Hastings District Council

Engineering Code of Practice

2011

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HASTINGS
HEART OF HAWKE'S BAY

Schedule of Changes

Amendment No:	Subject	Part No.	Paragraph	Page	Date
1	First Draft Published				Sept 2008
2	Second Draft Published				Jan 2009
3	Third Draft Published				April 2010
4	Fourth Draft revised to reflect release of NZ4404:2010				October 2010
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Contents

Part One - Context

This document is a guideline for the engineering of subdivision and land developments within the Hastings District. It sets out what the Hastings District Council (Council) expects from developers (and their agents) so that the requirements of the Resource Management Act and the Hastings District Plan are met. This document should also be used in conjunction with the *Subdivision and Infrastructure Development Best Practice Design Guide 2010* which illustrates acceptable innovative design solutions.

The Resource Management Act (RMA) is concerned with promoting the sustainable management of natural and physical resources. In the RMA emphasis is placed on the integrated management of the effects of activities on the environment. Environmental management under the RMA is intended to be outcome orientated, and this provides challenges for both developers and Council.

The RMA provides for effects-based Regional and District Plans through which the implementation of established and new or innovative solutions for development can be undertaken. However, the successful adoption of new or innovative designs depends to some degree of certainty in the resource consent process.

Section 11 of the RMA requires local authorities to control subdivision, and to make specific provision for subdivision and land development in the District Plan. To date, this Council's response to Section 11 has been mainly through rules and standards defined in the District Plan and through a prescriptive Code of Practice (CoP). Although the previous CoP was only one means of compliance, it tended to become the norm because of the certainty it provided in the resource consent process.

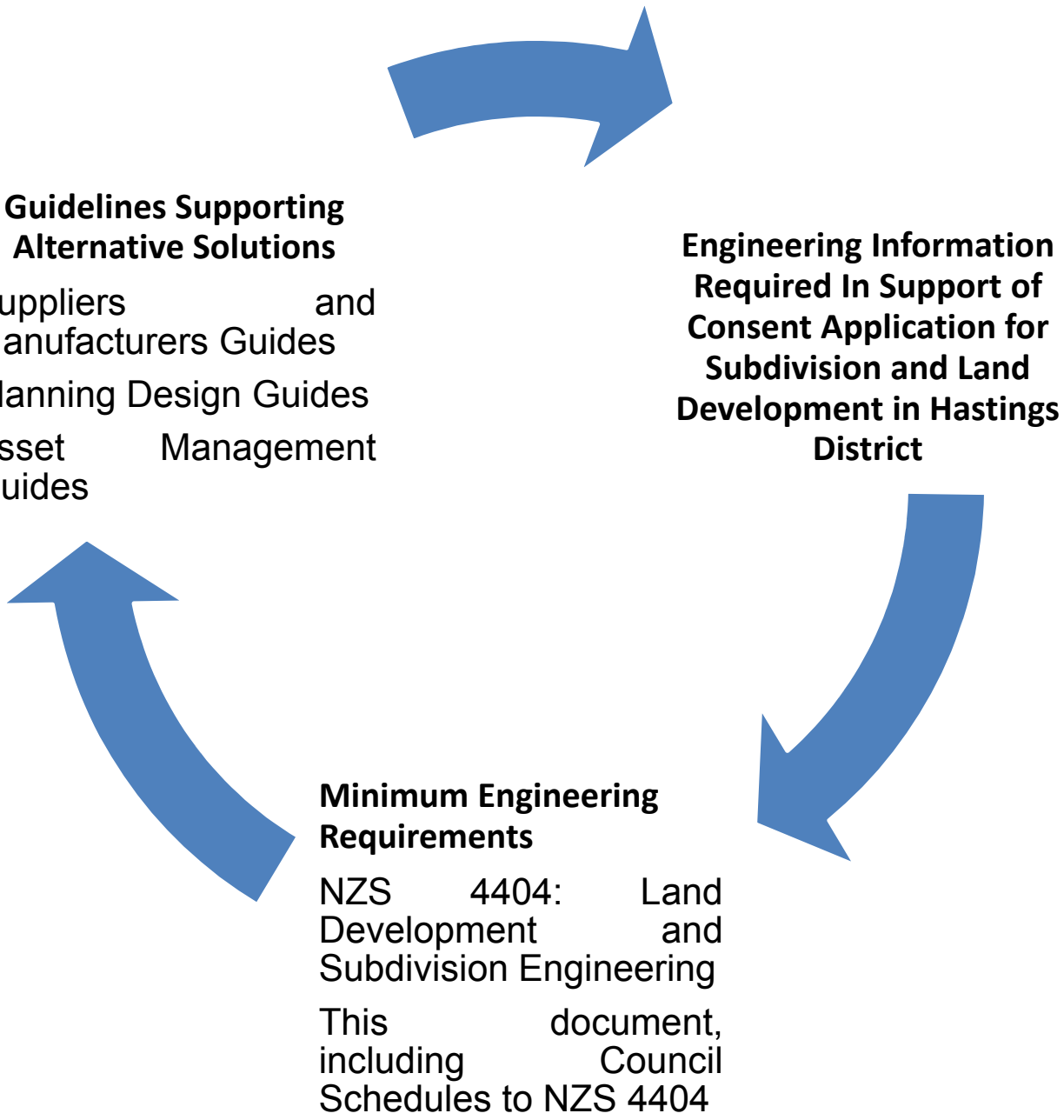
Council now wishes to support, where appropriate, greater innovation in the design and consent process and in the provision of engineering services.

Council's policies are evolving in response to increasing environmental awareness, the desire to promote and implement sustainable solution, and Council and community concerns about service and infrastructure constraints within the District. These concerns include the provision of adequate potable water supplies, treatment and disposal of wastewater, dealing with stormwater issues and design of roads and facilities to support alternative transport options. These are all relevant to development planning and need to be taken into account in development proposals.

Council acknowledges that some developments will continue to be more suited to traditional engineering approaches. These will be best provided for by using the New Zealand Standard NZS 4404 as the base document for meeting minimum engineering requirements with Schedules that provide specific design information and any other Council requirements that may differ from those in NZS 4404.

Alternative means of compliance are not discouraged in the District Plan. The acceptability or otherwise of alternative means of compliance will make use of best practice design guides such as *SNZHB44:2001, Subdivision for People and the Environment* and the *Subdivision and Infrastructure Development Best Practice Design Guide 2010*. This approach is based on the use

of alternative design guides and minimum engineering requirements, as illustrated in the diagram below:



The subdivision and land development consent system now in place seeks to provide a degree of certainty for both developers and Council, to be sufficiently flexible to allow innovation, and to provide information about minimum engineering requirements and acceptable solutions. It provides a mechanism for developer's to propose alternative design solutions. Compliance with minimum standards is still available for those situations where alternatives are not desired.

The system also seeks to integrate the consent and approval process across departments within the Council and to align with national directions and legislative changes. Accordingly, the approach to land development and subdivision within the Hastings District has been considered in conjunction with the direction of the Local Government Act 2002 and the implications of community planning on Council activities and subdivision and land development in the future.

To assist Council to assess applications, a combined interdisciplinary process is used that enables the applicants, developer's representative, and Council engineering, resource management, and parks and recreation representatives, to examine proposals in an interactive and integrated manner. A *Design and Review* group within Council is responsible for assessing applications and/or early design concepts, recognising that compromises may need to be made in some areas for the benefit of the wider community. This is the essence of sustainable management and the process provides for dialogue between Council staff, applicants and the community to ensure an integrated approach to decision-making is achieved.

Developers should discuss their development concepts with the Council at an early stage. Having a robust subdivision design process is critical in ensuring that consideration is given to the site and wider context and that multiple outcomes are achieved e.g. traffic calmed, high amenity streets (refer *Subdivision and Infrastructure Development Best Practice Design Guide 2010 for detailed requirements)*

The following design process should be used when undertaking the design of significant subdivisions:

STAGE 1

- *Identify and analyse the wider, suburb / neighbourhood context*

STAGE 2

- *Identify and analyse the characteristics, constraints and opportunities of the site*

STAGE 3

- *Design the proposal using the principles outlined in the design guide*
- *Hold minute recorded pre-application meeting with the Council*
- *Consult with affected parties*
- *Refine design proposals*
- ***Lodge resource consent application***

The use of alternative and/or innovative subdivision design and environmental technologies (compared to more conventional engineering approaches) may mean that industry knowledge

about the long term operation, maintenance and success of some designs may be limited or not available. This is apparent on a national basis and is not just a local issue. This may require, at least initially, that Council take a trial and error approach to allowing developers to use these alternative designs, thereby building local experience to a level where some degree of certainty in the selection and application of alternatives can be gained.

It also requires developer's to adequately research alternatives and innovative processes prior to submitting a consent application, and to clearly document this research in their development proposals, including addressing ongoing maintenance and asset management considerations, and "lowest whole of life costing".

Each application will be assessed on its merits against the general requirements and objectives that are documented in the District Plan and in this document.

In all cases, the specifications and guidelines referred to in this document are the current published version.

Part Two - Development Principles

1 Design Process

Before any subdivision or land development can commence a resource consent will almost always be required. Developers should consult with the Council at an early stage to ascertain any particular requirements or site limitations for the development proposed.

The Team Leader, Environmental Consents/Subdivision will coordinate a *Design and Review* Group comprising cross sectional staff representation which can meet to work through design issues with developers. Experience has shown that there is a great deal of value in having such meetings at a very early stage, particularly prior to the lodgement of any resource consent application and before detailed design has been undertaken.

The trigger for initiating a pre-application meeting would be for subdivisions creating new public space e.g. new roads, reserves, open spaces or is a Council development project which has significant design implications e.g. significant road upgrading, new road or community facilities such as an Aquatic centre where there are opportunities for innovative design and best practice.

However prior to meeting with the *Design and Review Group* the following design process should be followed:

(i). Context Analysis
Identify and analyse elements that contribute to the wider context of the site e.g. landforms, transport patterns, development patterns, open space, community facilities, waterways, surrounding land uses etc.

(ii). Site Analysis
Identify and analyse site characteristics, constraints and opportunities to develop a comprehensive understanding of the site. This could include natural features, topography, orientation, aspect, accessibility, natural hazards, soil types, groundwater levels, climatic conditions, existing infrastructure and buildings, previous land use, cultural or historic features.

(iii). Planning Requirements
Research and understand the planning requirements that apply to the site. This could include the Hawke's Bay Regional Council Regional Fresh Water Plan, Regional Discharge to Land Plan, Regional Soil Plan and Regional Air Quality Management Plan. They should consult with the Regional Council to seek advice on the above plans and to ascertain if resource consents are required from the Regional Council. This is particularly the case where large scale earthworks and/or changes to waterways are involved in a subdivision or land development proposal. Applicants should also consider the Hawke's Bay Regional Council Waterway Design Guidelines which outline innovative low impact stormwater design solutions.

(iv) Consultation

- Discuss the development proposal with parties who may have an interest in the development including:
- Adjoining land owners
- Tangata whenua
- Department of Conservation
- Land Information New Zealand
- New Zealand Historic Places Trust
- Network Utility Operators
- New Zealand Transport Agency
- New Zealand Fire Service
- Local environmental interest groups

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(v). Subdivision Design

Use all of the information collected in the steps above to inform the layout and design of the subdivision or development.

Once the above analysis and initial design has been completed you should make contact with the Team Leader, Environmental Consents/Subdivision who can make the necessary arrangement for the pre application process. A sketch/outline of proposal should be emailed to the Team Leader, Environmental Consents/Subdivision at least 2 days prior to meeting. Minutes will be taken at meeting and they will be circulated with agreement reached on design outcomes**.**

2 Concept Plan

A concept plan will be required where a large area is proposed to be developed, particularly if it is to be staged over a number of years. It may also be advantageous to provide concept plans where alternative designs are proposed. Concept plans will need to look beyond the site to consider any strategic issues within the area.

Where the Council requires a concept plan, sufficient copies of the plan and supporting information shall be provided to the Council for evaluation of the proposal. The plan shall include sufficient details to give a general outline of the nature of the development, either as part of the plan or in the explanatory material accompanying the plan. Information supporting alternative design proposals should be sufficient to enable Council staff to assess the effectiveness of operation and consider the “whole of life cost implications” if the facility is to become public property.

The concept plan should identify and analyse elements that contribute to the wider context of the site and identify and analyse site characteristics, constraints and opportunities to develop a comprehensive understanding of the site. This includes approximate locations of:

CONTEXT

- The existing and planned built environment including local commercial centres, open spaces (parks), schools and other community facilities, medical centres, churches, scale of buildings, housing typology and landuse density;
- Movement Networks (arterial roads, local roads, cycleways, pedestrian routes and desire lines) and the opportunity to create highly connected, walkable and cycle friendly communities which relate to the built environment;
- Infrastructure, both existing and planned and any possible capacity issues;
- Existing natural features such as waterways, topography, view shafts or significant trees or native vegetation should be incorporated into the subdivision design.
- Need to consider downstream capacity and sensitive receiving environments.

SITE ANALYSIS

- topography and landforms, natural features, wetlands, springs and streams
- Existing native vegetation and significant trees
- Soils and groundwater
- Coastal conditions
- View shafts, site orientation, solar, wind and climatic conditions
- Existing buildings and structures
- Heritage and cultural elements
- Surrounding road network and possible connection points
- Possible future road connections
- Reserves, parks, open spaces
- Existing and proposed cycleways, walkways or bridle paths which link with the site
- Existing pedestrian desire lines which may exist through the site
- Drainage, stormwater paths and any downstream capacity constraints
- Existing and proposed water and sewer infrastructure and any capacity
- constraints
- Possible contamination issues
- Natural Hazards, e.g. flooding, coastal erosion
- Location of nearby shops, schools, commercial or community facilities
- Character of the surrounding area, in terms of landuse, density and building types
- Other significant features.

The concept plan should also extend beyond the site to take account adjoining developable land, whether or not owned by the developer, and any effects on existing developed land. Refer to *Subdivision and Infrastructure Development Best Practice Design Guide 2010* for examples of subdivision design.

3 Resource Consents

The following guidance is provided in relation to the preparation and submission of Resource Consents. Specialist advice on the requirements for Resource Consents can be obtained from Council.

(a) Subdivisions and land developments projects usually require resource consents in accordance with the Resource Management Act. In some cases resource consents will be needed from

both the Hastings District Council and the Hawke's Bay Regional Council. Developers are advised to consult with the Council's Consents staff prior to lodging resource consent applications

(b) Section 88 of the Resource Management Act and the Hastings District Plan set out the information that must be included with any application to subdivide. A checklist is available from Council's Consent Planners which states the information required by the District Plan. Important parts of any application are the Assessment of Environmental Effects, reports covering specific aspects of the proposed development and plans of the development; being concept plans, scheme plans for subdivisions and development plans for other developments

(c) The application (particularly for subdivisions) should include reports covering; proposed land uses, factors influencing the design of the development, the extent of any earthworks proposed, geotechnical report if required for land stability considerations, foundation design and/or as evidence to support any proposal to dispose of sewage effluent on-site, stormwater disposal proposals, potable and fire fighting water supply provisions, road safety audits, current and future effects of traffic, the provision of off-street parking, access for fire fighting appliances, landscaping proposals and any other relevant information which may assist the Council in making an informed assessment of the proposals. Where alternative designs are proposed, then the applicant shall provide sufficient evidence to enable Council staff to assess the viability of the proposal, ongoing maintenance requirements and whole of life cost assessments

(d) If a subdivision is likely to fall within the provisions of Section 106 of the Resource Management Act, then the Council may refuse to grant subdivision consent, or may grant subdivision consent subject to conditions. In cases where Section 106 provisions may apply, applicants should propose suitable conditions for the purpose of avoiding, remedying or mitigating the material damage effects referred to in subsection (1) of Section 106

(e) An applicant is required to assess the flood risks associated with any proposed subdivision through direct liaison with the authority responsible for the administration of watercourses in the area. If the Hawke's Bay Regional Council or the Hastings District Council does not have the necessary information, then the applicant will be responsible for providing it. Applications should include proposals for dealing with stormwater from the development, including, where necessary, assessment of the effects of the proposed development on upstream and downstream stormwater flows and levels. The assessment should also include possible effects the proposed development may have on groundwater levels and, where applicable, what measures are proposed to mitigate any adverse effects arising from possible changes in groundwater levels. Existing stormwater systems shall be able to cope with stormwater runoff from the development without adverse impacts on other properties either upstream or downstream of the development site, within Council's agreed levels of service. Potential increases in stormwater runoff peak flows shall be mitigated within the development by appropriate measures

(f) To meet the requirements of Section 106 of the Resource Management Act, Council needs to consider in any subdivision application the implications of flooding or inundation and any coastal hazards. Building sites within subdivisions are required to be above the flood level of the 1% annual exceedance probability (AEP) storm event plus an approved freeboard. A

distinction is made between inundation by ponding and inundation where flood waters are likely to generate scour velocities and consequent erosion. Applicants must either establish that the land is not subject to material damage, or propose measures that will ensure that material damage under "bank full" conditions does not occur or can be remedied

(g) A report from a suitably qualified person covering stormwater disposal and inundation issues, including a catchment plan and calculations, should be included with the resource consent application

(h) Council will require easements or covenants to be recorded on the title if a planned secondary flow path arising from the 1% AEP event intrudes into an allotment within the development to a point where a dwelling site is normally permitted

(i) Once an application is submitted Council will decide whether to notify it or not. Under the Act it is possible to gain consent for discretionary and non complying activities without public or limited notification and hearings. However, the Council must consider each application and be satisfied that this is only possible if:

- That the effects on the environment will be minor; and
- Approval of all potentially affected parties has been obtained (unless the Council considers it unreasonable in the circumstances)

Note: The Resource Management Act allows any application to be notified under special circumstances, even if a relevant plan expressly provides that it need not be notified.

