pipes, valves, house connections and other fittings shall be disinfected. All disinfection testing will be at the developers cost.

The main shall firstly be thoroughly flushed via a temporary supply in sections through hydrants or washouts with sufficient volume of water to develop a velocity of 0.8 m/s in the main to remove all foreign matter. The main shall then be drained and slowly filled with potable water to which sufficient free chlorine is added to produce a concentration of 50 parts per million in the main. It is recommended this is done via a water tanker of known volume.

The point of water application shall be at the beginning of the section of main to be sterilised.

The main shall be left full of the chlorinated water for 24 hours, during which time all valves, hydrants and other fittings on the section shall be operated.

The residual chloride concentration must not be less than 10 ppm after 24 hours.

The main shall then be flushed out until the chlorine concentration of the issuing water is between 2 and 0.2 parts per million.

If the chlorination is found to be unsatisfactory, the Contractor shall repeat the procedure until the water is of acceptable quality.

The testing of the chlorine concentration is to be carried out <u>on site</u> by the Whangarei District Council Wastewater laboratory or other approved laboratory. It is the Contractors responsibility to organise the laboratory representative to be on site. At least 24 hours notice is required for the initial chlorine application. The representative shall return 24 hours later for the second residual chlorine test and will stay on site while the line is flushed till the chlorine concentration is down to between 2 and 0.2ppm.

The laboratory will then issue the Council a report in writing confirming the tests.

Chlorine may be added to the pipe in one of the following ways:

a) Chloride of lime solution
b) Calcium hypochlorite solution
c) Sodium hypochlorite solution
d) HTH dry chlorine granules dissolved in water before put into the main

Following approval by the Council of the tests and provided all other aspects of the pipework are satisfactory Form WB will be completed by a Water Services representative.

Upon completion of Form WB the applicant shall keep the new reticulation continuously charged with water under pressure and obtain Council approval to connect to the existing reticulation. This is requested by notifying the Council in writing, including identifying the approved contractor, and providing the Council file and property identification numbers. The connection shall only be made by Council approved contractors. Upon connection the new reticulation is to be flushed to the satisfaction of the Council, and then left operational.

6.5.3 Hydrant Flow Test

Following completion of the pipe test and connection to the main, the developer may be required to provide certification from the Fire Service or other approved independent certifier, of the static pressure, the maximum flow and the residual pressure at maximum flow for each hydrant.

6.6 Completion

6.6.1 As-Built Plans

A set of drawings which clearly and accurately show the locations of all water mains, valves, hydrants and bends constructed including any modifications made to the existing system shall be submitted as per Clauses 1.3 and 2.4. Locations shall be indicated by offset measurements from property boundaries where possible at regular intervals and direction changes.

Where PE80/PE100 pipe has been used, as-built drawings shall provide details of the person who did the welding, and relevant weld details which include:

Name
Company name
Welding registration number
Type of welds
Number of welds
Weld parameters
Welding equipment used.
Pipe details - OD
- ID
- Wall thickness
- Material
- Manufacturer

A long section of the pipeline will also be required showing ground levels and invert levels at regular intervals not exceeding 20 metres. The levels shall be to DOSLI datum and accurate to 10 mm. The longitudinal section shall show all fittings and changes in depth of the pipe.

In order to update Council's "Pipeline Asset Management System" the following information shall also be provided for all hydrants and valves:

Position - from LH, RH and front boundary of adjacent lot.
Location - xyz co-ordinators.
Item - hydrant, sluice valve, peet valve, pressure reducing valve.
Make, model - depth to spindle/handle.
Date installed.
For Hydrants - static pressure
- residual pressure
- maximum flow rate
For valves - Number of turns to fully open.

These drawings will be checked on site for accuracy by a Water Services representative who will also check the completion of the subdivision or development in accordance with Form WC. A certificate of completion for the works will not be issued until acceptable As-Built plans have been produced and the requirements of Form WC met.

6.6.2 Defects Liability

(See Clause 2.5)

A maintenance bond for 10% of the total value of all water assets for a period of not less than six months will be required where water mains equal to or greater than 100 mm dia. are installed for subdivisions or developments.