(j) If an application is non-notified then Council staff may make the decision to grant or refuse consent under delegated authority. Applicants can object to the Council if consent is refused, or if they are not happy with the conditions. The Council is happy to forward draft conditions to applicants and consider any comments they may have prior to issue of the resource consent. Further information can be obtained from the Council regarding non-notified applications and objections

(k) If the Council decides to notify an application, it will first decide if it is to be publicly notified or have limited notification. If it is to be publicly notified, it will be advertised in the Public Notices section of an appropriate local newspaper. A sign is generally erected on the site of the proposed activity and any parties who are considered to be potentially affected are notified in writing. These parties are invited to inspect the application at the Council buildings or the local library, and to make a submission either for or against the proposal. The aim of notification is to ensure that everyone that may be affected by a proposal is given the opportunity to make a submission

(l) If notification is to be limited, then only those parties who are considered to be directly affected by the application, such as immediate neighbours, will be served notice and invited to participate in the hearing process

(m) Once the closing date for submissions has passed the Council may arrange a prehearing meeting. The applicant and all submitters are invited to discuss the application in an informal way. The aim is to first clarify the concerns and goals of all parties, and to agree on the facts

as far as possible. Secondly, the prehearing meeting can go on to resolve as many differences as possible. If all differences are resolved a hearing may not be necessary. If some concerns remain unresolved, then the application will go to Hearing. A Hearing Committee of at least three elected Councillors, or independent commissioners, will hear the case and make a decision to grant or refuse consent. This decision may be appealed to the Environment Court. Further information is available from the Council

(n) Consents may have conditions imposed to ensure that developments are sound in relation to both engineering and environmental aspects, and to protect other landowners and future residents. Council staff will set the conditions using the District Plan and other planning and engineering documentation, including these requirements, as guidance. Applicants may appeal or object to any conditions set on their consent. Further information regarding appeals can be obtained from the Council

(o) Once resource consent has been granted, there is normally a period of five years to submit a land transfer plan for the Council's approval. This plan must be in accordance with the original plan and any conditions of approval. If the land transfer plan satisfies the Council's requirements, approval is granted. The land transfer plan is then lodged with Land Information New Zealand (LINZ)

(p) A longer period for the survey plan to be submitted may be agreed by the Council at the time consent is granted, and an extension can be granted later by the Council if certain criteria are met

(q) A certificate stating that all the conditions of consent have been satisfied must be provided within three years of the Council's approval of the land transfer plan. This certificate and other documents are then lodged with the District Land Registrar to allow the new certificates of title to be issued. Failure to gain this certificate within the time limit may result in the consent approval lapsing.

(r) The Council imposes fees for the processing of resource consent applications and for the later monitoring of resource consent conditions. Fees are split into two components. An application fee is required for the consent planning processes required for decisions on applications and, where applicable, an application fee is required for the engineering considerations required. Where consent monitoring is involved additional fees may be required. The quantum of these will generally be included in the resource consent conditions. Additional charges and costs are required to be fair and reasonable. Schedules of the fees and charges are available from the Council

(s) Resource consent procedure and time frames can be obtained from the Council's Resource Consents Section.

4 Financial Contributions

Reserves contributions for subdivision and land development projects may be required in accordance with the requirements of the District Plan.

Development contributions for capital expenditure to accommodate growth in demand for roads, cycling, walking and bridle ways (CWB), water supply and waste water treatment facilities, community infrastructure and flood mitigation activities, can take the form of money or land or both at Council's discretion in accordance with Council's Development Contributions Policy.

5 Assessment of Environmental Effects (AEE)

The following guidance is provided in relation to the preparation and submission of AEE reports.

(i) For all resource consent applications it is necessary to provide an assessment of any actual or potential effects that may result from the activity for which the consent is sought. An Assessment of Environmental Effects needs to be prepared in accordance with the Fourth Schedule to the Resource Management Act. The Council has a series of brochures describing the Assessments of Environmental Effects reports

(ii) An Assessment of Environmental Effects may include such issues as increased traffic (vehicular and pedestrian), effects upon vegetation and the landscape, effects arising from stormwater, wastewater and provision of potable water supply, and effects of additional buildings on amenity values. The amount of detail of an assessment of environmental effects should be proportional to the scale of the potential or actual effects of the activity

(iii) The Fourth Schedule to the Resource Management Act requires details of who is affected, any consultation undertaken with the parties (including Tangata Whenua), the results of this consultation and the views of those consulted. It is best to consult early on in the preparation of an application. Effective consultation can resolve any misunderstandings and concerns that affected parties may have. This in turn can result in the application being simpler and quicker to process. If adequate consultation is not undertaken by the applicant, this will be done by the Council, at the applicant's cost

(iv) If an Assessment of Environmental Effects is not completed or does not have sufficient information for Council staff to make a decision, a request will be made for further information. There is the right to formally object to a request for further information. Advice on this is available from Council.

6 Scheme Plans

Scheme plans for subdivision and land development projects shall comply with those requirements of the District Plan that apply to the land being subdivided and be submitted by a Registered Professional Surveyor or Licensed Cadastral Surveyor with the resource consent application.

Scheme plans shall provide the following information:

(a) The position of all existing public utility services and water courses, water catchments and other significant water features

(b) Adequate contour information to illustrate the existence on each allotment of a suitable building platform and to enable the gradients proposed for roads, rights of way and access ways to be

assessed. For two or three lot subdivisions spot levels in terms of mean sea level datum (Hastings) may be acceptable where the land is of gentle enough contour to enable road and right of way grades and feasibility to be assessed from such limited information

(c) Sufficient topographical information, including a locality plan if necessary, to accurately identify the site. The position of all buildings and significant stands of trees or bush and any other significant feature of historic, cultural, environmental or other interest shall be shown

(d) Where a scheme plan forms only part of the future potential development of a larger block of land held in the same ownership and zoned residential, and a concept plan has not previously been provided, the scheme plan shall show the total development including roading, drainage, water supply and the number of allotments, so as to ensure that the initial scheme plan application does not prejudice full and future development. The extended development may be shown to a smaller scale as an insert on the initial application

(e) All allotments on the plan shall be numbered, including any land to vest, and shall show metric dimensions for all boundaries as well as the area of each allotment

(f) Indicative roading networks and service layouts shall be shown with typical road cross-sections that provide sufficient information to check that adequate gradients and suitable manhole invert levels can be achieved

(g) The draft conceptual cycleway, walkway and bridleway indicative network

(h) All landscape works proposed, including on road reserves, including the location and species of trees

(i) Details shall be given of any proposed reserve and its proposed development. The applicant shall be responsible for nominating the purpose for which each reserve is to vest and such information shall be shown on the plan. Council may or may not approve part or any of the proposals

(j) Public roads, private ways, service lanes, access ways and cycleway, walkway and bridleway networks shall be laid out to fit in with the general roading requirements of the locality in which they are situated. They shall generally provide for connectivity and any requirements arising from road safety audits that have been undertaken

(k) The width of legal road reserves and carriageways and road geometry and gradients shall be in accordance with the requirement of the Hastings District Council Development Requirements, unless alternative designs are required or approved by Council

(l) Plans shall be drawn to commonly accepted metric scales. The Council's preference is for scales of either 1:500 or 1:1000. However scales of 1:100 or 1:200 are acceptable in appropriate situations. Datum shall have reference to mean sea level (Hastings). A north point must be shown on plans

(m) Due regard shall be given for any road widening or upgrading proposals which the Council may have and any requirements shall be ascertained by consultation at an early stage with appropriate Council staff

(n) In designing any scheme plan, consideration shall be given to the future development of adjoining land and the Council may, as a condition of consent, require the creation of road reserve and/or the formation of roads to or near the boundary of adjoining land

(o) In submitting any scheme plan for approval, the applicant shall provide documentary evidence that the general layout is sufficient for reticulation by other utility services authorities and meets New Zealand Fire Service requirements. When a scheme plan has been approved adequate provision shall be made for transformer sites, junction boxes and other special needs of these authorities.

7 Water Permits

The applicant shall undertake a thorough evaluation of the effects which the proposed works are likely to have on surface run-off and the consequences thereof, both on the land to be developed and also on adjoining lands, or into water. Water permits shall be obtained from the Hawke's Bay Regional Council for any restricted activity covered by Section 14 of the Resource Management Act and any requirements arising from the Regional Fresh Water Plan and Regional Discharges to Land Plan.

The approval of the Hawke's Bay Regional Council shall be obtained for temporary or emergency overflows from sewage pumping stations in order to comply with the requirements of Section 15 of the Resource Management Act "Discharge of Contaminants into the Environment".

A water permit may be granted on either a temporary or permanent basis. A permanent permit is required if the obstruction, impounding, diversion or discharge of water, whatever the case may be, is to become a permanent part of the development.

Any condition imposed by the Hawke's Bay Regional Council or the Hastings District Council shall be deemed to be a condition of scheme plan approval for the land development and/or subdivision.

Where a water permit requires the Council to assume responsibility for any of the temporary works which will remain in operation subsequent to the sealing of the Land Transfer Plan, the Council will require the applicant to enter into an agreement enabling the Council to recover any costs arising from the operation of such temporary works.

The applicant shall be responsible for the payment of all fees to the Hawke's Bay Regional Council for the licensing of the permits to discharge stormwater. Application for a permanent water permit will be made by the council to the Hawke's Bay Regional Council where necessary, in the name of the Hastings District Council.

8 Network Utility Services

8.1 Telecommunications

It will be necessary at the time of subdivision for the applicant to demonstrate the following requirements

- The provision of telecommunications infrastructure to the boundary of each lot to the requirements of the telecommunication provider

- Written agreement be obtained from the telecommunication provider that there is sufficient capacity in the wider network to supply the subdivision.

Part Three - Engineering Requirements

Part Three - Section 1: General Requirements and Procedures

1 Introduction

Council has adopted the New Zealand Standard NZS 4404 as the base document to specify the minimum engineering requirements. Schedules outlining the Council requirements that are different to, or not covered in this Standard, have been developed and form part of the minimum engineering requirements. These are presented in Section Four of this document.

1.1 General Requirements and Procedures

Developments shall comply with Section 1, General Requirements and Procedures of NZS 4404 whether using the Minimum Engineering Requirements or alternative approaches, except as modified by the schedule titled **Schedule A, Hastings District Council Altered Requirements to Part 1 NZS 4404, General Requirements and Procedures** in Section Four of this document.

1.2 Developer's Representatives

The owners of any development projects shall appoint a Developer's or Owner's Representative or Representatives who shall be responsible for the investigation, design and obtaining of approvals of the works, contract administration and supervision of the works, and certification upon completion of the works. The Developer's Representative shall be a person with qualifications and/or experience appropriate to the project with suitable liability and indemnity cover commensurate with the scale of the development.

1.3 Suitably Qualified Persons

Where investigations and reports are required by a suitably qualified person, this person or persons will have nationally recognised qualifications and accreditation, such as Chartered Professional Engineer (CPEng), Registered Professional Surveyor or Licensed Cadastral Surveyor. The person or persons will normally be expected to be professionally recognised in the area of competence claimed and to carry professional indemnity insurance to a level suitable for the purpose but in any case not less than $1,000,000 per project.

Council reserves the right to have any work peer reviewed regardless of any prior approval as to the acceptability of the suitably qualified person. The cost of all peer review work will be borne by the developer.

Without limiting the Council's rights to require the use of suitably qualified persons the following are examples of areas of expertise, together with the expected minimum qualifications where such people may be required:

- geotechnical engineering *(CPEng with recognised discipline competence)*

- traffic and transportation engineering *(CPEng with recognised discipline competence)*
- stormwater engineering and flood mitigation *(CPEng with recognised discipline competence)*
- wastewater engineering *(CPEng with recognised discipline competence)*
- potable water supply engineering *(CPEng with recognised discipline competence)*
- non- potable or rural water supply engineering *(CPEng with recognised discipline competence)*
- landscape design and practice *(Registered Landscape Architect)*
- land surveyor (subdivision plans) *(Registered Professional Surveyor, Registered Engineering Surveyor or Licensed Cadastral Surveyor)*
- land legalisation , subdivision lots, roads, reserves etc *(Registered Professional Surveyor and Licensed Cadastral Surveyor)*

1.4 Maintenance of Standards

Developers have the responsibility, both directly and through their appointed representatives, to ensure that all works carried out directly or by contractors or sub-contractors on their behalf are at all times in accordance with the approved drawings and specifications (including approved variations), and in accordance with sound engineering practice. While Council staff will be available to offer advice and guidance, it remains the developers' representatives' responsibility to supervise all investigation, design and construction and certify that the required standards have been achieved.

1.5 Safety

Developers, Developer's Representatives and Contractors must meet the requirements of the Health and Safety in Employment Act 1992. Developers and/or contractors working on a development site are responsible for the safety of Council employees and anyone else undertaking work on, or inspections of, the development.

Developers and their representatives shall ensure that contractors have in place effective safety management systems. These systems will include having in place suitable plans to carry out the required work in a safe manner, ensuring that the contractors comply with the requirements of relevant legislation covering the works.

Where a contractor working on a developer's behalf is to make connections to Council owned existing services or roads then the Developer, the Developer's Representative and the Contractor shall comply with Council instructions and guidelines at all times. For the

purposes of the Health and Safety Manual requirements any work on Council owned assets is deemed to be managed by the Developer's Representative on behalf of the Council.

1.6 Engineering Services

Engineering services required for a development shall be provided in accordance with Council requirements, and could include the design and provision of:

For Urban developments

(a) Earthworks

(b) Stormwater drainage, including pipe systems, swales, ponds, lakes, wetlands, attenuation devices, etc

(c) Wastewater collection, treatment and disposal

(d) Water supply, including for fire fighting purposes

(e) Underground power, gas and telecommunication services

(f) Street lighting

(g) Kerbs and/or channels where appropriate

(h) Road formation, pavement construction, sealing, drainage, kerbs and/or channels (where appropriate) and provision of services for private rights-of-way and service lanes

(i) Paths and fencing (where appropriate) in public access ways, cycleway, walkways and bridleways

(j) Grass areas, planting and other landscaping within road reserve or recreational and drainage reserves to vest.

For Rural developments

(a) Earthworks

(b) Road surface water drainage and culvert installations

(c) Wastewater treatment and disposal

(d) On site water supply or restricted water supply reticulation if a public system is available, including for fire fighting services

(e) Electric power and telecommunication services

(f) Street lighting, if appropriate

(g) Formed, metalled and sealed road pavements, and adjoining features

(h) Cycleway, walkways and bridleways where appropriate.

1.7 Natural Ecosystems

Developers will ensure that natural ecosystems are able to continue to function and are not unnecessarily degraded or lost as a result of the proposed land development and/or subdivision. Enhancement of existing natural ecosystems should be considered a priority as a form of mitigation.

As a minimum, developers are required to:

- Provide information about any natural values (including indigenous fauna) that occur within the development site or that will be affected by the development site (i.e. can be off site as well)

- Submit to the Council a plan detailing how any natural values will be protected and enhanced, and appropriate conditions or methods to achieve this.

The natural values/ecosystem assessment and plan will:

- Identify all natural values that will be affected and detail appropriate mitigation

- Manage the impact of proposed roads, buildings, structures, people, domestic animals, introduced vegetation etc and increased use of the area and adjacent on indigenous vegetation, landforms (e.g. dunes) and fauna etc.

Investigation and design requirements may include:

- Protection of areas of indigenous flora and fauna through good design, legal protection, fencing and pest and weed control

- No build areas or planted buffer areas to ensure that 'edge effects' and conflicts in use are not caused by building too close to natural areas (including watercourses)

- Improving Community Understanding: this can help residents and the public to understand the values of a site and determine how these should be protected.

1.8 Working in Legal Road Reserve

Any person proposing to carry out construction or maintenance work in a Legal Road Reserve shall apply to Council (or if required New Zealand Transport Agency) for a Road Opening Permit. For Legal Road Reserves under the control of Council the excavation work must be:

- Carried out in accordance with the current codes of practice for working on the road

- Restored to the specified standards, by appropriately qualified and experienced contractors.

1.9 Design performance criteria

The purpose of an engineering design is to provide common terms of reference for defining the physical works (as may be required to meet Council requirements and/or resource consent conditions) and to provide a mechanism to evaluate the works against their performance requirements.

An engineering design shall:

- Define the objective for and scope of the works, and incorporate all of the components required for the intended project, including references to appropriate standards and specifications

- Be legible and understandable and be supported by sufficient drawings, calculations, reports and associated documentation to facilitate competent appraisal and if required peer review

- Provide sufficient information for construction purposes

- Provide for
    - Safety
    - The whole of the catchment
    - Sudden or catastrophic failure
    - Future development
    - Efficiency in operation and maintenance
    - Optimisation of life cycle costs

- Be prepared and verified by suitably qualified professionals

- Demonstrate compliance with resource consent conditions, this document and other regulatory and statutory requirements

- Be a platform for approvals and certification.

1.10 Commuted Sums

In some situations the Council will require a commuted sum to be paid by the developer based on the net present value of the ongoing operation, maintenance and replacement costs for a facility taken over by the Council. This particularly relates to sewer pumping stations, but may also apply to other non-normal situations. If relevant, applicants should discuss this aspect with the Council at an early stage.

1.11 Alternative Approaches

The Council is prepared to consider alternative approaches to engineering design and construction provided that the District Plan requirements can still be achieved. Approval for

the engineering design and construction of works on subdivision and land development projects can be achieved by either:

- Following a more prescriptive approach based on Minimum Engineering Requirements as outlined in this document, or

- Utilising a less prescriptive approach, which offers opportunity for greater innovation, and which is based on other published design guides and standards.

The requirements outlined in the following paragraphs of this section apply to both approaches.

- The Council has adopted the New Zealand Standard NZS 4404 as the base document to meet its minimum engineering requirements. Schedules outlining the Council requirements that are different to, or not covered in the Standard, have been developed and form part of the minimum engineering requirements in Section 4

- Other published design guides including the *Subdivision and Infrastructure Development Best Practice Design Guide 2010,* Hawkes Bay Regional Council Waterway Design Guidelines 2009 and Standards New Zealand Handbook, SNZHB 44:2001 Subdivision for People and the Environment, provide guidance on alternative means of carrying out the engineering of subdivision and land development projects. Applicants can also submit to Council alternative designs based on other appropriate published Design Guides and with appropriate supporting detail

- Applicants can choose for their developments whether to use the Minimum Engineering Requirements in Section s, other published Design Guides or use a combination of the two.

Part Three – Section 2: Earthworks and Geotechnical Requirements

2 General Requirements and Objectives

Developments shall comply with Section 2, Earthworks and Geotechnical Requirements of NZS 4404, whether using the Minimum Engineering Requirements or the Design Guide approaches, except as modified by the schedule titled **Schedule B, Hastings District Council Altered Requirements to Section 2 NZS 4404, Earthworks and Geotechnical Requirements** in Part Four of this document.

Geotechnical appraisal and design may be required:

- prior to detailed planning, which usually involves some form of subsurface investigation and consideration of historic behaviour;
- during the review of design concepts;
- during construction to ensure the adequacy of bulk filling and the execution of the earthworks design; and
- following construction, to provide certification and/or define limitations of the works.

2.1 Performance Criteria

The overall site, including earthworks proposed as part of the development shall:

- Meet the relevant standards and criteria of the District Plan
- Be safe and stable and geotechnically sound during and after construction, and for the life of intended structures
- Not unnecessarily alter the natural land form or interfere with natural features
- Provide stable locations and foundations for roads, berms and drainage paths, pedestrian and cycleway access, overhead and underground services
- Provide an accessible and stable building platform within each lot of a subdivision appropriate to the zoning of the land and in accordance with the requirements of the Building Act
- Control surface and ground water flows and sediment movement both during and after construction
- Not cause undue nuisance from silt, dust, noise or disposal of vegetation
- Be able to be reinstated and planted in a manner that is consistent with the zoning and consent conditions.

2.2 Archaeological and Cultural Sites

Should a waahi tapu or other cultural site be unearthed during earthworks the contractor and/or owner shall:

(a) cease operations;

(b) inform local iwi;

(c) inform the NZ Historic Places Trust (NZHPT) and apply for an appropriate authority if required; and

(d) take appropriate action, after discussion with the NZHPT, the Council and iwi to remedy damage and/or restore the site.

Where an archaeological site is present (or uncovered), an authority from the NZ Historic Places Trust is required if the site is to be modified in any way, in accordance with the Historic Places Act 1993.

2.3 District Plan Provisions

The Hastings District Plan contains various provisions for the preservation of vegetation and or landform. Developers shall comply with those provisions and should note that this may have an impact on the extent of earthworks which may be permitted, and hence on the conditions to be imposed on a subdivision or land development project.

Part Three – Section 3: Transportation

3 General Requirements and Objectives

Developments shall comply with Section 3, Roads, of NZS 4404, whether using the Minimum Engineering Requirements or the Design Guide approaches, except as modified by the schedule titled **Schedule C, Hastings District Council Altered Requirements to Part 3 NZS 4404, Roads** in Part Four of this document.

The Council's transportation objective is to plan, provide and maintain an efficient transportation network appropriate to the agreed level of use that will ensure the safe and orderly passage of all road users (including public transport, cyclists and pedestrians) throughout the Hastings District. This will be achieved by:

- Planning and implementing a balanced transportation network, including roads, cycleway and footpaths, with adequate opportunity for future growth, that supports the well being and economic development of the District

- Ensuring that the roads, cycleway and footpaths that make up the District's transportation network are fit for purpose, compatible with the environment in which they operate, and fully integrated to provide the necessary transport links for the wider community.

3.1 Performance Criteria

The layout, structure and performance of the transportation network and the associated amenities shall:

- Meet the relevant standards and criteria in the District Plan
- Be appropriate for the relevant position in the published District road hierarchy
- Provide safe and sustainable transport systems, compatible with the surrounding environment
- Provide effective and sustainable linkages and connectivity
- Be fit for purpose, and generally allow for the least "whole of life" cost in respect to structures, pavements and amenities
- Provide adequately for stormwater management, landscaping and other utility services
- Minimise the adverse effects of noise, runoff and contaminants in a manner compatible with the surrounding environment and the character of the neighbourhood
- Provide all Lots in the land development or subdivision with safe, sustainable and stable road access

3.2 Construction

Construction of all transportation systems shall be undertaken in accordance with the requirements of Section 3, Roads of NZS 4404, except as modified by the schedule titled

Schedule C, Hastings District Council Altered Requirements to Section 3 NZS 4404, Roads, unless otherwise approved by Council.

4 Part Three – Section 4 – Stormwater General Requirements and Objectives

Developments shall comply with Section 4, Stormwater Drainage, of NZS 4404, whether using the Minimum Engineering Requirements or the Design Guide approaches, except as modified by the schedule titled **Schedule D, Hastings District Council Altered Requirements to Section 4 NZS 4404, Stormwater** in Part Four of this document.

The Council's objective is to have a stormwater drainage system on all land development and subdivision projects that regulates storm surface water runoff and groundwater levels to the extent that agreed levels of service are maintained, any adverse effects on the environment are not more than minor, that protects public and private property from inundation, and minimises the effects of erosion and water pollution. Means of providing acceptable engineering solutions to stormwater projects are outlined in this document.

The Council will support the use of alternative or low impact stormwater disposal systems, provided that these minimise the whole of life costs to Council and the community, and that they succeed in reducing impacts on the receiving environment. Alternative systems can include reduced pavement areas, permeable pavements, wetlands, ponds, swales, soak pits and attenuation options. The use of suitable material such as river stone embedded in the base of the swale rather than mulch or bark should be used to reduce maintenance costs.

Generally the use of alternative or Low Impact stormwater disposal systems has higher risks, operation and maintenance costs, requiring more regular maintenance than traditional systems. However in many cases there will be a greener and more pleasant living environment with an associated increase in the value of the development which will have a net benefit to the local and wider community. With greenfield subdivisions new owners could be encouraged to take "ownership" of the area in front of their properties e.g. swales much like residents taking responsibility for mowing the front berm.

If there is a need to control stormwater runoff that is greater than the Council's agreed level of service to the property when fully developed, consideration should be given to stormwater attenuation or on site disposal. Appropriate site investigations will be required to ascertain the suitability of such alternative means of stormwater management.

Natural watercourses shall remain as public open space wherever possible, and become landscaped features of the urban environment. Bank protection and/or channel lining may be necessary to protect the adjoining environment (natural and developed) from the increased stormwater flows generated by a development. Protection works shall utilise methods that are sensitive to the surrounding environment. Piped waterways are preferred where the land being developed is to become private property.

4.1 Performance Criteria

Capacity and Layout Criteria

Any stormwater system shall:

(a) Provide protection from storms of at least a 50 year return period (2% annual exceedance probability, *AEP*) using a system of primary and secondary flow paths, appropriate to the intended land use over its design life. The primary system shall have a minimum capacity of at least a 5 year return period storm (20% AEP)

(b) Provide flood management to avoid serious inundation or hazard

(c) Provide rural lots with an area suitable for effluent pipes, tank and treatment system which is free from inundation in a 50 year event, and an area suitable for effluent disposal that is free from inundation in a 10 year return period storm (10% AEP) and not likely to cause a health hazard during any 50 year event inundation

(d) Adequately service the catchments and accommodate the design flows, for both the level of development at the time of design and that which can reasonably be expected to exist once the catchments are fully developed

(e) Adequately service each lot, road area or land area discharging to the point of entry through to an approved outlet.

Functional Criteria

Any stormwater system (primary and secondary system) shall:

(a) Meet the relevant standards and criteria in the District Plan, Council Bylaws, and Regional Plans

(b) Convey the flow by gravity, unless it can be shown that this does not represent the least whole of life cost option

(c) Be compatible with the existing drainage network, and not impose any adverse effects on the existing system, and on upstream and downstream properties

(d) Not cause undue restrictions on the location of any future building or development nor cause any undue risk to public health and safety

(e) Be designed and constructed to facilitate ongoing maintenance, minimize risk of debris or gravel blockage, outlet scour or land instability, and provide efficient and safe inlet and discharge

(f) Enhance the environmental and amenity value of any open channels and flood banks with protection from scouring, erosion or siltation

(g) Comply with all applicable Consents (both District and Regional Plan Consents and Bylaw Consents) and minimize adverse effects on the environment.

(h) Where required by Council utilise mechanical, electrical, alarm and telemetry equipment which is compatible with existing equipment used by Council

(i) Ensure that mechanical and electrical equipment is either designed for submergence, or located above the 100 year design flood level. (1% AEP)

(j) Be compatible with existing groundwater conditions, and control groundwater flows when necessary and in an appropriate manner.

Durability Criteria

Any stormwater system shall:

(a) Be constructed from approved materials suitable for that use, with a minimum design life of 150 years for civil works (e.g. pipes , manholes, buildings etc), and 25 years for mechanical and electrical components such as pumps and control systems, and with a proven record of performance

(b) Not suffer damage from any anticipated superimposed load (dead or live load) during the life of the system, and ensure safety during operation of the system

(c) Minimize the risk of root penetration of piped systems, and of erosion, piping or collapse of batter slopes of open channels or other drainage facilities particularly under extreme conditions such as rapid drawdown.

4.2 Construction

Construction of stormwater systems shall be undertaken in accordance with the requirements of Section 4, Stormwater Drainage of NZS 4404, except as modified by the schedule titled **Schedule D, Hastings District Council Altered Requirements to Section 4 NZS 4404, Stormwater**, unless otherwise approved by the Council.

Low impact designs and other alternative specific proposals shall have construction details referenced to an appropriate design guide and/or have full construction details provided, with appropriate supporting engineering information.

Part Three – Section 5 – Wastewater

5 General Requirements and Objectives

Developments shall comply with Section 5, Wastewater, of NZS 4404, whether using the Minimum Engineering Requirements or the Design Guide approaches, except as modified by the schedule titled **Schedule E, Hastings District Council Altered Requirements to Section 5 NZS 4404, Wastewater** in Section Four of this document.

Council is seeking to have reliable, affordable and environmentally acceptable wastewater collection and disposal systems that are adequate to meet present and future needs protect public health and safety and the environment. Wastewater systems shall minimise adverse environmental impacts, including erosion, pollution of waterways, coastal and marine environments, and habitats. Development of alternative wastewater systems that minimise environmental concerns and/or maintenance expenditure will be encouraged. Where the Council's wastewater network is available to service developments then each lot shall be provided with a connection and each development shall be provided a piped wastewater system connecting to the Council's system, unless alternatives are approved by Council.

5.1 Performance Criteria

For all subdivision and land development projects, the design of a wastewater collection and disposal system shall:

- Meet the relevant standards and criteria of the District Plan and the Hawke's Bay Regional Council Regional Plans
- Provide for the collection of wastewater, allowing for ultimate future development within the catchment and/or adjoining catchments
- Minimise health and safety related risks
- Be compatible with the existing wastewater system where this is available
- Prevent stormwater ingress (inflow and infiltration) into the system and sewage egress out of the system
- Where the Council wastewater system is available, provide a connection for each lot
- On-site systems (where required) are required to be compatible with daily flow, waste water characteristics and soil/site conditions so that effective assimilation of pollutants without exceeding the carrying capacity of the receiving environment is achieved.

5.2 Design Principles

The design of a wastewater collection and disposal system shall include consideration of the following:

- Pipe sizes shall be based on the design flow without surcharging. Mains that are to pass into Council ownership shall be a minimum of 150mm diameter, except where a private drain is involved that services more than one dwelling on a Lot
- The design flows shall be calculated using the flow parameters detailed in Schedule E

- The proposed wastewater system shall be compatible with the existing network and comply with current requirements as identified by Council
- If future demand on the system requires use of the Council's wastewater reticulation model to ascertain effects, then this will be at the cost of the applicant
- The system design shall identify and incorporate downstream improvements required as a result of the proposed works
- Where a proposed development cannot be adequately serviced by a gravity system, a public wastewater pumping station may be proposed for consideration by Council, provided it is located and designed to service the entire area of potential catchment beyond the reach of the gravity system and that the design provides the minimum whole of life cost. The land area to be served shall be demarcated on the basis of sound engineering practice. A financial contribution towards future operation, maintenance and replacement will be required
- On-site wastewater disposal systems shall be specifically designed taking into account the daily flow, the wastewater characteristics and the site/soil conditions

5.3 Private and Public Drains

A private drain (generally 100mm diameter) is a drain which serves one lot, regardless of the number of dwellings on that lot and regardless of whether it traverses adjacent lots. In some cases drains with appropriate easements serving more than one lot will be considered common private drains.

Public drains include:

- Any drain or pipeline which serves more than one lot, except where a common private drain situation applies
- The section of 100mm diameter drain within the road reserve between the lot served by it and the pipeline to which it connects
- Any drain over which the Council has exercised control for a period of not less than 20 years
- Drains for the general interest of the district as opposed to the particular or personal benefit of one or two individuals or households are generally public drains
- Any drain so declared under Section 462 of the Local Government Act.

5.4 Alternative Wastewater Systems

The following principles are applicable when considering alternative wastewater systems.

Compatibility of Treatment and Disposal Systems

The designer of the system shall ensure any wastewater treatment and disposal/use systems proposed in a subdivision or land development are able to maintain and enhance the condition of natural systems, ecological values, landscape, recreation, cultural and safety values of that system. When assessing proposals Council will look to:

- Require the provision of monitoring and maintenance of alternative systems as part of the supplier's contract for a reasonable post installation period depending upon the specific system installed
- Encourage the use of the latest technology, including continuous monitoring through the provision of a 24 hour monitored system
- Ensure that where on-site wastewater systems are used in a community capacity that not contamination of adjoining land or water bodies occurs under all conditions

5.5 Reuse of Wastewater

Council will encourage the safe and efficient use of water resources within subdivision and land development projects through the use of treated wastewater (grey water only) from community/neighbourhood systems as a water resource for non-potable uses. When assessing proposals Council will look to:

- Ensure that public are aware of areas where non-potable supplies exist as well as the precautions necessary for its use
- Require the plumbing of new dwellings in communities where non-potable water is used in this manner will prevent any cross contamination of potable water supplies and allow grey and black water to be separated for treatment on site.

5.6 On Site Wastewater Systems

Council will support where appropriate the utilisation of ecosystem services for wastewater treatment and assimilation into the environment as neighbourhood systems in areas not connected to the reticulated wastewater system or where it is inefficient to connect to the reticulation system. When assessing proposals Council will look to:

- Ensure that suitably qualified and experienced on-site wastewater treatment suppliers are used by developers, and that these suppliers are involved with ongoing monitoring and maintenance of the systems throughout their lives
- Ensure that approved systems provide an acceptable level of risk that is balanced between environmental, efficiency and public health concerns
- Encourage appropriate involvement in the assessment process from the Hawke's Bay Regional Council, Regional Public Health, iwi and other affected parties.

On-site wastewater systems will only be approved where:

- The public reticulated system is not available or is at capacity; or connection to the public reticulated wastewater system is not desirable due to site, environment, integrated subdivision design or cost constraints which would result in such connection being inefficient and lead to a lower environmental result; and
- The system results in a reasonable level of maintenance and responsibility for the future owner.

5.7 Construction

Construction of wastewater systems shall be undertaken in accordance with the requirements of Section 5, Wastewater of NZS 4404, except as modified by the schedule titled **Schedule E, Hastings District Council Altered Requirements to section 5 NZS 4404, Wastewater**.

Alternative specific proposals may be submitted with appropriate engineering information that will enable the Council to assess the proposal.