The bond will commence from the date of completion of Form WC, or issue of a conditions certificate, whichever is the latter.

Section 7
Sewage Reticulation and Disposal Facilities

7.1 Service Requirements

All pipelines connected to Council's sewerage reticulation systems require adequate diameters, velocities, and/or pressures, treatment, and disposal facilities without creating overflows, or health hazards.

All lots within Living 1 and 2 and Business 1 - 5 Environments shall have sewer connections, unless the Council confirms in writing that such requirements are unwarranted, unavailable, or unnecessary.

Resource consent approval in any Environment may require connection to a Council sewer reticulation system. Conversely, developers wishing to connect in Environments other than Living 1 and 2 and Business 1 - 5 will be subject to availability of pipeline, treatment and disposal capacity.

Where connection to an existing sewage reticulation and disposal system is available, or provision of such a system is required, the reticulation and disposal facilities required shall be designed to serve the whole of the upstream catchment area. The reticulation shall be constructed to the boundaries of the approved development at the applicants expense and be capable of serving the entire development and any undeveloped land beyond. Reticulation and flow design shall be based on potential land uses identified in the District Plan, assuming complete urbanisation where applicable. Where appropriate, the Council will advise on the capacity of downstream sewerage reticulation and disposal facilities to determine their adequacy.

Where sewerage reticulation is not available or able to be extended economically then the Council may approve alternative systems for sewage disposal. These proposals may include alternative designs, such as individual on-site effluent disposal, package treatment plants and reticulation, or similar.

7.2 Basis of Design

7.2.1 On Site Disposal Systems

Where an on-site treatment and disposal system is to be used, the applicant shall demonstrate that the site is suitable for the disposal system proposed, and that adequate area including an alternative area is available. This shall be done by investigation over all sites requiring such disposal systems. The acceptance of a proposed system shall be based on the drainage conditions of the lots, and the extent to which the system will effectively protect health and prevent contamination of water resources. The investigation shall be carried out by a suitably qualified and experienced person. The acceptable basis of design for on-site disposal systems is the ARC Technical Publication No.58 (1994) and the Northland Regional Council regional plans with the lot size not less than 1,800 m².

Where the proposed on-site system will require a resource consent from the Northland Regional Council, this shall be noted in the application.

It is recommended that a secondary filter or similar be installed at the outlet of any septic tank system.

7.2.2 Community Systems

Domestic sewage flows shall be calculated on the following basis:

- Average dry weather flow - 200 litres/day/person
- Wet weather peak flow - 5 times average dry weather flow
- Number of persons per house unit - 4
- Number of house units per gross ha - 15.

Industrial Flow and Trade Wastes shall be calculated as follows;

- Where the industrial waste and trade waste flows from a particular industry are known, these shall be used for the sewer design.
- When the above information is not available, the following flow rates may be used as a design basis for industrial areas:

Table 9

Min. Design Flows	**Flow Rates** (Litres/Sec/Ha)
Light water usage	0.4
Medium water usage	0.7
Heavy water usage	1.3

- A wet weather peak flow factor shall be applied as for domestic flows unless some other factor is shown to be more appropriate.

District Plan rules should be consulted to confirm the type and intensity of development allowed in each land use category. This is particularly important where multi-unit development is likely.

The reticulation including pump stations and rising mains shall be designed to provide for the peak domestic flow and industrial flow as above. Pump stations shall have 24 hours dry weather flow storage capacity, as required by the Northland Regional Council regional plans.

7.2.3 Hydraulic Design

(See Sheets 23 and 24)

The hydraulic design of sanitary sewer pipelines shall be based on Colebrook - White formula or any other design method as approved by Council. The pipe roughness coefficient k used in the design shall be 1.5 mm.

The flow velocity in 150 mm diameter gravity reticulation shall be not less than 0.65m/sec at a minimum gradient of 1 in 200 (0.5%), with 0.75m/sec at a minimum gradient of 1 in 133 (0.75%) as the desirable minimum velocity for the upper portions of the reticulation system. In practical terms, unless the catchment is likely to exceed 250 houses, residential units, or their equivalent, and where no flow from a pumping station is involved, 150 mm diameter pipes laid no flatter than 1 in 200 (0.5%) will be adequate without specific hydraulic design.

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

Rising mains are to be specifically designed with a minimum flow velocity of 1m/sec. Thrust blocks shall be provided at all changes of direction of the rising main.

7.3 General Requirements

7.3.1 Service Connections

(See Sheet 14)

A 100 mm diameter service connection shall be provided for each allotment able to be serviced unless the Council requires a larger size connection to be provided.

Connections shall be positioned at sufficient depth to enable the buildable area of the property to be served, allowing for the following minimum grades in private foul water drains, and minimum cover provisions. (Minimum grade to be used is 1 in 120 for 100 mm dia. pipe , and 1 in 200 for 150 mm dia. pipe). The depth of the terminal inspection shall not be less than 600 mm and generally not exceed 1200 mm. Exemptions or variations will require specific Council approval.

A connection shall not cross more than one lot boundary. To achieve this, a 150 mm (min.) branch sewer with a terminal manhole or lamphole may be used. This condition may be relaxed for minor "infill" development to take account of the layout of existing reticulation at the discretion of Council.

Where an existing or proposed sewer is more than 4.5 m deep to the top of the pipe, connections shall not be made directly to it, but a new shallower branch sewer shall be laid from a manhole on the deep sewer and connections provided to the lots to be served.

7.3.2 Minimum Pipe Size

The reticulation is to be sized in accordance with potential design flows with the minimum pipe size being 150 mm diameter at a grade of 1:200.

7.3.3 Depth, Cover and Location

(See Sheets 23 and 24)

The minimum cover over pipes shall be 600 mm in areas not subject to traffic loading.

For uPVC pipes under carriageways, the minimum cover shall be 750 mm. Where the above cover cannot be provided the pipe shall be adequately protected. This shall be by reinforced concrete slab protection in areas subject to traffic loading, and by unreinforced concrete slab protection in other areas.

The cover and protection to other types of pipe shall be based on manufacturer's recommendations.

Where practicable, reticulation is to be located in the road berms. It shall avoid road carriageways and building envelopes as far as possible. All manhole structures shall be kept clear of boundaries. Where the buildable area is compromised then the position of the reticulation will require the approval of Council. In such situations the reticulation must be protected from any potential damage that may be caused by construction or foundation bearing pressure.

No structure shall be erected over any buried public sewer or stormwater system without prior written approval of Council's Wastes and Drainage Manager.

Where the reticulation lines are located in the front yard of lots, the invert level shall be deep enough so as not to interfere with any future driveway construction.

7.3.4 Pipe Materials

The following pipe materials and fittings complying with the relevant Standards may be used for sanitary sewer reticulation;

uPVC	to NZS 7649
HDPE	to NZS 7604
Ceramic	to NZS 3302
Concrete	to NZS 3107
Steel	to NZS 4442.

Pipes manufactured from other materials and satisfying New Zealand standards may be permitted subject to the approval of the Council. Pipes made of uPVC may not be used where they are likely to carry waste which would lead to their deterioration.

Steel pipes shall have a spun concrete lining not less than 6 mm thick, and an approved external coating. Care shall be taken to ensure that the concrete lining and external coating remains undamaged.

7.3.5 Pipe Joints

All pipes shall have flexible joints of an approved type and complying with the relevant New Zealand Standard and manufacturers requirements. Steel pipes may be flange jointed. Gibault joints shall be of approved manufacture.

7.3.6 Special Measures in Saline Soils and other Aggressive Ground Conditions

All bolts, nuts and washers shall be of stainless steel or aluminium-bronze and be wrapped with “Denso” tape if buried.

7.4 Reticulation Components

Details of reticulation components are shown on the attached drawings. The following gives additional information and requirements not necessarily included in the drawings.