Part Three – Section 6 – Water Supply

6 General Requirements and Objectives

Developments shall comply with Section 6, Water Supply, of NZS 4404, whether using the Minimum Engineering Requirements or the Design Guide approaches, except as modified by the schedule titled **Schedule F, Hastings District Council Altered Requirements to Section 6 NZS 4404, Water Supply** in Section Four of this document.

The Council seeks to have a reliable potable water supply that delivers water to acceptable quality and reasonable quantity standards. The water supply must meet the present and future needs of the Hastings District Community, protect public health, meet fire fighting requirements, and promote water conservation and sustainability. This section provides guidance for the effective and systematic design and construction of water supply systems in land development and subdivision projects, leading at all times to high standards.

6.1 Performance Criteria

The water supply system shall:

- Meet the relevant standards and criteria established in the District Plan and this document
- Be appropriate for its position in the water supply hierarchy
- Be compatible with the existing and future water supply system
- Where connection to an existing reticulation supply is possible, provide a connection for each new Lot
- Provide for an adequate water supply that will meet fire fighting and reasonable domestic needs, reasonable commercial and industrial requirements, allowing for the future development within the catchment or adjoining catchments
- At all times prevent contamination of the water supply system for all users and minimise public health and safety related risks.

6.2 Design Principles

The design of a new water supply system shall:

- Confirm pipe sizes, pump, valve and hydrant sizes and positions, and overall reticulation layouts based on the need to deliver the design flows required to meet anticipated fire fighting and supply requirements
- Where appropriate identify and incorporate improvements to the existing network as a result of the proposed works
- Where on-site storage is required this shall be a minimum of 25,000 litres, with the recommended capacity being 50,000 litres, unless otherwise approved by Council. In particular circumstances, greater storage capacity may be required
- Early in the development process confirm with Council whether the proposed works require the inclusion of booster pumping stations and/or storage in order to comply with Council's requirements

- Where on-site water supply systems are required these shall be specifically designed. The aim of the design shall be the efficient and safe use of water resources within a site. Applicants are referred to the Ministry of Health's "Household Water Supplies" (1995) which provides guidelines on the selection, operation and maintenance requirements of individual household water supplies

6.3 Construction

Construction of water supply systems shall be undertaken in accordance with the requirements of Section 6, Water Supply of NZS 4404, except as modified by the schedule titled **Schedule F, Hastings District Council Altered Requirements to Section 6 NZS 4404, Water Supply**.

Alternative specific proposals may be submitted with appropriate engineering information that will enable the Council to assess the proposal.

Part Three – Section 7 – Landscape

7 General Requirements and Objectives

Developments shall comply with Section 7, Landscape, of NZS 4404, whether using the Minimum Engineering Requirements or the Design Guide approaches.

Developers are encouraged to undertake landscaping within their developments that will provide an interesting and varied living environment which is attractive to residents and visitors. As a minimum, developers are required to:

- Meet the relevant standards and criteria of the District Plan with regard to landscaping and amenity value
- Submit to the Council for approval with the proposal a comprehensive landscape plan where new roads are created or existing roads extended, and, where required, for reserves and other community features. The plan shall consider existing amenity value and ambiance of and any special character of the adjacent street and landscape
- Complete the landscaping work in accordance with the approved landscape design and provide temporary screening as protection during building construction
- Other landscaping and plantings may be required for specific locations e.g. riparian planting in drainage situations, coastal areas and adjacent to open space.

When preparing the landscape plan, the designer shall consider how the Hawke's Bay climate will affect the proposal, and seek within the design to mitigate the risk of hot dry summers and cold winters where appropriate.

Part Four – Minimum Engineering Requirements

Introduction

The Minimum Engineering Requirements are made up of:

- The following Schedules A to F containing Council's amendments and additions to NZS 4404
- NZS 4404, Land Development and Subdivision Engineering
- Other Standards and Guidelines as listed in NZS 4404
- Other Standards as listed in this Section
- Council's Engineering Specifications where applicable

Schedule A – Altered Requirements to Section 1 NZS 4404 – General Requirements and Procedures

The Hastings District Council has adopted Part 1 of NZS 4404 with the following additions and/or alterations to be used in conjunction with NZS 4404:

Clause 1.8.1 Documents to be submitted for design approval

- The Council requires the documents listed in paragraphs 1.8.1.1 (a) to (c) inclusive to be submitted.

- Two copies of preliminary drawings, specifications and calculations shall be supplied to the Council. One set will be returned to the applicant when these have been checked by Council staff with any required amendments endorsed on the plans and specifications. These check prints shall be preserved intact and returned to the Council when the required amendments have been completed, along with two copies of the amended set of plans and specifications. Drawings may be provided in electronic format.

- The Council requires the documents listed in paragraph 1.5.1.1 (d) to use the attached Producer statements PS1 and PS2.

Clause 1.8.3.3 Lifestyle Costing

- Where a developer proposes to use "alternative" solutions evidence that the proposed solution provides the least whole of life cost option for Council owned assets shall be provided with the design documentation. The discount rate shall be 10%, over a 100 year life cycle

Clause 1.8.4 Approval of Design

- Add to the existing paragraph 1.8.4.1

  In order to expedite the commencement of works, design approval in principle may be applied for prior to the granting of the resource consent. However design approval will not be given until after a resource consent is granted.

Clause 1.8.6 Supervision of Work

- The Council requires completion certificate using the attached Producer Statements PS3 and PS4.

Clause 1.8.9 *Maintenance*

Replace the existing clause with the following.

- The developer shall maintain the works until they are formally taken over by the Council. Formal takeover is the date when the Council issues the Section 224(c) certificates, or such other earlier date as may be agreed by the Council. For uncompleted works covered by a bond the developer shall maintain the works until a date specified in the bond or, if earlier than such date, the works are completed to the satisfaction of the Council

- Unless stated otherwise in the engineering approval, a defects liability period of six months from formal takeover by the Council shall apply. However the developer shall not be responsible for damage caused by other activities, such as building construction on completed sections, or for fair wear and tear caused by public use.

Clause 1.9.1 Uncompleted works bonds

The amount of any bond under paragraph 1.9.1.3 is 150% of the estimated and agreed value of the uncompleted work.

Schedules 1A to 1C Certificates

The Certificates covering design and construction in NZS 4404 shall be used for all subdivision or land development works. In cases where design or construction certification is required for all or parts of works requiring a ***Building Consent***, the ACENZ Certificates presented in Appendix A of this document shall be used as appropriate.

Schedule 1D As-Built plans

Council will require that as built drawings are submitted with the information required for Compliance. These will need to be submitted by a suitably qualified person.

- "As built" drawings of all engineering works will be drawn as required in clause 1.8.2 and meet the requirements as set out in clause 1.8.10 and schedule 1D of NZS 4404.

- Each drawing will be clearly stamped as 'as built' and signed by the appropriately qualified person so certifying the same. Council will retain a copy of all "as built" drawings. If Computer Aided Drawing ("*AutoCAD*") has been used, A1 paper "as built" copies and computer file copy will be supplied in all cases. The computer file must be compatible with council's systems. Developers should confirm with council the software compatibility before supplying the computer file copy.

- Survey control and locations for "As-Builts" will be based on co-ordinated data (x, y and z) from permanent control points, in accordance with LINZ datum. All locations will be dimensioned and shown on the plans. The tolerances shall be:

Horizontal ± 10mm
Vertical ± 10mm

It will be necessary to refer to the following Council documents for further details:

- Hastings District Council Water Services Policies and Procedures Manual

- Hastings District Council Transportation Policies and Procedures Manual

Additional Requirements

Emergency Works

If during the course of the development, any situation arises associated with the development whereby, in the opinion of the Council, public safety, the security of public or private property, or the operation of any public facility or ecological site is endangered, the developer shall immediately carry out such remedial measures as the Council requires removing the danger. Any work so required shall be at the expense of the developer.

If such emergency works are not immediately carried out, the Council will be entitled to arrange for the necessary remedial work to be carried out and charge the developer the cost for carrying out the works.

Damage to Existing Roads, Services and Property

All damage to existing roads, services or private property, or any disturbance of survey boundary marks due to or caused by any new works, shall be the liability of the developer. All damage must be repaired by the developer immediately. If such remedial works are not commenced expeditiously, the Council will be entitled to arrange for the necessary work to be carried out and charged to the developer. This provision includes the removal of mud and debris from existing roads in the vicinity of the development. A daily removal of such debris may be necessary in the interests of traffic safety.

In any situation where the Council considers that damage to existing roads, services or private property constitutes a risk or potential risk to the safety, of road users, pedestrians or other persons, the developer shall immediately repair the damage or otherwise abate the hazard or potential hazard.

Safety

Temporary fencing and warning signs shall be erected in accordance with the Contractors Health and Safety Plan to protect site personnel and the general public, particularly children, from all hazards associated with the development. All fences and warning signs shall comply with Occupational, Health and Safety requirements.

Final Valuations for the Council's Asset Register

An itemised schedule of quantities and costs shall be provided for those services and assets which are to vest in the Council.

Where the work has been built by an "arms length" contractor the work Schedule of Prices, modified to represent the work as built and complete with the market unit rates, will be considered a current market valuation.

Where the work has not been undertaken by an arm's length contractor (i.e. by own staff) the valuation shall be provided by a suitably qualified person in the form of a Schedule of Works as built, priced at current commercial market rates as assessed by the suitably qualified person.

The Schedule shall take the following form:

Item description	Unit	Quantity	Rate $/Unit	Amount $

Easements

Easements are required over any rights of way and communal services where these pass through private lots in subdivisions. The Council may also require other easements. Easements shall be shown on the land transfer title plan and documentation shall be prepared by solicitors at the Developer's expense. Draft easement documentation will require Council approval.

Schedule B – Altered Requirements to Section 2 NZS 4404 – Earthworks and Geotechnical Requirements

The Hastings District Council has adopted Part 2 of NZS 4404 with the following additions and/or alterations to be used in conjunction with NZS 4404.

Standards and Codes

Any development that involves significant earthworks may, on the advice of the geotechnical engineer require reference be made to the following recommended publications:

NZS 4431:1989 Code of Practice for Earth Fill for Residential Development

NZS 3604:1999 Code of Practice for Light Timber Frame Buildings not requiring specific design (Parts 3 and 4 in particular)

NZS 4229:1999 Code of Practice for Concrete Masonry Buildings not requiring specific design (Parts 3 and 4 in particular)

NZS 4402:1986 Methods of Testing Soils for Civil Engineering Purpose, Parts: 1 & 2

TNZ F/1 1997 Specification for Earthworks Construction

New Zealand Building Code, in particular Section B1, and Section E1.

Clause 2.1 Scope

In addition to the scope described in this section, Council would expect that a geotechnical assessment would be required in support of a Land Development or Subdivision proposal when a particular project involves any or all of the following:

<u>Earthworks – General Refer Section 13.4.8 of District Plan</u>

- Total earthworks volume (cut plus fill) >100m³, in-situ measure
- Rural 2,000m³ per hectare of property per annum
- Plains 100m³ per hectare of property per annum
- Urban 25m³ per property per annum
- Earthworks within designated hazard zones
- Earthworks that significantly alter surface or subsurface drainage patterns

<u>Excavation</u>

- Excavations greater than 2.5 metres overall vertical extent
- Excavations steeper than 2.5 Horizontal to 1 Vertical (22°)
- Excavations on, or within ten metres of, existing slopes higher than 5 metres overall vertical extent.

- Excavations below the ground water table
- Excavations the top of which are within 10 metres of buildings or surcharge loads.

Fill

- Building platforms or roads on fill or made ground
- Fills on existing ground sloping steeper than 3.5H:1V (16°)
- Fills constructed on, or within a zone extending above an angle of 3 Horizontal to 1 Vertical (18°) from, the toe of a slope or river bank
- Fills within 10 metres of a building or the base of a slope
- Fills with a maximum depth greater than 1.5 metres
- Fills with batter slopes steeper than
- (a) 2H:1V (26°) in sand and gravel
- (b) 3H:1V (18°) in silt and clay

Retaining Structures

- Retaining walls higher than 1.5 metres overall vertical extent
- Retaining walls with sloping backfill
- Retaining walls with surcharge loading within three metres of top of wall.

Table B1 below gives guidance on the extent of geotechnical investigation required based on the risk of instability, and the evidence on the site, the consequences of instability, and the implications of development. Developers and their geotechnical advisors are encouraged to discuss the extent of geotechnical investigation with Council staff at the beginning of the project.

Table B1 – Guidance for Risk Classification for Sites Subject to Land Instability

Risk Classification for Sites Subject to Instability				
Risk of Instability	**Evidence/Type of Instability**	**Consequence of Instability**	**Implications for Development**	**Extent of Investigation Required**
VERY HIGH	Evidence of active or past instability – landslip or rock face failure; extensive instability may occur within site or beyond site boundaries.	High risk of loss of life. Catastrophic or extensive significant damage or economic loss.	Unsuitable for development unless major geotechnical work can satisfactorily improve the stability. Risk after development may be higher than normally accepted (includes Building Act Section 36(2)).	Extensive geotechnical investigation required.
HIGH	Evidence of active creep, potentially progressive/regressive/ minor slips or minor rock face instability; significant instability may occur during and after extreme climatic	Low risk of loss of life. Significant damage or economic loss.	Development restrictions and/or geotechnical works required. Risk after development may be higher than normally accepted (may include Section 36(2)).	Engineering geological assessment with drilling investigation required.

Risk Classification for Sites Subject to Instability				
Risk of Instability	**Evidence/Type of Instability**	**Consequence of Instability**	**Implications for Development**	**Extent of Investigation Required**
	conditions and may extend beyond site boundaries.			
MEDIUM	Evidence of possible soil creep or a steep soil covered slope; significant instability can be expected if the development does not have due regard for the site conditions.	Virtually nil risk of loss of life. Moderate damage and economic loss.	Development restrictions may be required. Engineering practices suitable to hillside construction necessary. Risk after development generally no higher than normally accepted.	Visual assessment. Hand and possible drill investigation methods.
LOW	No evidence of instability observed; instability not expected unless major site changes occur.	Minor damage, limited to site unless major development occurs.	Good engineering practices suitable for hillside construction required. Risk after development normally acceptable.	Visual assessment. Possible hand investigation method.
VERY LOW	Typically shallow soil cover with flat to gently sloping topography.	Virtually nil.	Good engineering practices should be followed.	Visual assessment.

Clause 2.2.4 – Geotechnical requirements

- Function (b) will be reported on in a **Preliminary Geotechnical Assessment** which will need to be submitted with the Resource Consent Applications
- Functions (c) and (d) will be reported on in a **Comprehensive Geotechnical Assessment** which will need to be submitted in support of any consent conditions and as a normal part of the documentation of the design process
- Functions (d) to (g) will be reported on in a **Geotechnical Completion Report**, as discussed in Section 2.6.1 of NZS 4404, which will need to be submitted with the application for the 224 Certificate.

Clause 2.3.2 – Preliminary site evaluation

The Preliminary site evaluation will lead to the preparation of the ***Preliminary Geotechnical Assessment***. In addition to the expectations described in Clause 2.3.2, Council will expect that specific attention in this report is given to the following:

- The results of any site investigations and material testing,
- The assessment of geological hazards,
- The geotechnical constraints on land development

- The geotechnical recommendations for site development, for issues such as batter slopes, fill construction, drainage, erosion control etc,
- The identification of any requirements for additional investigations or analysis,
- The confirmation that a suitable and stable building site is available on each lot,
- The confirmation that suitable and stable vehicle access can be provided to each lot, and building site.

Council will expect the ***Comprehensive Geotechnical Assessment*** to give specific attention to and report on the following:

- A review, as required, of all the aspects discussed in the Preliminary Geotechnical Assessment
- The review and recommendations for any special design or construction requirements
- Special considerations for foundation requirements, services, road access, effluent disposal and stormwater management, both engineered and non-engineered fills
- Reporting on all slope stability assessments
- A statement of professional opinion as to the suitability of the land for its intended purpose – refer NZS 4404 Schedule 2A

Clause 2.3.4 – Stability Criteria

The minimum factor of safety for the design of permanent slopes in land development and subdivision projects of 1.5 is required for the conditions which may be expected to occur during the design life of the structure – 100 years for dwellings and 50 years for retaining structures beyond 8m from the dwelling. A reduced factor of safety of 1.2 is applicable for extreme conditions, Reference to Crawford, S A, and Miller, P J. contained in referenced documents of NZS 4404

Clause 2.3.8 – Seismic Considerations

The minimum factor of safety for the numerical analysis of slope stability of 1.2 shall be adopted for the return periods discussed in Crawford, S A, and Miller, P J. contained in referenced documents of NZS 4404

Clause 2.6.2 – As Built Drawings for Earthworks and sub soil drains

Refer to Section Four - Schedule A of this document.

Schedule C – Altered Requirements to Section 3 NZS 4404 Roads

The Hastings District Council has adopted Section 3 of NZS 4404 with the following additions and/or alterations to be used in conjunction with NZS 4404.

Clauses 3.2.4.2 Link Context Council uses a road hierarchy which has four overall classifications, as shown below in Table C1. These classifications are described in more detail in Tables C2 and C3.

Table C1: Hastings District Road Hierarchy

Classification	Description	Roads included	Typical Annual Daily Traffic (AADT) in Vehicles per Day (vpd)	
			Urban	Rural
Major Arterial	Roads of strategic regional importance and contributing significantly to the regional economy.	State Highways (*not managed by Council)* and major local roads that are of an inter-regional nature and provide links between significant areas of population and other inter-urban links.	> 8000	> 2500
Minor Arterials	Roads of strategic importance which provide significant links within the local economy.	Links between areas of activity within a community, providing alternative links between centres of population and contributing significantly to the movement of goods or produce.	4000 – 8000	500 – 2500
Collector Roads	Locally preferred routes or within areas of population and activities. Links to arterials or state highways.	Road giving connectivity between local populations areas and places of interest. Most roads within an industrial area would be collector roads.	1500 – 4000	100 – 500
Local Roads	Roads whose primary function is a street for people, public space, meeting, gathering as well as accessing property.	All Council roads not categorised in the above hierarchies and servicing land use activities including cul de sacs.	0 - 1500	0 – 100

To encourage a more appropriate use of the road hierarchy, both urban and rural roads have been classified based on characteristics of traffic volumes and use/purpose factors. Tables C2 and C3 provide more description of how the hierarchy is intended to operate in

the District's urban and rural areas. State Highways, Motorways and Expressways have not been included as these are managed nationally.

Table C2: Characteristics for Urban Roads (Posted Speed Limits < 70km/hr)

Criteria	Road Class – Urban Roads			
	Local	**Collector**	**Minor Arterial**	**Major Arterial**
Traffic versus Land Access Function	Land access primary function	Land access and traffic movement of equal importance	Traffic movement primary function; some land access control	Traffic movement primary function; subject to land access control
Typical Two Way AADT (vpd)	0 – 1500	1500 – 4000	4000 – 8000	> 8000
Flow Characteristics	Interrupted flow		Generally uninterrupted flow with at grade intersections	
Desirable Operating Speed (km/h)	30 – 50	40 – 50	45 – 70	50 – 70
User Types	Pedestrians, cyclists, all motor vehicle types, except restrictions on use by heavy vehicles may be necessary		Pedestrians, cyclists, all motor vehicle types.	Some restriction may apply to pedestrians and cyclists
Accommodation for Public Transport	Limited	Preferred	Preferred	Preferred
Allowable Connections for new roads	Locals, collectors	Locals, collectors, arterials	Collectors, arterials	Arterials
Provision of Landscaping / LIUD	Preferred	Preferred	Limited	Limited

Urban roads are those which have posted speed limits of < 70 km/h. These can exist within established urban areas (e.g. Hastings and Havelock North) and also within smaller urban

areas in generally rural zones, such as smaller coastal settlements (e.g. Waimarama) and isolated rural settlements (e.g. Maraekakaho)

Table C3 Characteristics of Rural Roads (Posted Speed Limits > 70 km/hr)

Criteria	Road Class – Rural Roads			
	Local	**Collector**	**Minor Arterial**	**Major Arterial**
Traffic versus Land Access Function	Land access primary function		Land access and traffic movement of equal importance	Traffic movement primary function; some land access control
Typical Two Way AADT (vpd)	0 – 50	50 – 500	500 – 2500	> 2500
Flow Characteristics	Interrupted flow		Generally uninterrupted flow	
Desirable Operating Speed (km/h)	60 – 80		70 – 100	80 – 100
User Types	Pedestrians, cyclists, all motor vehicle types			
Accommodation of Pedestrians	Footpaths generally not required, except for safety provisions to support adjoining communities			
Accommodation of Cyclists	Cycle lanes or sealed shoulders desirable on sealed roads			Separate cycle lanes or sealed shoulders recommended
Allowable connections level (new roads only)	Locals, Collectors		Locals, Collectors, Arterial	Collectors, Arterials

Rural roads are those which have posted speed limits greater than 70 km/hr

For both urban and rural roads, where additional traffic from a new development is likely to have an adverse effect on the agreed Level of Service (LoS) of the existing adjoining network, Council may require the developer to commission a traffic study to determine the effects, and possible mitigation options. Levels of Services are defined in the Austroads Traffic Management Volumes.

Clause 3.3.1 Minimum Requirements

Table C4 below sets out the minimum road design standards for use on urban and rural roads in the Hastings District. This replaces Table 3.2 in NZS 4404.

Drawings C1 to C3 provide more definition of these requirements. Drawings C4 to C6 provide definition of vegetation control and service location features of a development.

Table C4: Minimum Road Design Standards – Urban and Rural Roads

Place Context		Typical Classification		Design Environment				Link Content			
Area	Land Use	Hierarchy	Traffic Volume (Max vpd)	Locality Served	Target operating speed	Minimum Road Reserve Width (m)	Max Grade	Pedestrians (See Note A)	Passing, Parking, Loading & Shoulder	Cyclists (See Note A)	Minimum movement lane (excluding shoulder) (See Note E)
Urban	Live & Play (Residential & Home Occupation)	**Lane**	**100vpd**	1 -10 du (Public) or 1-6 du (Private)	10	4.5	20%	Shared (in movement lane)	Allow for passing every 50m,	Shared (in movement lane)	2.75
		Lane	**200vpd**	Side or rear service access, up to 100m in length, (1 - 20 lots)	10	6	12.5%	Shared (in movement lane)	shared parking in the movement lane	Shared (in movement lane)	2 x 2.75
		Lane	**200vpd**	1-20 du	20	12	16%	1.5m one side where more than 100m in length	shared parking in the movement lane	Shared (in movement lane)	2 x 2.75
		Local	**2000vpd**	1 - 200 du	40	15	12.5%	1.5m one side or 1.5m each side where more than 20 du or more than 100m in length	shared parking in the movement lane up to 100 du. Separate parking required over 100 du	Shared (in movement lane)	2 x 2.75
		Collector /Arterial	**8000vpd**	All other integrated activities in this land use not specified in this table	40	20	10%	1.5m each side	Parking, Public Transport, Turning	1.5m Network in accordance with cycle network strategy	2 x 3.0
	Shop and Trade (Commercial & Industrial)	**Lane**	**200vpd**	Side or rear service access, (1 - 20 lots)	10	6	12.5%	Shared (in movement lane)	loading bays	Shared (in movement lane)	2.75
		Lane	**200vpd**	1 to 20 Lots	10	15	10%	1.5m one side or 1.5m each side	parking	Shared (in movement lane)	2 x 2.5
		Local	**2000vpd**	1-200 lots	30	20	10%	3m each side	parking + loading bays.	Shared (in movement lane)	2 x 2.75

Table C4: Minimum Road Design Standards – Urban and Rural Roads Continued

Place Context		Typical Classification		Design Environment				Link Content			
Area	Land Use	Hierarchy	Traffic Volume (Max vpd)	Locality Served	Target operating speed	Minimum Road Reserve Width (m)	Max Grade	Pedestrians (See Note A)	Passing, Parking, Loading & Shoulder	Cyclists (See Note A)	Minimum movement lane (excluding shoulder) (See Note E)
Urban continued	Work and Learn	**Lane**	**200vpd**	Side or rear service access, (1 - 20 lots)	10	6	12.5%	Shared (in movement lane)	loading bays	Shared (in movement lane)	2 x 2.75
		Lane	**200vpd**	1 to 20 Lots	10	15	10%	1.5m one side or 1.5m each side where more than 100m in length	parking	Shared (in movement lane)	2 x 2.75
		Local	**2000vpd**	1-200 lots	30	20	10%	1.5m each side	loading bays.	Shared (in movement lane)	2 x 2.75
	Mixed Use	**Local**	**2000vpd**	1 -200 lots	30	20	10%	1.5m each side	parking	Shared (in movement lane)	2 x 2.75
		Collector/Arterial	**8000vpd**	Neighbourhood Centre, 200 - 800 lots	50	20	10%	2.0m each side	Parking, Public Transport, Turning	1.5m Network in accordance with cycle network strategy	2 x 3.5
Centre	Mixed Use	**Lane**	**200vpd**	Side or rear service access, (1 - 20 lots)	10	6	10%	Shared (in movement lane)	Loading bays (shared in movement lane)	Shared (in movement lane)	5
		Lane	**200vpd**	1 to 20 Lots	20	15	10%	2 x 2.5	Parking	Shared (in movement lane)	2 x 2.5
		Local	**2000vpd**	1-200 lots	30	20	10%	3m each side	Parking	Shared (in movement lane)	2 x 2.75
		Collector/Arterial	**8000vpd**	Urban Street, 200 - 800 lots	40	20	10%	3.0-3.5m each side	parking	1.5m Network in accordance with cycle network strategy	2 x 3.0

Table C4: Minimum Road Design Standards – Urban and Rural Roads Continued.

Place Context		Typical Classification		Design Environment				Link Content			
Area	Land Use	Hierarchy	Traffic Volume (Max vpd)	Locality Served	Target operating speed	Minimum Road Reserve Width (m)	Max Grade	Pedestrians (See Note A)	Passing, Parking, Loading & Shoulder	Cyclists (See Note A)	Minimum movement lane (excluding shoulder) (See Note E)
Rural	Live & Play - (Residential & Home Occupation)	**Lane**	**100vpd**	1 -10 du (Public) or 1-6 du (Private)	20	6	20%	Shared (on shoulder & Berm)	Allow for passing every 50m, total shoulder 0.5m, sealed	Shared (in movement lane)	3
		Lane	**200vpd**	1-20du	30	9	16%	Shared (on shoulder & Berm)	Total shoulder 0.5m, sealed	Shared (in movement lane)	2 x 2.75
		Local Road	**1000vpd**	1-150du	70	15	12.5%	Shared (on shoulder & Berm)	Total shoulder 1.0m, sealed shoulder 0.5m	Shared (in movement lane)	2 x 2.75
	Make and Move	**Local**	**500vpd**	Low level agricultural activity	up to 100	20	10%	Shared (on shoulder & Berm)	Total shoulder 1.0m,	Shared (in movement lane)	2 x 2.75
		Collector	**1000vpd**	Medium level agricultural activity	up to 100	20	10%	Shared (on shoulder & Berm)	Total shoulder 1.0m, sealed shoulder 0.5m	Shared (in movement lane)	2 x 3.0
		Minor Arterial	**2500vpd**	Medium / high level agricultural activity + medium through traffic	up to 100	20	10%	Shared (on shoulder & Berm)	Total shoulder 1.5m, sealed shoulder 0.5m	Preferred on sealed shoulder.	2 x 3.5
		Major Arterial	**>2500vpd**	High/medium level agricultural activity + high level through traffic	up to 100	20	10%	Shared (on shoulder & Berm)	Parking and loading. Total shoulder 1.0m, sealed shoulder 1.0m	Preferred on sealed shoulder.	2 x 3.5

Table C4: Minimum Road Design Standards –Design Notes

Note A - Provision will be in accordance with HDC walking and cycling strategy

Note B - Minimum perpendicular parking should be 2.4 x 5m, parallel parking should be 2.1 x 6.0m

Note C - Where not shown in the table, cyclists shall be provided with separate movement lanes if identified in a local or regional cycle network

Note D - A full safety audit process will be required to accompany these designs

Note E -The movement lane can be reduced at intervals to provide for increased amenity and greening of the street and/or traffic calming.

Note F - It may be appropriate to consider an alternative to this design table however this will require discussion with Council (prior to design is preferable).

Note G - Any private road or lane serving greater than 6 sites shall be offered as public road to be vested by Council.

Note H - Link Context in Rural areas will only apply where residential activities are located within 800m of the subject site.

Clause 3.3.2: Road Geometric Design

Table C4 above sets out the minimum road design standards for use on urban and rural roads in the Hastings District. This replaces Table 3.2 in NZS 4404.

Clause 3.3.3: Pavement Structural Design

The requirements set out in Clause 3.3.3 of NZS 4404 will apply to all public and private road pavements presented with a development proposal, with the following additions:

- Pavement design shall be in accordance with the current published versions of the Austroads and TNZ: NZ Supplement. The latter can be downloaded from the New Zealand Transport Agency website www.nzta.govt.nz
- The minimum pavement design life is 25 years
- In situations where seal widening is required the extended pavement shall be designed as a new pavement

For all roads to be vested in Council, the designer must present comparisons of various pavement designs with respect to the following, to ensure that the best design option is being presented:

- Whole of life costing, taking into account construction, maintenance and rehabilitation costs, including possible salvage value of the pavements at the end of the design life.

- Constructability, including the availability of equipment especially material mixing, placing and compaction plant

The structural design of a pavement also needs to take into account the surfacing treatment. For flexible pavements, surfacing treatments are considered to be thin surfaces and their purpose is to provide weather protection for the underlying pavement, and to improve the safety on the road by removing dust nuisance and providing adequate skid resistance.

The surfacing treatments commonly used in the District are:

- Chip Seal
- Asphaltic Concrete Paving (AC)
- Friction Course (FC)
- Interlocking Concrete Block Pavers

The following factors should be considered when choosing the appropriate surfacing treatment:

- Urban residential areas should be designed for a pleasant appearance and low road noise
- Busy traffic routes, particularly those carrying a high percentage of heavy commercial vehicles will subject surfacing treatments to wear and high stresses, particularly at intersections, industrial entranceways and cul-de-sac heads. The surfacing design will need to take these additional stresses into account
- The surfacing in retail areas should be designed for appearance as well as resistance to wear from high turning stresses, particularly power steering
- Asphaltic concrete shall be used as a surfacing in high stress areas such as steep grades on private access ways, roundabouts or cul-de-sacs, and where traffic noise needs to be mitigated, particularly in residential areas
- The type of surface used must contribute to the safety of the road. Skid resistance is important in areas such as high speed corners and steep grades. If the carriageway does not drain quickly then vehicles may experience aquaplaning on smooth surfaces, such as AC
- In special situations (e.g. high stress intersections) the structural design of the pavement and surfacing may need to change from a flexible to a rigid pavement design philosophy, as described in the *Austroads guide to Pavement Technology Part 2: Pavement Structural Design and Guide to Asset Management Part 5: Pavement Performance Asset.*

Chip sealing is the most common surface treatment used on the District's roads. The designers of pavements using chip seal surfacing for a new development will normally only be required to design the First Coat Seal.

- First coat sealing shall be designed to the current published versions of TNZ specifications (refer to www.nzta.govt.nz) M/01(Specification for Asphaltic Bitumen) and P/03 (Specification for First Coat Sealing). The sealing chips shall comply with TNZ specification M/06 (Specification for Sealing Chip)

The designer of alternative surfacing treatments should utilise the following design advice:

- Asphaltic concrete surfacing shall be designed in accordance with the current published versions of TNZ specifications M/10 (2005) (Specification for Asphaltic Concrete) and P/09 (Specification for Construction of Asphaltic Concrete Paving)
- As an alternative to AC a friction course (FC) can be used. The design shall be carried out as detailed in the current published version of TNZ specification P/11 - (Specification for Friction Course Materials)
- The use of concrete block pavers as a surfacing treatment on roads can be considered particularly in traffic calming areas. Design of such surfaces shall comply with NZS 3116:2002, Concrete Segmental Paving, with specific note being made that collector and arterial roads are considered to be main roads for application of the standard. Cement and Concrete Association of New Zealand: 1988, Interlocking Concrete Block Road Pavements provides a guideline for the construction of paved roads. As an alternative to Concrete Pavers, kiln fired Clay Pavers may be used provided that appropriate design certification is provided.

Clause 3.3.6 : Parking, passing and loading

Council's requirements for off road parking are outlined in the District Plan, and in this section. The dimensions of car parks shall be as shown in NZS 4404, and in Table C4.

If a development proposal includes provision for on road car parking in association with mountable kerb and channel, then the designer shall ensure that all associated infrastructure (e.g. footpaths, kerb and channel, sumps and grassed berms) are able to safely and effectively carry the proposed traffic loads from parked cars (and commercial vehicles as required).

Clause 3.3.8: No exit Roads

Council prefers designers to design out no exit roads to ensure positive connectivity; however it should be noted that in instances where this practically unachievable the use of cul – de – sac turning heads will be required. This will also apply to low level roads and Right of Ways.

Clause 3.3.11: Footpaths, access ways, cycleway paths and berms

Footpaths are required on most urban roads on either side of the carriageway (refer Table C4). It will be the objective to create footpaths that do not deviate in crossfall or gradient especially through access crossings. In rural areas footpaths may be required for safety reasons. In areas where topography makes it impractical or where the road width is insufficient one footpath may be approved.

Concrete footpaths are preferred. The minimum acceptable width of the footpath is 1.5m, with the footpath separated from the kerb by at least 1.2m. The footpath shall not sit over the underground service corridor provided from the back edge of the boundary. Refer to Indicative Locations of Utility Services in Berms (Drawing C6) for further details. Concrete shall comply with NZS 3109, and shall have a minimum strength of 25 MPa at 28 days. All surfaces to have a broom finish.

Footpaths on local roads with vista control can be less than 1.5m wide and can be adjacent to the kerb in special approved circumstances.

To provide for shading and increased amenity there shall be at least one tree per section and/or the equivalent grouping of trees. This should be planted once houses have been built as planting before housing development runs the risk of being vandalised and/or damaged by constructors. A bond to cover the cost may be required.

The maintenance of grass berms will be undertaken by adjoining residents, however until occupancy occurs the maintenance of those berms will be the responsibility of the developer. A bond to cover the cost may be required.