7.4.1 Manholes

Manholes shall normally be provided at each change of direction or gradient, and at each branching sewer, and at a spacing of not more than 100m. The height of the bottom riser shall be the maximum available to suit the manhole depth - there should be no riser joints in manholes less than 2.5 m depth. Details of manholes shall comply with Sheet No 12. They shall be constructed to best trade practice, and the manufacturer’s requirements. The size of any opening created in a manhole for pipeline entry shall be absolute minimum. Details shall ensure that the manholes do not allow infiltration at joints or lid.

In addition to the normal pipeline gradient, all manholes shall have a minimum drop of 30 + 5 mm per 10 degree of the angle of change of flow within the manhole.

Where pipe sizes change at the manhole, the soffit of the inlet pipe should be at least as high as the soffit of the outlet pipe.

Where manholes are constructed in soft or unsuitable ground, the area under the manhole shall be undercut and backfilled with suitable hardfill to the satisfaction of the Council in order to provide an adequate foundation for the manhole base. Any excavation to a greater depth than necessary shall be made good with weak mix concrete.

(a) Deep Manholes

Where manholes are more than 5.0 m deep they shall incorporate an intermediate landing platform or grill in order to prevent a free fall of more than 5m. This shall comply with details given in NZS 4404, Fig 10, or otherwise be specifically designed.

(b) Drop Manholes

Drop manholes will only be permitted in special circumstances. Where manholes have a drop in excess of 500 mm from the soffit of any inlet to the soffit of the outlet, a properly constructed drop connection into the base of the manhole shall be provided. For pipe sizes up to 250 mm diameter this shall be in accordance with the drawings. Drops in larger diameter pipelines must be specifically designed to the satisfaction of the Council.

7.4.2 Lampholes

Branch lines less than 50 m long may terminate with a lamphole, as shown on Sheet 14.

7.4.3 Pumping Stations

All pumping stations shall have twin submersible pumps and be designed to the approval of the Council. In general they are to conform to the details of Whangarei District Council drawing 7589 / A1 (or drawing 3474/A3 for individual residential units, or similar. Pumps for Council maintained systems shall be 'Flygt' unless specific Council approval is obtained to use an alternative. Early consultation with Council is advisable to identify any specific requirements for the proposed station.

Where practicable, pumping stations shall be avoided in favour of gravity systems. Pump stations serving less than the equivalent of six urban lots will not generally be taken over by the Council.

Except where a permanent Council maintained pump station is sited on Council owned land, it will require its own separate lot vested in Council at no cost to the Council. The site for a temporary pumping station may be an easement registered in favour of Council rather than a separate lot.

Odour control devices shall be installed where necessary.

All Council maintained pump stations shall be provided with the following :

- Access and hard standing to right-of-way standard, including provision for turning as required by Council.
- A 25 mm diameter water service with an approved back flow preventer (complying with the New Zealand Building Code for a high hazard installation).
- Underground power supply.
- Site to be fenced with a gate as necessary (See Sheet 25).

- Shall utilise sewage pumps with non clogging impellers capable of handling minimum solid size of 75 mm discharging into 100 diameter or larger rising mains. If sound technical reasons make the use of 100 diameter rising mains unreasonable then grinder/macerater pumps with rising main of not less than 75 diameter ID may be approved. The effects of water hammer pressures shall be addressed and measures to limit their impact incorporated in the design as necessary. Rising mains shall be rated appropriate to the maximum design head but not less than Class C (90 metres) or PN9 of AS/NZS 1477.

- The pumps shall be fitted in pairs so that while one pump is acting as a duty pump, the other is on automatic standby. Each pump operating separately shall be capable of delivering the design wet weather flow. The duty sequence is to be automatically interchangeable, with a manual override.

- All electric switch gear is to be located above ground level and above the 50 year flood level in a aluminium weather proof cabinet. Pump stations shall incorporate all necessary control, monitoring, alarm and telemetry systems, including float controls for duty start, standby start, stop, overflow, an isolating door switch for the alarm, a cabinet heater, reset switches where practicable, hourly recorders for each pump, spare fuses, a single phase three pin plug for portable lighting and equipment, a 12 volt sealed wet battery alarm and charger with an externally mounted horn suitably audible, amp meters, and adequately protected side entry “Reyrolle” plugs where practicable.