In circumstances were mountable kerb and channel is installed, footpaths may need to support parked vehicles and therefore adequate provision of strength will be required.

Other surfacing materials (e.g. Asphaltic concrete or block paving) will be considered by Council provided specific design details are provided with the Consent Application.

Drawings C7 to C9 show the preferred footpath detailing.

Footpaths in commercial areas shall be the full width of the berm; that is from the kerb to the property boundary, unless specific features such as garden areas are approved by Council.

The longitudinal grade of the footpath should follow that of the carriageway. Where the footpath grade is steeper than 12.5 percent a special surface treatment may be required for safety reasons. On steep grades consideration shall be given to the use of steps and handrails. Specific attention needs to be paid to disabled persons access. In this and other regards, footpaths shall be designed as detailed in the current published version of the following references:

- NZS 4121 2001 Design for Access and Mobility: Buildings and Facilities
- Austroads: Traffic Management and Road Design Manuals
- NZ Building Code

Cross fall should be placed on the footpath surface towards the road (minimum cross fall 2%) sufficient to facilitate stormwater runoff to the street channel, while still preserving walking comfort.

Where due to the contour of the finished ground surface it is necessary to situate the footpath below the level of the road, adequate drainage must be provided, which includes provision for effective long term operation and maintenance.

When designing footpaths in high use areas, consideration shall be given to using tactile paving to assist vision-impaired people, in accordance with the reference below:

- RTS 14 Guidelines for Facilities for Blind and Vision-Impaired Pedestrians

In all cases footpaths shall be designed to ensure there are good sightlines for drivers, cyclists and pedestrians, especially at intersections, driveways, desire lines and crossing points. At intersections a 1.5m x 1.5m pedestrian visibility splay is recommended, accompanied with low height fencing and vegetation so that vehicles can see pedestrians and cyclists.

- **Clause 3.3.11.1– Footpaths and Access ways**
  Pedestrian access ways shall generally have a minimum legal width of 6 metres and shall be formed to a specific design to be approved by the Council. The design shall include fencing that does not exceed 1.5 metres in height.

Fencing of reserves

The covenant will also specify that fencing on and within 3 metres of the boundary with the reserve shall be in accordance with the following table:

	Close Boarded	**Visually Permeable***
Passive Reserve	• **700mm**	• **1200mm**
Active Reserve	• **1200mm**	• **1500mm**

- * Visually Permeable means that more than 50% of the fence area is not obstructed by materials making up the fence.

A fence shall be erected in accordance with the above table for urban areas. A fencing covenant in accordance with the criteria outlined in paragraph (a) will also be required.

Clause 3.3.112: Cycle paths

Drawing C10 shows the preferred cycle barrier detail.

Where provision needs to be made for cycle and pedestrian traffic, and in particular disabled pedestrian and mobility access, use shall be made of the current published versions for the following references when preparing the design detail:

- Austroads Traffic Management and Road Design Manuals
- Council's Cycling Strategy – 'Towards Better Cycling' 2001
- Council's Walking Strategy – 'Walk the Walk' 2004
- Land Transport NZ - Cycle Network and Route Planning Guide 2005 (LTSA Guidelines)

Clause 3.3.12: Traffic Services, Signage and Road Furniture

Council places considerable emphasis on the District's sign asset, standardising where possible the location, height, size and material composition of road and traffic signs. Developers will be expected to embrace this philosophy. Council where possible standardises signage materials and uses flute, powder coated sign poles, and the "SIGNFIX"TM connection system. Drawings C10 to C18 show acceptable details.

Council also places great emphasis on the standard of manufacture and maintenance of traffic signs, name signs, posts and fittings. The references, *Standard for the Manufacture and Maintenance of Traffic Signs, Posts and Fittings, New Zealand Transport Agency and Road Safety Manufacturers Association, 2003*, shall be used in this regard.

All traffic signs shall be designed and located in accordance with the current published version of the following references:

- New Zealand Transport Agency Manual of Traffic Signs and Markings, Part 1, Traffic Signs
- Land Transport Rule 54002 - Traffic Control Devices 2004, Amendment 2005, Amendment 2006

The construction and location requirements for street names signs, in both urban and rural areas shall comply with the *Hastings District Council, Street Name Sign Policy*, as shown on Drawing C18.

Private access ways that have a number of residential properties can have street numbers associated with streets they access off and an appropriate street name blade, with numbers, erected at the entrance showing all the numbers.

All road marking and delineation treatments in both urban and rural areas shall be designed with regard to the current published version of the following standards, and Table C6 below.

- Manual of Traffic Signs and Road Markings, Part 2, Markings : New Zealand Transport Agency
- Guidelines for Rural Road Marking and Delineation, RTS 5, New Zealand Transport Agency
- Land Transport Rule 54002 - Traffic Control Devices

Table C7 describes the link between road marking, delineation standards and the road hierarchy preferred within the District. The installation of road marking and delineation shall be in accordance with the current published version of the following:

- Specification for Pavement Marking, TNZ, P/12
- Specification for Road Marking Paints, TNZ M/7

Table C7 – Preferred Road Marking and Delineation Standards

Roading Hierarchy	**Minimum Requirements**				
Urban Roads	**Centreline**	**Edge lines**	**Cycle Lane Marking**	**R.R.P.Ms**	**Edge Markers**
Local Roads and Collectors					
< 9m carriageway	No (1)	No	No	N/A	N/A (7)
> 9m carriageway	Yes	Yes	(3)	N/A (5)	N/A
Arterials	Yes	Yes	(4)	Yes	N/A
Rural Roads					
Local roads					
< 6m carriageway	No (2)	No (7)	No	No	No (6), (7)
> 6m carriageway	Yes	Yes	(3)	No	No (7)
Collectors	Yes	Yes	(3)	Yes	Yes
Arterials	Yes	Yes	(4)	Yes	Yes

Notes from Table C7

A centreline may be marked on some < 9m carriageways when approved: parking restrictions may be required

On narrow rural roads (i.e. < 6m carriageway) isolated centrelines may be required on corners and through winding sections for safety reasons. No centrelines shall be marked where the carriageway is less than 5.5m

Where the sealed shoulder outside the edgeline is 1m or more, that space may serve as a de facto cycle lane although care may be needed when the space is also utilised for parking

Specific cycle lanes will be provided where the road is part of Council's agreed Cycling Network Strategy and where it is practical to do so

Reflectorised Raised Pavement Marker (RRPMs) may be used on approved collectors

Approval may be granted on a case by case basis depending on the geometry, crash history etc of the site for the marking of specific hazards

Edge lines to be marked as necessary – mandatory for 7.5m seals and greater

Where sections of new or improved road have been reconstructed to a greater width than the adjacent lengths, edge lines must be smoothly transitioned between the different widths.

Over wide seals can occur where sections of roads, usually locals or collectors, are rehabilitated and upgraded. Some have been sealed out to include the water tables to deal with scour, but with others it is the discontinuity of building a standard width of seal within a substandard length of road. Where sections of road have been upgraded and made significantly wider than the adjacent pavement, they must be marked to the correct standard for their classification.

Clause 3.3.14: Lighting

Road lighting is provided for traffic safety and public amenity value only. Council does not intend that roadway lighting be provided for security purposes, although there will obviously be some mutual benefit and lighting design for roads lit to *AS/NZS 1158* will take security into consideration, in line with the standard.

In recent years the Hastings District Council has invested considerable effort into improving the efficiency and effectiveness of the road lighting in the District.

As a general philosophy the following aspects need to be considered:

- Lighting should be selected to have a high illuminating efficiency and to provide no more illumination than is necessary for safety and public amenity. Lighting should be located to minimise light shining upon residential windows, or into the eyes of drivers, pedestrians or cyclists
- The role of the lighting in relation to the road hierarchy is a factor in determining the standard of lighting required
- Lighting design needs to take into account the maintenance requirements of lights when in service. Council will not approve for use on District roads lighting components which do not have a proven and certified maintenance performance history and which provide Council with the least whole of life cost option. Particular attention needs to be taken of the sensitivity of lighting components to UV damage

Referring to *Table 1 in AS/NZS 1158.0*, Council requires the following lighting categories be used on the District roads:

- V3 for national routes and regional arterials in urban areas, and for intersections of same in rural areas.
- V3 or V4 for District arterials and rural intersections of District arterials
- V3 for roads in commercial/industrial areas, V4 in residential areas unless residents consent for V3 can be obtained or there is a history of night-time accidents attributable to poor visibility
- V4 for collectors in urban areas, or at rural intersections of collectors
- P3 to 5 for local roads and rural collectors (refer AS/NZS 1158.3.1)
- In addition, all classifications should be checked against Section 4 “Policy Considerations” of AS/NZS 1158 part 1.3, particularly for rural intersections in unlit

areas, but also for any area where traffic volumes are high for the road description and/or the accident rate is high

Designers shall provide full lighting design documentation for approval along with related traffic safety analysis. Poles and luminaries shall be provided that have at least a minimum five year manufacturer's guarantee.

Urban Road Lighting Design

The lighting of urban roads should be designed to provide safety for vehicles, cyclists and pedestrians using NZS 1158 parts 1.1 and 1.3 for vehicular traffic. Lighting for other areas such as local roads, walkways, separate cycleway, car parks and access ways in public areas will require specific design to NZS 1158 part 3.1.

Pedestrian crossings should be evaluated in line with Traffic Regulations 1976 and Traffic Amendment Regulations 1998. Should the crossing be used at night, lighting to section 11 of NZS 6701: 1983 should be provided. Council's preferred lamp type is high pressure sodium, in Goughlite 700 Pedestrian fitting (or similar) fitted on the approach side of the crossing

Rural Roadway Lighting Design

Lighting on rural roads is provided for vehicle safety in hazardous areas such as intersections. Rural road lighting shall comply in particular with Clauses 3.4 "Intersections, Junctions and other specified locations" and 3.5 "Isolated Intersections and junctions" of NZS 1158 part 1.1.

Where an unlit road fitting Category V meets a road lit to Category V, full intersection lighting should be provided. Where an unlit road fitting category P intersects a road lit to Category V, full intersection lighting is only required if there is channelisation or a possible safety risk.

At unlit intersections full intersection lighting is only required if there are high traffic volumes or a possible safety risk. In other cases, strategically placed lighting ("flag lighting") shall be used or the intersection shall be designed in such a way that lighting is not required (refer clause 3.5.2 (a) of the standard).

Where flag lighting is appropriate, a minimum of two fittings shall be used for those new roads intersecting with a Rural Arterial or Collector road. In this case one light on the opposite side of the main road, and one on the side road will be required.

Suburban Development Considerations

For new suburban developments, decorative or "heritage" style poles and fittings may be used provided they meet with specified standards. Where decorative fittings are already in use on adjacent roads, the new installation shall have a similar appearance. Where a new subdivision road is joining on to an existing Council network road, the poles used at the intersection of the existing road must all be of the same design as those already in use on

the existing roadway. The defining line shall be the extended boundary line of the existing roadway at the entry point of the new road.

Areas of Significance

Lighting designs for areas that are in the central CBD and/or noted in the District Plan as having heritage, cultural or similar significance, should be submitted to the Landmarks and Community Services section of the Council for comment prior to the Consent being submitted.

Lighting designs for special features such as sculptures or memorials should take the effect on any surrounding traffic into consideration. In particular, designs for any special lighting abutting State Highways shall be submitted to New Zealand Transport Agency for approval.

Dual Circuits

Allowance shall be made for the installation of dual circuits on all new or relocated street light systems. This would allow Council the opportunity to reduce power usage to non essential lights at times of power supply shortages or high power supply costs, and also in the small hours of the morning when traffic flows are very low.

Clauses 3.3.16: Private ways, private roads, and other private accesses.

The minimum formed and legal widths for all non-public accesses are described in Table C4.

Clause 3.3.17.1: Urban Crossings

Designers should utilise Figure 3.9 in NZS 4404:2004 for break over angles

Urban crossings shall be installed in accordance with Drawing C19.

The design of all crossing points shall take into account all user visibility requirements. Refer to the current published version of the following:

- Austroads Guide to Traffic Management Part 6, Intersections, interchanges and crossings and Guide to Road Design Part 4 Intersections and Crossings.
- RTS 14 Guidelines for Facilities for Blind and Vision-Impaired Pedestrians
- NZTA Pedestrian Planning and Design Guide

Concrete crossings are preferred. Concrete shall comply with NZS 3109, and shall have a minimum strength of 30 MPa at 28 days. All surfaces to have a broom finish. The underlying basecourse shall comply with the Transit M/4 Specification and have a minimum compacted depth of 100mm below the concrete. Access points being constructed on low strength subgrade (CBR < 5%) shall have a specifically designed foundation.

For more difficult access across kerb and channel, especially where the access is a steep gradient, specific design is also required.

If an alternative crossing design is proposed using either Asphaltic concrete or block paving, this shall be specifically design (refer Clause 3.3.3)

No part of any crossing shall encroach any closer than 5m to the tangent point on any kerb radius at an intersection and any crossing to be installed directly onto a collector or arterial road shall be subject to safety audit

Crossings expected to carry industrial or commercial traffic must be specifically designed to accommodate the additional traffic loading, usage and turning circles.

Pram, wheelchair and mobility scooter crossings shall be designed to the standards contained in the current published version of NZS *4121, Design for Access and Mobility: Buildings and Associated Facilities.*

Clause 3.3.17.2: Rural Crossings

Rural vehicle crossings generally exist in a higher speed environment, and often have more variable topography to accommodate. The design of the vehicle crossing should:-

- Provide a safe environment for the traffic on the existing road,
- protect the users of the access,
- prevent detritus material from the access encroaching onto the road
- minimise maintenance risks such as cutting out of corners, blocked culverts, scour etc

All vehicle crossings shall be specifically designed to suit the location in which these are being placed. The following design guidelines should be achieved:

- Visibility at rural crossing points is critical. Reference should be made to Austroads Guide to Traffic Management Part 6, Intersections, interchanges and crossings and Guide to Road Design Part 4 Intersections and Crossings. In some instances it will be appropriate to make reference to Guidelines for Visibility of Driveways, RTS6, LTNZ. Austroads provides useful guides to the design of commercial vehicle crossings. Alternative design options including the use of flush medians can also be considered. Existing cuttings and batters may require cutting back both within the road reserve and on private property in order to meet sight distance requirements. The speed environment is actual average vehicle speed (85% percentile speed km/hr), not the posted speed limit
- Crossings must be constructed at right angles to the road. Where an access way then turns, a minimum 8m long straight must be provided from the edge of the carriageway to the gate or boundary
- The gradient of entrances should be a flat as possible, however shall not be steeper than $\pm$3% over the distance from the carriageway to the boundary and shall have adequate cross fall to prevent water flowing onto the rural road. Additional measures may be required, E.g. Extended sealing may be required to prevent gravel migration on rural approach grades $\geq$ 10%.
- Crossings expected to carry industrial or commercial traffic shall be specifically designed to accommodate the additional loading and vehicle usage. If necessary, the crossing width, radii and splay shall be greater than the standard dimensions

- The pavement used in the crossing shall have sufficient strength to meet the anticipated traffic loads (refer Cause 3.3.3). A rural crossing shall have a minimum formation thickness before sealing of no less than 150mm for flexible pavements

- The Drawings C20 to C29 can be used for guidance with respect to the design of acceptable solutions for rural crossings

Clause 3.3.19: Road run off

Carriageway drainage on urban roads uses kerb and channel although dish channels, slotted drains, subsoil drains, open drains or culverts can be considered. Road stormwater systems will normally be connected to a sump which in turn is connected by a lead to a manhole on the main stormwater system.

It will be necessary to refer to Table D2 for Expected Road Corridor Stormwater Level of Service requirements.

On rural roads the provision of a surface water channel a minimum of 0.5m below the adjacent road surface is appropriate on a majority of rural roads where 5:1 verge slopes can be readily constructed. In situations where open drains are inadequate, additional stormwater systems such as kerb and channel, sealed, paved or concrete channels and subsoil drains will be necessary.

There may also be other sustainable stormwater systems that can be put forward for consideration by Council (refer Schedule D Stormwater).

Clause 3.3.19.3: Subsurface Drains

Figure 3.5 in NZS 4404 describes an acceptable solution.

Clause 3.3.19.4: Side Drains/Water Tables

Reference should be made to Drawing C30 and Table C4.

Clause 3.3.21.4: Kerbs and Channels

Drawing C31 shows acceptable kerb and channel profiles. Other acceptable profiles are also given in Drawings C32 to C34.