7.4.4 Rising Mains

Rising mains shall meet the requirements for the construction of a water reticulation system and be fitted with suitable devices to prevent emptying of the main when the pumps are not operational. Rising mains in private property shall be sited clear of building sites.

7.5 Inspection and Testing

7.5.1 Sewer Reticulation

All sewer pipes, including connections, shall be pre-tested during construction. The applicant shall in all cases give 1 working day's notice to the Council before filling any trench or testing any pipeline or structure. On substantial completion of all other associated engineering work there shall be a final test carried out to the approval of the Council.

The pipeline test procedure is as follows:

(a) The pipeline under test shall be effectively plugged, particular care being taken to fix the plugs against movement, and air introduced by suitable means (such as hand pumps) until a pressure of 300 mm of water is indicated by a suitable manometer (such as a U-tube) connected to the system.

(b) After the air has attained a uniform temperature, as indicated by the pressure becoming steady, the source of air supply shall be physically disconnected and the pressure drop measured after a test period of five minutes.

(c) The wetting of pipelines before test, where applicable and practicable, is recommended.

(d) The acceptance limit shall be a pressure drop not exceeding 20 mm in 5 minutes.

In wet conditions, should the low pressure air test pass and there be signs of infiltration, this shall not exceed 600 ml/ hr/25 mm pipe diameter/1000 metres length of pipe.

Should any leaks be discovered, these shall be made good by the Contractors who shall then arrange for the test to be reapplied.

New sewer reticulation must be completely and permanently isolated from Council's "live" sewer reticulation until such time as all the foregoing tests are passed, and authority from the Council to connect to the live sewer, is obtained. Connection shall only be carried out by a Registered Drainlayer.

Discharging surface water into any Council sewer system is not permitted.

7.5.2 Manholes

All manholes shall be watertight and may require testing at the Council's direction. The test involves plugging and filling the manhole with water (including time allowed for absorption). During the test, the level of water in the manhole shall not drop more than 5 mm in 10 minutes.

7.5.3 Rising Mains

Rising mains shall be tested using the test prescribed for water pipes, with the test pressure being 1.5 times the maximum working pressure.

7.6 Completion

All connections shall be sealed with an approved plug or cap, and be marked with a 100x50H4 treated stake painted white, extending from invert level of the pipe to 600 mm above ground level.

Exposed surfaces of manhole covers shall be painted white.

As-built plans complying with Section 2.4 of this Standard shall be provided.

Section 8
Land Drainage

8.1 Service Requirements

All lots within Living 1 and 2 and Business 1 - 5 Environments shall have piped stormwater reticulation and connections to an approved stormwater disposal system unless the Council confirms in writing that such requirements are unwarranted, unavailable, or unnecessary.

Resource consent approval in any Environment may require connection and/or construction of an approved piped or open channel disposal system.

Adequate provision shall be made to control and dispose of stormwater to protect against flooding and adverse effect on the environment. Where connection to an existing stormwater reticulation system is available, or provision of such a system is required, the reticulation shall be designed to serve the whole of the upstream catchment area. The reticulation shall be constructed and extended to the boundaries of the approved development at the applicants expense and be capable of serving the entire development and any undeveloped land beyond. Reticulation and flow design shall be based on the potential land uses as identified in the District Plan, assuming complete urbanisation where applicable. Where information is available, the Council may advise on the capacity of downstream reticulation to determine its adequacy. If there is inadequate capacity, Council may require the developer to pay for, or contribute towards any upgrading.

In urban areas, where surface water may be concentrated onto the subdivision or development from properties above, adequate provision shall be made to control this. This may be by means of concrete dished channels directed to a field sump, or an alternative method approved by the Council.

Stormwater quality shall comply with the Northland Regional Council regional plans.

8.2 Basis of Design

The design shall follow the Building Code E1 Section 2, and the publication "Procedure for Hydrological Design for Urban Stormwater Systems" by the New Zealand Institution of Engineers - particularly with respect to Rational Formula design method. Intensity Duration Curves and Runoff Coefficients to be used in the design are given in Sheets 15 and 16.

Small urban areas of less than 5 ha can generally use a runoff of 210 litres/sec/hectare for the design of pipelines but this will need to be verified using the Rational Method.

'Waugh' Charts are also acceptable as a design method for rural catchments.

Calculations supporting the pipe/channel sizes selected shall be submitted with the application.

8.2.1 Primary Design Flow

The primary design flow is the estimated runoff selected to provide a protection to the surrounding land. This flow will be piped or, upon dispensation by the Council, contained within relatively narrow confines under the Council's control within reserves or easements, or as otherwise approved by Council.

The following are the various Return Period years for primary design flow of stormwater systems for different land usage's are as follows:

Table 10

Land Use	Minimum Return Period (Years)
Residential Industrial Commercial	5 10 20
Rural (Roads Only)	10 (No heading up)

These criteria represent minimum standards for primary flow. In special land use situations the Council may require higher standards to be used.

8.2.2 Secondary and Over Flow Paths

A secondary or overflow path shall be provided to give protection to surrounding buildings and services when flow exceeds the primary flow. Secondary flow paths shall be designed for a one in 50 years Return Period flow, for commercial, industrial and residential lots.

Secondary and overland flow paths that occur naturally as streams or drains or are created as a result of subdivisional earthworks shall be located entirely within easements, public reserves, or permanently incorporated in the subdivision design as roadways, walkways, open spaces, etc. They will be plainly designated on the plans and design calculations submitted. Adequate permanent access for maintenance will be required to these secondary flow paths.

8.2.3 Hydraulic Design

(See Sheets 23 and 24)

The design of pipelines shall be based on appropriate formulae or pipe manufacturer's charts. Where the pipeline is steep and the critical slope is exceeded, specific design shall be done to size the pipe for the design volume of flows based on inlet conditions and energy losses governing in the manholes.

The minimum velocity for pipes flowing full or half full shall be 0.7 m/sec with no limitation on the maximum velocity although 4.5 m/sec is a desirable maximum velocity objective.

Special measures to dissipate energy and reduce scour, both inside and outside of pipelines may be required, particularly at manholes, connections, inlet and outfall structures and in steep pipelines.

Manholes on pipelines shall be designed to compensate for the energy lost due to the flow through the manhole at the design radius. In addition to the drop caused by normal pipeline gradient and energy loss compensation, all manholes other than those incorporating precast bends shall have a minimum drop of 20 mm plus 5 mm per 10 degree of the angle of change of flow within the manhole.

Where the flow velocities are high, or the pipelines of any pipe sizes are steep or the continuity of flow is disrupted by significant branch inlet lines, the drop through the manhole and/or the outlet pipe size shall be designed to accommodate energy losses without surcharging the incoming pipelines or the manhole.

8.2.4 Open Drains

In Environments Living 1 and 2 and Business 1 - 5, all open drains shall be piped except for contour cut-off drains. Where pipes are installed, drainage swales, subsoil drains and field sumps shall be provided as necessary.

Where a drain requires a pipe in excess of 1200 mm diameter, dispensation from the piping requirement may be permitted provided that calculations and channel design are approved by the Council prior to the drain being reconstructed. Such drains shall have a non scour hydraulic channel, with mowable grass berms and/or be rock or concrete lined. Adequate permanent access shall be provided to all open drains traversing more than one property to allow maintenance to be carried out. Such open drains may be accepted as a public drain if specifically approved as such by the Council.

Easements shall be provided over drains when requested by the Council.

8.3 General Requirements

8.3.1 Service Connections

(See Sheet 14)

All lots within Environments Living 1 and 2 and Business 1 - 5 shall be provided with a connection to an approved land drainage system which is adequate to serve the buildable area of the lots. The applicant may be required to justify the pipe sizes and grades proposed.