Kerb and channel is required on all urban roads and on rural roads where open drainage/swales is impractical. Council currently uses two styles of kerb and channel, mountable and non-mountable. Nibs are also used around intersection details and streets using open drainage/swales. The following general standards shall be applied:

- The desirable minimum fall on channels is 1 in 400, with the absolute minimum fall being 1 in 500
- A kerb and channel shall be manufactured of concrete complying with NZS 3109 with a minimum strength of 20MPa at 28 days

- All kerb and channel shall be placed on a foundation of not less than 150mm of compacted basecourse meeting the current TNZ M/04 Specification
- The use of mountable or non mountable kerb is influenced by the roads intended function and position within the hierarchy. When the use of mountable kerb and channel is required because there is insufficient room within the carriageway to accommodate reasonable on-road parking, then the design will need to consider whether un-reinforced kerb and channel will have sufficient long term strength and will not crack or deform under load. If cracking or deformation is expected in un-reinforced kerb and channel, Council will expect the designer to propose options to mitigate this risk, such as reinforcement or foundation strengthening

- If the development proposes to use the mountable kerb and channel profile M1 (Drawing C31) then no domestic stormwater connections can be made through this kerb and channel
- Council has two other mountable kerb and channel profiles as shown in Drawing C31. The use of these details should be considered where greater stormwater drainage capacity within the road carriageway is sought

A stormwater connection is required between the kerb and the boundary where runoff from adjacent properties is to be directed into the roadside channel. In the past this has routinely been provided by including an adaptor in the kerb and connecting this to the property boundary using pipe work in the footpath.

Council will now expect that designers consider the option of connecting stormwater connections from adjoining lots directly to stormwater rider mains placed underground in the berm area behind the kerb. These rider mains will be 200mm minimum diameter and be installed between adjacent sumps, discharging directly into the sump chamber. Gradients on rider mains will generally be the same as the adjacent kerb. Access “Ys” should be provided for each property connection. The property connection should be 75mm minimum diameter. The alignment of the rider main should be such that it can be rod cleaned without difficulty.

Drawing SW11 provides acceptable detail for the connection of stormwater leads from private property to existing or new kerb and channel. This detail is not suitable for connection to the mountable kerb and channel profile M1 (refer Drawing C31) and with the other mountable kerb and channel profiles (M2 and M3) the entrance of the outlet into the kerb may need to be shaped to ensure that a permanent kerb surface can be reinstated over the outlet. The means by which kerb reinstatement above the stormwater outlet is to be achieved shall be detailed on the design drawings that are submitted with the Consent Application.

Clause 3.3.19.7: Sumps

Sumps are normally connected to a manhole on the stormwater drainage system by sump leads, except that if the trunk stormwater drain is of a greater diameter than 600mm and a manhole is not conveniently located, the sump lead may be saddled directly into that drain,

soffit to soffit. A manhole must be located within 40m of the sump lead connection. Manholes shall not be located in the traffic lane wheel paths.

When designing the road stormwater systems, the designer needs to check the surcharge depth for the proposed sump layout. The surcharge depth for grate sumps and dish channels in particular may impact unsatisfactorily on the adjoining road carriageway, and therefore may require additional sumps in the design solution. Surcharge depths need to be considered both with respect to the use of the road and its place in the road hierarchy. .Council would expect the traffic flows are not disrupted on Arterial and Collector routes. The effect surcharge and water moving on secondary drainage paths is likely to have on other infrastructure and adjoining private properties will also need to be considered when the designer is designing the road stormwater system.

A number of manufacturers can supply precast concrete and cast iron components for sumps and leads. Council has over time developed several sump details (refer Drawings SW14 to SW17). Council's expectation with respect to the design and construction of sumps within a road drainage system are as follows:

- Sumps should allow for the most effective movement of stormwater from the road into the stormwater drainage system that mitigates as much as possible the risk of blockage by debris such as plastic bottles and leaves
- The design of sumps, and in particular sumps intruding either into the carriageway (cycle and parking lanes) or into the footpath (e.g. access lids to sump barrels) need to consider the safety of all road and footpath users, and mitigate accident risks by using appropriate components (e.g. cycle friendly sum grates)
- Access into the sump must be provided for long term maintenance
- All components must be of suitable quality, and provide Council with the least whole of life cost option with respect to long term maintenance and system capacity

On rural roads sumps are not usually required, except in areas where kerb and channel is used. Transverse and longitudinal culverts are the more common. Drawings SW12 and SW13 provides suitable details.

- Culverts should be installed to ensure longitudinal scouring of the water tables does not occur
- Culverts controlling stormwater flow across the road are generally spaced no greater than 100 metres apart
- Spacing is dependent on a number of factors including area rainfall intensity, slope, soil type and the existing natural watercourses, refer Part 4
- Minimum culvert sizes are 375mm for culverts passing under the road and 300mm for culverts at vehicle crossings
- Design of appropriate inlet/outlet structures should ensure support is provided under all flow conditions to the culvert structure and the adjoining road
- No culverts are to be constructed in such a manner as to concentrate runoff into a neighbouring property without the consent of the owner of that property
- Stormwater should, where possible, be directed onto stable virgin ground and energy dissipation by rock rip-rap or equivalent shall be provided in erosion prone areas.

Where outlets are required on fillings or on unstable ground, fluming or other protection will be required.

Clause 3.3.19.7.3: Sump Gratings

Cycle friendly sump gratings will be required in all urban locations.

Clause 3.4 Pavement Construction

In general, the design principles outlined in Section 3.4 of NZS 4404 are to be followed. The following text provides additional comments and some specific changes that will take precedent over Section 3.4 in NZS 4404.

Clause 3.4.2.2 Subbase

TNZ M/03 Notes provide an acceptable specification for subbase aggregate. Where possible it is desirable to use local material or recycle existing material to minimise carbon footprint and reduce waste.

Clause 3.4.4.1 First and Second Coat Chip Seals

The principal objectives of the First Coat seal are to:

- Waterproof the new pavement
- Provide a safe surfacing with sufficient skid resistance
- Be compatible with the adjoining environment, giving due consideration to noise, surface drainage etc

Clause 3.4.11 Defection Testing

The designer will need to assess acceptable defection standards for each individual pavement project, based on the subgrade strength and proposed pavement structure. The proposed defection standards to be used for quality assurance testing in the field will need to be described and justified in the design reports which are submitted with the Consent.

Clause 3.4.16 Berms and Landscaping

The designer will need to consider the location and climatic conditions, and the purpose of the vegetation cover when designing grass mix and vegetation types proposed to be used in a development. The Hawke's Bay climate will expose grass and vegetation to extremes of climate including drought in summer and cold temperatures in winter.

Clause 3.4.20: As-built and completion documentation

Refer to Section Four – Schedule A of this document.

Schedule D – Altered Requirements to Section 4 NZS 4404 Stormwater Drainage

The Hastings District Council has adopted Section 4 of NZS 4404 with the following additions and/or alterations to be used in conjunction with NZS 4404.

Drawings

NZS 4404 includes Standard Drawings in Appendix A. Council has opted in this document to make reference back to these drawings, and also the drawings produced for WSA 02, and has amended these drawings for inclusion in this document. Within the following text specific reference is made where appropriate to the attached Drawings, referenced as *SEW - *****. Document users are also encouraged to be familiar with and where appropriate utilise the Drawings in Appendix A in NZS 4404.

Standards

The Standards and Codes of Practice which are listed below are referred to in this section. The design, materials and methods of construction shall comply with these standards and codes as applicable. The standards shall incorporate the latest amendments. Standards superseding those listed shall automatically apply.

AS/NZS 1260 : 2002	*PVC – U pipes and fittings for drain, water and vent applications*
AS/NZS 2566.1:2002	*Buried Flexible Pipes, Part 1 Structural Design*
AS/NZS 2566.2:2002	*Buried Flexible Pipes, Part 2 Installation*
NZS 3109 : 1997	*Specification for Concrete Construction*
AS/NZS 3725 : 2007	*Design for Installation of Buried Concrete Pipes*
AS/NZS 4058:2007	*Precast Concrete Pipes (Pressure and Non-Pressure)*
AS/NZS 4130 : 2003	*Polyethylene (PE) Pipes for Pressure Applications*
NZS 4405 : 1986	*Helical lock-seam corrugated steel pipes*
NZS 4442 : 1988	*Welded Steel Pipes and Fittings for Water, Sewage and Medium Pressure Gas*
AS/NZS 4058 :	*Manufacturing, Handling and Storage*
Concrete Pipe Association of Australia	*Manual on the Selection and Installation of Concrete Pipes and Associated products*

Clause 4.3 Design

In general, the design principles outlined in Section 4.3 of Part 4 of NZS 4404 are to be followed. The following text provides additional comments and some specific changes that will take precedent over Part 4 in NZS 4404.

The Stormwater System

Stormwater drainage encompasses a total system providing amenity, land drainage and protecting land and infrastructure against flooding.

The on-site system comprises guttering, down pipes, storage tanks, infiltration tanks, and pipe and overland flow systems to the property boundary which are usually installed in accordance with the Building Act.

The public stormwater system comprises a primary drainage system (usually consisting of pipes and open channels); while overland flow paths and controlled flood plains provide additional protection (a secondary system).

Design for Integration, Efficiency and Compatibility

Council seeks to promote the utilisation and enhancement of natural systems for stormwater treatment and integration into the environment through subdivision and land development design. When assessing proposals the Council will look to:

- Encourage development styles and stormwater management methods that maximize infiltration, control frequent flood flows and direct flows in large storms through secure overland flow paths
- Promote protection and enhancement of riparian vegetation
- Minimise vegetation loss in riparian areas associated with development
- Ensure water flows are maintained to support healthy aquatic life by maximising infiltration
- Promote the restoration of degraded streams
- Promote on site disposal
- Encourage the fencing off of stock from water bodies and their margins
- Promote the use of bioengineering solutions where practicable
- Preserve stable meander pattern in streams, and for streams already in a forced alignment encourage the realignment into a stable meander pattern

Council will encourage the efficient use of water resources within subdivision and land development projects. When assessing proposals the Council will look to:

- Promote the use of stormwater methods that minimise, retain, treat and reuse stormwater runoff within the development for non-potable uses such as irrigation, and fire fighting in areas where water resources are limited
- Ensure that treated stormwater water quality is of a standard suitable for the proposed use, where it will be used in contact with people

- Ensure that specifications for stormwater treatment devices take into account habitat requirements in the receiving water

Council will also seek to ensure that new subdivision and land development projects are compatible with existing receiving waters. When assessing proposals the Council will look to:

- Minimise the adverse effects of activities on habitat quality and promote sustainable solutions
- When addressing flooding issues, give priority to solutions that also address water quality and habitat values by ensuring a practical balance is achieved to address both flooding and ecological considerations
- Ensure secondary flow paths are located in public land in areas where they will not be obstructed by fences or planting
- In areas subject to flooding ensure the type of planting does not obstruct stormwater flows
- Consider effects on groundwater quality, levels and flows.

Council will also seek to ensure any stormwater treatment and disposal/use systems proposed in a subdivision or land development project are able to maintain and enhance the natural and human environment. When assessing proposals the Council will look to:

- Promote the use of stormwater management devices that are designed to increase habitat opportunities
- Preserve natural watercourses as public open space and ensure these become landscaped features of the urban environment. Piped waterways are preferred where the land being developed is to become private property
- Require the treatment of road runoff within a development, prior to discharge to natural systems, where expected traffic volumes constitute a significant source of contaminants
- Ensure stormwater infrastructure (including manmade natural systems) is designed to minimise whole of life costs, including maintenance costs
- Ensure stormwater systems do not conflict with the operation of other utilities
- Ensure safety of the general public in terms of the management of stormwater.

Catchments

All stormwater systems shall provide for the collection and controlled disposal of stormwater from within the developed area, together with any runoff from upstream catchments including roads and driveways, etc. When designing downstream facilities the upstream catchments should be considered as being fully developed, and provision made to extend the system to the upstream boundary.

For larger developments or where constraints exist in the downstream stormwater system, a developer may be required to ensure that the development creates no increase in either downstream peak flow or total volume or both. To satisfy this requirement stormwater

attenuation or re-use may be required within the proposed development area. Specific attenuation methods and design criteria shall be submitted to Council for approval.

Where existing or future land-use in a catchment gives rise to the possibility of stormwater contamination, or where sensitive receiving environments exist, stormwater treatment will be necessary.

Stormwater Runoff

Pre and post development stormwater peak runoff from a catchment or watershed may be calculated in accordance with the Rational Method or Modified Rational Method. These methods are described in the New Zealand Building Code, Approved Document E1 - Surface Water. However, care is to be taken in application of time of concentration formulae to flat catchments (Section 2.3.2 b i) of Approved Document E1) Alternative methods will be accepted subject to appropriate certification by a suitably qualified person.

Table D1 below provides typical values for an average runoff coefficient, C, for use on catchments in this District where impervious surfaces dominate the runoff coefficients. These can be used for the design of public stormwater infrastructure where there is no other downstream constraint. If a developer does not wish to restrict runoff to this capacity and to undertake a development that utilises the maximum site coverage permitted in the District Plan, this may require on site attenuation, storage or infiltration. Such conditions may need to be protected by Restrictive Covenant on the Title.

Table D1 Stormwater Runoff Coefficients

Type of surface or land use	Return Period	
	5 Year	**50 Year**
Sealed Surfaces, Roofs	0.9	0.9
Central Business District	0.8	0.8
Industrial Heavy	0.5	0.6
Industrial Light	0.7	0.75
Residential	0.5	0.6
Parks (not residential)	0.3	0.5

When working in catchments where the percentage of impervious surface is lower, alterative design approaches using a ‘soil profile method’ for calculation of the average runoff coefficient can be used. This method uses District soil characteristics to match site soil profiles to select the pervious surface part of the average runoff coefficients.

Council has commissioned studies to determine soil data for Hastings, Havelock North and Heretaunga Plains. Data can be obtained from Council. If free draining soils exist in these catchments the average runoff coefficient may be lower than the typical District values. However, reductions below typical District values will not be accepted unless soil profile data has been provided from an IANZ accredited soils laboratory.

Rainfall intensities and durations for 2, 5, 10 and 50 year return periods (i.e. 50%, 20%, 10% and 2% AEP) for the Hastings urban areas can be obtained from Council's Engineering Division. The rainfall intensity data provided in this code relate / is extracted from NIWA's HIRDS programme. Version 3 is about to be issued and will become the required reference source for design data. This data includes standard tables and tables incorporating an allowance for probable climate change effects over the next 50 years. NZS4404 requires designers to "consider" climate change. This code requires designers to "take climate change into account", as part of a whole of life approach to the asset design, including managing the risk of climate change over the intended life of the asset.The advice of Council staff should be sought if variations to the low-medium-high range of intensity values are being considered to suit specific developments.

Data for other areas can be obtained from Council. Specific charts are available for Havelock North, Ocean Beach, Poukawa and Waimarama.

System Design

The primary stormwater system shall usually comprise pipes except where Council approves an alternative solution. In general, existing natural perennial watercourses (i.e. streams, rivers) shall not be piped and shall be incorporated in public open space.

The primary stormwater drainage system of pipes and/or open watercourses shall have sufficient capacity to convey a 5 year rain storm without surcharging onto roads (i.e., not within 400mm of kerb tops). If a detailed runoff calculation method is applied, a hydraulic grade line 250mm below kerb level may be acceptable. This requires designers to consider 5 & 50 year storm scenarios in the design process. This requirement is currently under review and other scenarios may also be required.

It will be necessary to refer to Table D2 for the Roading Network Expected Level of Service when considering the ability of the road corridor to assist with Stormwater Management.

Storm surge, tsunami hazards, and sea level rise should also be considered when designing any stormwater system, particularly on low lying land.

For rainfall in excess of a 5 year storm up to a 50 year rainstorm, the secondary stormwater system shall have sufficient capacity to discharge runoff and protect buildings and household gully traps from inundation.

If the run-off calculated for a 5 year event using coefficients in Table D1 is above the level of service provided by the downstream stormwater system, run-off must be controlled by an approved system of on-site stormwater management.

The flowchart approach to stormwater system design shown in Diagram D1 below is encouraged:

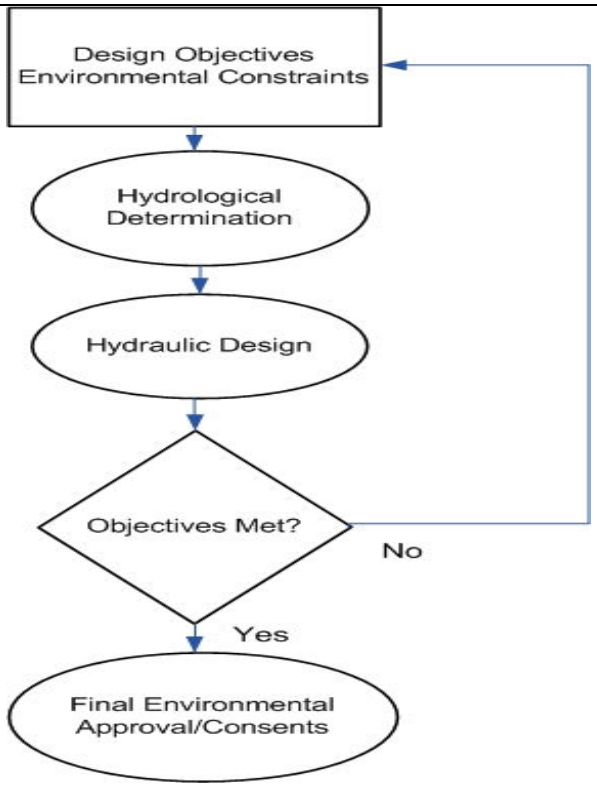

Diagram D1: Flowchart showing Stormwater Design Methodology

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Expected Road Corridor LOS for Stormwater Management

Hierarchy Classification	Storm Water Return Period (yrs)			
	5	10	20	50
Arterial Road	All designed movement lanes	All designed movement lanes	2 x Full traffic lanes	2 x Full traffic lanes
Collector Road	All designed movement lanes	2 x Full traffic lanes	2 x Full traffic lanes	1 x Full traffic lane
Local Road	1 x Full traffic lane	1 x Full traffic lane	0mm depth on Carriageway Center line	100mm depth on Carriageway Center line
Lane	1 x Full traffic lane	0mm depth on Carriageway Center line	100mm depth on Carriageway Center line	200mm depth on Carriageway Center line

Table D2: Required Road Corridor Level of Service for Stormwater Management

Pipeline Design

Pipes shall be sized according to Colbrook-White, or Manning's formula. Alternative methods will be accepted subject to appropriate certification by a suitably qualified person.