The connections provided for these lots shall be of a type capable of taking the spigot end of an approved drainpipe of the appropriate size, or a level insert connection.

Where lots are at a higher elevation than the street channel, a connection to the street channel may be provided as shown on Sheet 10. Calculations may be required to justify the minimum number of pipe outlets to the kerb. Otherwise connections will be to a reticulated system, or Council approved open watercourse.

The connection shall be positioned at sufficient depth to enable the buildable area of the property to be serviced, and to allow for the collection of surface run-off and the provision for field sumps and cut-off drains as required.

Connections for commercial and industrial lots shall not be less than 150 mm diameter discharging into a reticulated system and be designed to take the full design flow from the area served by the connection. Provision shall be made to ensure that contaminants do not enter the stormwater system.

Service connections of diameter smaller than 300 mm (including sump leads 300 mm in diameter) may be saddled on to pipes 600 mm diameter and larger.

8.3.2 Minimum Pipe Sizes

(See Sheet 13)

Stormwater connections for Environments Living 1 and 2, shall not be less than 100 mm dia.
Stormwater connections for all other Environments shall not be less than 150 mm dia.
Field sump outlets shall be not less than 225 mm dia.
Road sump outlets shall not be less than 300 mm diameter.

8.3.3 Depth, Cover and Location

(See Sheets 23 and 24)

The minimum cover to pipes in areas not subject to traffic loading shall be 600 mm.

For pipes in areas subject to traffic loading, the minimum cover shall be 750 mm. Where the above cover cannot be provided the pipe shall be adequately protected. This shall be by reinforced concrete slab protection in areas subject to traffic loading, and by unreinforced concrete slab protection in other areas.

Where practicable, reticulation is to be located in the road berms and avoid road carriageways and building envelopes as far as possible. All manhole structures shall be kept clear of boundaries. Where the buildable area is compromised then the position of the reticulation will require the approval of Council. In such situations the reticulation must be protected from any potential damage that may be caused by construction or foundation bearing pressure.

Where the reticulation lines are located in the front yard of lots, the invert level shall be deep enough so as not to interfere with any future development.

Pipelines shall be extended to the upper catchment boundary of the subdivision or development unless exempted by the Council.

No structure shall be erected over any buried public sewer or stormwater system without prior written approval at Council's Wastes and Drainage Manager.

8.3.4 Pipe Materials

The following pipes may be used for land drainage work, provided they comply with the relevant New Zealand Standard and manufacturers requirements:

- Galvanised steel
- Reinforced concrete
- Vitrified clay
- uPVC
- Aluminium

NB: The applicant shall demonstrate that the ground conditions will not promote the corrosion of the pipe before approval is given for aluminium and galvanised steel.

Other pipe types satisfying New Zealand standards may be permitted subject to Council approval.

8.3.5 Joints

Where possible, all pipes shall have rubber ring joints. Flush jointed pipes may be permitted by the Council if they have an appropriately designed foundation and are adequately sealed.

8.4 Reticulation Components

8.4.1 Inlet and Outfall Structures

(See Sheet 17)

Where stormwater drains discharge into open channels, the outlet shall be protected with an apron and wingwalls or other erosion protective materials such as `Reno Mattress' or similar. On some outlets, extra stone pitching or similar may be required to protect the ground from scour. Rock spalls securely grouted in concrete and contoured to suit the outlet shall be constructed, as necessary.

The inlets to piped systems shall be constructed with wingwalls and headwalls, and child and debris proofed with a grill if directed by the Council. The grill shall be specifically designed.

8.4.2 Manholes

Manholes shall normally be provided at each change of direction or gradient, and at each branching line, and at a spacing of not more than 100 m. Manholes may be either cast in situ or of precast concrete. Where the main pipe exceeds 600 mm diameter, spacing may be increased to 150 m, and where the main pipe exceeds 1050 mm diameter, up to 200 m. For pipes over 1050 mm diameter curved lines may be approved by the Council, but each case must be by specific application. Details of manholes shall comply with Sheet 12. They shall be constructed to best trade practice, and the manufacturer's requirements.

In addition to the normal pipeline gradient, all manholes shall have a minimum drop of 20 + 5 mm per 10 degree of the angle of change of flow within the manhole. Where pipe sizes change at the manhole, the soffit of the inlet pipe should be at least as high as the soffit of the outlet pipe. The pipe sizes through a manhole shall not decrease in size.

Manholes on pipelines of more than 600 mm diameter and on smaller pipelines where the use of standard manholes is not suitable, shall be specifically designed utilising larger diameter manholes, cast in-situ reinforced chambers or a combination of the two.

Where manholes are constructed in soft or unsuitable ground, the area under the manhole shall be undercut and backfilled with suitable hardfill to the satisfaction of the Council in order to provide an

adequate foundation for the manhole base. Any excavation to a greater depth than necessary shall be made good with weak mix concrete.

(a) Deep Manholes

Where manholes are more than 5.0 m deep they shall incorporate an intermediate landing platform or grill in order to prevent a free fall of more than 5m. This shall comply with details given in NZS 4404, Fig 10, or otherwise be specifically designed.

8.4.3 Sumps

Sumps shall be provided as required to prevent surface drainage from discharging over adjoining properties, or over footpaths. This includes surface drainage from vehicular and pedestrian accessways. The sumps shall be designed to serve the area draining into them.

Sumps on private accessways shall have a grate not smaller than 300 x 300 mm. Where an accessway is steep, or stormwater connections discharge onto the accessway, standard single or double sumps as required for roads, and detailed on Sheets 10 and 13 shall be used. Sump leads shall be adequate for the catchment area.

8.5 Testing

The testing of stormwater mains or branch pipelines will not normally be required. Acceptance will be on the basis of the quality of materials and the standard and accuracy of construction. Where the Council requires testing of pipelines, the test shall be as for sewer pipelines or as otherwise required.

Pipelines shall be left clean and free of debris. Vertical and horizontal alignments must be straight unless otherwise approved by the Council.

8.6 Completion

All connections shall be sealed with an approved plug or cap, and be marked with a 100x50H4 treated stake painted red, extending from invert level of the pipe to 600 mm above ground level.

Exposed surfaces of manhole covers shall be painted red.

As-built plans complying with Section 2.4 of this Standard shall be provided.

Section 9
Electricity, Telecommunications and Gas

9.1 General Requirements

- Necessary electricity, street lighting, and telecommunications shall be provided to the requirements of the appropriate utility service operators and as below at the applicant's expense. Where available, gas may also be provided in accordance with NZS 5258 as part of the subdivision works.

- Reticulated electricity and telecommunications shall be provided to the boundary of each new lot, including that of the balance allotment as specified in the District Plan.

- Where it can be demonstrated that the intended land usage does not warrant a power or telecommunications supply, i.e. Forestry, run off blocks, or where it can be seen that it is uneconomic to provide such services to the boundary, ie. the cost of reticulation exceeds the sale value of the new block, then the Council or controlling utility service operators may approve the use of a `no power' or `no telecommunications' encumbrance registered on the new title.

- It is the incoming owner's responsibility (not withstanding prior arrangements) to meet the costs of any internal power and telecommunication reticulation and/or any network upgrade that may be necessary to supply loads above and beyond that designed for.

- Easements - Where applicable, electrical and telecommunication easements will need to be registered over new and existing plant to ensure the security of supply.

9.2 Electricity

In urban areas, and where practicable in other areas the supply of electric power shall be made by means of an underground ducted system installed at the time of roading construction. Sites for power transformers and switching stations shall be provided for as and where required at no cost to the Council. (See Clause 5.13)

Power cables, lines and plant constructed on public land, or on private property and secured by an easement in gross; need to be signed over to a recognised network operator to meet the requirements of the Electricity Act 1992.

9.3 Telecommunications

Telecommunications reticulation in urban areas shall be an underground system installed at the time of roading construction. Sites for necessary services and equipment shall be provided for as and where required at no cost to the Council.