Acceptable pipeline designs may incorporate the use of the following software:

- HEC – HMS
- MIKE URBAN (DHI)
- XP – SWMM
- AULOS (Hydra Software)
- MIKEII (DHI)
- PURRS
- ILSAX
- XP - CULVERT

Council will require supporting calculations with the submission. Appropriate allowance shall be made for head losses at changes of direction in manholes.

The minimum flow velocity for pipes flowing just full shall be 0.7 m/s. The choice of a larger diameter pipe than is necessary for the peak discharge is not a satisfactory means of achieving compliance with the minimum velocity requirements.

No stormwater pipe, except for a connection to a lot shall be less than 200mm internal diameter. Stormwater connections to manholes and other Council infrastructure must be made using proprietary systems, and not cause unnecessary damage to the existing infrastructure, including breaking holes through manhole riser pipes.

All stormwater pipes shall then be laid in accordance with the manufacturers published recommendations.

Design plans shall show long-sections, identifying other service crossings (except water supply laterals) and other drains with pipe diameters and invert levels.

The maximum length of a connection from the boundary to the main shall be 20m in a straight line, with an inspection point installed on the boundary.

Pipe wall strength shall be sufficient to withstand anticipated soil pressures, surface and traffic loads, (crushing load imposed on a water service to exceed that which would arise from the soil overburden plus a HN-HO-72 wheel or axle load as defined by the New Zealand Transport Agency Bridge Manual 2004) and any other loads to be anticipated both during construction and when in service. These factors shall be taken into account during design, and appropriately documented in the design report.

Open Watercourses

Open drains are discouraged as permanent features within urban lots without specific Council approval. Early consultation with Council staff is encouraged if open drains are being considered.

Existing watercourses within a development or subdivision and those associated with Council project work, shall be protected by a drainage reserve. Easements may be considered in exceptional circumstances. The reserve/easement shall include clear land sufficient to allow access for maintenance purposes. Council's Bylaws and the Regional and District Plans provide rules for the set back distances from drains and other water courses. The Building Act set rules for the set back of foundations.

The extent of any stream or open watercourse improvement work shall be agreed with both the Regional and District Council. Factors that should be considered in the design process are:

- the retention of natural topography and vegetation
- land stability
- hydraulics
- ongoing maintenance requirements.

Where open watercourses are retained through a new development, channel upgrading/enhancement and/or land-raising may be required.

The design of open channels and secondary flow paths, e.g. parks, roads, paths and drainage reserves, shall ensure that flow velocities will not cause erosion or scour. Where potential for scour or erosion exists, preventative measures such as silt and debris traps, bank and bed protection, shall be considered in the design.

All overland flow paths shall be identified and protected from conflicting uses and restrictions or obstruction. The discharge of stormwater into ephemeral watercourses will

not cause an extra nuisance to downstream owners, or increase the potential for erosion or land instability.

Inlet and Outlet Structures

Permanent control structures shall be constructed at the inlets and outlets of pipelines. Provision shall be made for energy dissipation unless it is demonstrated that outlet velocities and in-situ bed and bank materials are such as to make this unnecessary. The design shall provide non-scouring velocities at the point of discharge and into the receiving channel, or alternatively provide scour/erosion mitigation in the solution design. Inlet structures shall be designed to develop sufficient head to overcome entry losses.

To control debris and ensure safe access, all pipelines < 600mm in diameter, or with a length > 20m, with an inlet from an open watercourse, shall have specially designed inlet structures.

Sumps

Sumps shall be located as necessary to ensure the design flow can enter the primary stormwater system without overtopping the kerb top or encroaching on the carriageway at intersections. (Refer Section Four: Schedule C)

All new sumps shall be Type II sumps as detailed in the Building Code E/1.

The design of a grate or back entry road sump shall include a calculation of its capacity based on acceptable levels of ponding, the risk of debris blockage and orifice flow.

Discharge from sumps shall be via pipe leads with a minimum diameter of 225mm, either

- directly into manholes, or
- soffit to soffit into a stormwater main of at least 900mm diameter, provided that the receiving pipe has a manhole within 40m of the sump lead connection. Where the hydraulic gradient of a sump lead is affected by pipe full conditions in the main, specific design calculations to determine size will be required.

The materials used for and the location of sump leads must be able to carry all superimposed loads from backfill and traffic, particularly during construction and when in service.

Where large capacity sumps are required, specific design of the sump and lead pipe work is required.

Design consideration shall also be given to the effects of road cross fall, and longitudinal grade (particularly on steep grades and at intersections), to ensure that the full design flow enters the sump.

During road works or construction a suitable means of preventing silt, detritus and contaminants entering sumps must be used. Any gravel or debris entering sumps or the stormwater system shall be removed from the system at the end of construction.

Appropriate filters shall also be installed in sumps during construction to remove any oils, cement or other contaminants that may have come from construction machinery or activities.

Stormwater Pumping

Stormwater pumping will only be approved where gravity disposal is not technically feasible because stormwater pump stations are often only used intermittently and under extreme conditions when mains power supply cannot be guaranteed.

Pumping systems shall be specifically designed so that the performance matches the inflow hydraulics of the upstream system without backwater effects. Council recommends that the design philosophy and technical details shall be discussed with Council staff before detailed design is commenced. All electrical equipment shall be designed for a maximum of 15 starts per hour.

Depending on the consequences of flooding during a pump station power outage, Council may require that on-site emergency power generation be provided.

The pumps shall be capable of limited dry running during routine maintenance. Pumps shall also be able to accommodate transient loads and cycling loading over their expected service life.

Pressure pipes of 100mm diameter or larger shall be ABS, API Schedule 40 line pipe, concrete lined steel, ductile iron, or PVC material (of appropriate Class); with all bends and valves adequately protected against movement. Flanged or welded fittings shall be provided throughout, with a proprietary dismantling joint or similar in the system to facilitate dismantling.

Stormwater pump stations shall incorporate control, monitoring, alarm and telemetry communication systems to Council standards at the time of the design.

All pump stations are to be located on public land with suitable all weather vehicle access.

Siphons

Siphons are not permitted except by the specific Council approval. If the designer believes siphons are an option, this should be discussed with Council at a very early stage.

Stormwater Treatment

Where a stormwater discharge is from land areas where there is a high risk of contamination, then design consideration shall be given to the treatment of the stormwater. Examples of high contamination risks include roads with traffic volumes greater than 5000 vehicles per day and industrial land uses.

Preference shall always be given for the treatment to be done at source of the contaminated flow before it is discharged into the reticulated network.

The Hawke's Bay Regional Plan controls discharges of contaminants to land, particularly those that may reach natural water bodies. Council's Water Services and Trade Waste Bylaw list requirements for the discharge of stormwater.

Subsoil Drains

The control of groundwater levels may be required.

In all cases subsoil drains shall be specifically designed, and shall allow for future maintenance. The final construction shall be such that no ingress of fines is allowed into the subsoil drain.

In areas where subsoil drains are required, the stormwater pipelines may also be required to act as a subsoil drainage system.

Soakage

Ground soakage for stormwater is not to be used in the following circumstances:

- for disposal of contaminated road runoff
- for disposal of runoff in areas not approved for soakage, for example Havelock North
- for disposal of runoff, where the method below shows that soakage is not permitted
- in areas where on-site stormwater management involving detention is utilised.

On site stormwater management and detention can be provided by a range of alternative methods such as rain gardens, rain tanks, ponds, depression storage, underground detention tanks, etc, as appropriate for the particular site and situation.

Designers should refer to the NZWERF publication "On-Site Stormwater Management Guideline" (NZWERF/Ministry for the Environment, 2004). This publication provides methods to assist in the selection and design of the appropriate system(s) for any site. It includes references to other available published information dealing with this topic. Refer http//www.nzwwa.org.nz , keyword "on-site"

Council has commissioned studies to determine soil data for Hastings, Havelock North and Heretaunga Plains. This data is available from Council's Engineering Division. If free draining soils exist in these catchments the average runoff coefficient may be lower than the typical District values. However, reductions below typical District values will not be accepted unless soil profile data has been provided from an IANZ accredited soils laboratory.

With small sites the range of onsite storage options is limited, and detention tanks may be the only practical solution.

The North Shore City Council (NSCC) has produced a useful document entitled *"Design Guide for Conventional Underground Detention Tanks for Small Sites"* which contains much useful information. It can be found in Section 4.16.3 of the NSCC *"Infrastructure Design Standards"* at the following website: http//www.nscc.govt.nz/IDSM/IDSM2006

North Shore City Council has developed a spreadsheet for detention tank design which has been adapted for use in the Hasting District. Copies are available on request from Council's Engineering Division.

Miscellaneous Facilities

Components of stormwater drainage systems which have not been specified may be proposed for use. Possible examples include stop banks, dams and spillways. Such items will be subject to the specific design by a suitably qualified professional and Council approval. Early consultation with Council staff is recommended.

Stormwater Quality

Stormwater quality issues shall be considered at all stages of a development, both during construction (short term issues) and resulting from the proposed land use (long term issues). Council prefers treatment at source. If a proposal includes designing stormwater treatment systems that are to be vested in Council, the option(s) delivering least whole of life cost to Council and the community will be used.

Water quality ponds (wet ponds), wetlands, or other effective treatment facilities shall be constructed when required to address either short term or long term sources of contamination.

Pre-treatment devices may be constructed to prevent floating contaminants and debris entering into the wet ponds or other treatment systems.

The design and construction of any treatment facilities shall be undertaken in such a way that future maintenance can be carried out easily.

When considering long term issues, designers are referred to the Hawkes Bay Regional Council Water Design Guidelines 2009 which outlines acceptable low impact stormwater design solutions and the Auckland Regional Council publications; *"Low Impact Design Manual"* and *"Stormwater Management Devices: Design Guideline Manual"*. Other references include Metrowater's *"On-site Stormwater Management Manual"* and *"Stormwater Soakage Manual"*; and Sustainable Urban Drainage Systems design manuals for countries within the United Kingdom. Other appropriate design manuals may also be used. The New Zealand Water Environment Research Foundation (NZWERF) and New Zealand Water and Waste Association (NZWWA) also provide useful internet based design guides and resources.

When using any of the references described above, designers must make allowance for the local soil and climatic conditions.

[Should include most acceptable design solutions from the HBRC design guidelines where appropriate]

Relevant Information

The Council holds a considerable amount of data concerning catchments, flood plains, flood levels, waterways and existing systems. Designers are encouraged to consult with Council's Engineering Division and obtain copies of any information that may be relevant to a proposed development.

Pipe joints and thermal expansion

Where thermal expansion of the pipe may occur, flexible joints capable of accommodating the expected movement for a temperature range of at least 25^{o}C shall be allowed for. Such joints should also be anchored against creep displacement.

Clause 4.3.3.2 Pipe Materials

Council requires that the pipe materials shown in Table D3 below be used in the construction of stormwater drains provided they comply with the latest amendment of the New Zealand Standard cited.

Table D3: Stormwater – Pipe Material/Joint/Minimum Class

Application	Pipe diameter (mm)	Pipe material**	Joint type	Minimum pipe class
Connection within public land	100 to 200	mPVC (modified poly vinyl chloride)	RRJ (Rubber Ring Joint)	SN 8
Sump lead	150 to 225	mPVC (modified poly vinyl chloride) or RC (reinforced concrete) when under a road	RRJ (Rubber Ring Joint)	SN 8 or Class 2
Downstream of manhole in road reserve	300 to 525	RC (reinforced concrete)[1] or Polypropylene Pipe (PP)	RRJ (Rubber Ring Joint) or Proprietary systems for PP Pipe	Class 2
In road reserve	600 and greater	RC (reinforced concrete)[2] or PP Pipes	RRJ or FJ (Flush Joint)[3] or PP pipes	Class 2

Note 1: Reinforced concrete pipes to NZS 4058:2007 (minimum Class 2)

Note 2: Concrete lined steel (CLS) to NZS 4442 : 1988 or Corrugated Steel Pipe (CSP) to NZS 4405 : 1986 for culverts greater than 500mm diameter outside urban areas may be required by Council staff in some applications

Note 3: Flush joints are to be wrapped in filter cloth. Joint detail for pipes 600mm diameter or greater to be approved by Council Drainage Services Manager

Clause 4.3.4 Manholes

General

Manholes shall be provided on all pipelines at each change of direction and/or gradient, at each branching line of a diameter between 150mm and 600mm, at the termination of mains, and at a spacing of not more than 90m unless specifically approved by Council. Manholes using pre-cast component are required, unless the design conditions dictate otherwise in which case specific approval will be required. The standard manholes drawings in NZS 4404 (CM – 004 to 006) are to be used, expect that Council will not allow the use of any rungs or permanent ladders. The use of lock down lids is required in heavily trafficked areas, or where a positive barrier to access is required by Council.

On Drawing CM – 005 designers should note that sufficient workspace needs to be available within any manhole utilising an internal drop. In cases where the manhole does not provide sufficient internal space and external drop shall be used. Within any drop inlet, allowance needs to be made for rodding access in line with the entry pipe. One means of achieving this requirement is to use a Tee junction with screw cap.

For manholes located in road carriageways, the finishing of the concrete manhole lid and cast iron frame and cover must take into account the flexibility or otherwise of the adjoining road pavement. If the adjoining road pavement is a flexible pavement, then the manhole lid needs to be located below the basecourse layer (at least 150mm) and the lid and cast iron frame brought up to the surface using appropriate risers and rings. The lids used in any manhole structure must be compatible with the expected traffic loading.

Manholes requiring person-entry fall within the definition of a “confined space” and the design must facilitate the use of safe operating procedures (e.g. the use of tripods and harnesses) when entry is necessary.

Standard Manholes

Standard manholes (refer Drawing CM – 004) are to be circular with an internal diameter of not less than 1050mm and shall be used on pipelines deeper than 600mm. On shallower pipelines an access chamber can be used. (Refer Drawing CM – 006)

Precast manholes shall consist of 1050mm internal diameter spun concrete pipe to NZS 4058:2007 Class 2 with the holes cast in the side for step irons to be securely plugged with mortar. Precast concrete bases are to be used for manholes with precast barrels. Riser sections shall be jointed as shown on the standard drawing, carried out in accordance with the manufacturer’s recommendations, to provide a watertight structure. The top riser is to be made 300mm deep, to allow for easy lowering of the manhole barrel height.

Cast in-situ manholes, where approved shall be constructed using ordinary grade concrete (20 MPa) vibrated to give maximum density and watertight construction.

All holes for pipe entry shall be saw cut. Impact holing is not to be used under any circumstances.

Manholes on Large Pipelines

Manholes on pipelines where the use of a standard manhole is not suitable shall be specifically designed.

Manholes on pipelines greater than 450mm diameter shall be constructed of larger diameter components to ensure benching space can be provided. Chimney style manholes may be used.

Manholes on straight sections of pipelines of 1200mm diameter and larger may be constructed using pre-formed tees.

On pipelines 1m diameter and larger the spacing of manholes may be extended to 200m and curvature on the pipeline may be permitted providing that joint deflections are within the limits of the manufacturer's recommendations.

Deep Manholes

Manholes deeper than 5 metres shall match the wastewater manhole shown on Drawing SEW-1311. Intermediate platforms shall not be used (to facilitate the use of exterior fall restraint and emergency evacuation equipment). Step irons or ladders are not to be installed, unless specifically approved by Council.

Hydraulic Flow in Manholes

Losses in a manhole shall be compensated for by a drop in the invert across the manhole equivalent to 20mm plus 5mm per 10° of change in direction of flow, or as determined from a specific calculation. For a pipeline greater than 1m in diameter the drop shall always be determined by specific calculation.

Benching

The pipe invert and benching through manholes shall either be as detailed in the standard drawings, or can utilise other options (e.g. half pipe) provided that the appropriate energy loss allowance has been made in the design. Edges shall be rounded and the benching given a form and finish which facilitates smooth flow, non-entrapment of debris, and easy access with cleaning rods.

Steps and Ladders

Permanent steps and ladders are not to be used. This policy is to discourage entry to the confined space.

Manhole Lids and Covers

Manhole lids and covers shall be as detailed on Drawing SEW – 1308. The use of Precast spacer rings shall be detailed to allow for the slope of the road, and the need to provide for

the proper construction of basecourse and surfacing construction, taking into account the need to apply both a first and second coat seal in the case of a chip sealed surface.

Aluminium covers are not permitted.

Manholes in Soft Ground and High Water Tables

Where a manhole is to be constructed in soft ground the foundations will require specific investigation and design. Options for foundation strengthening can include undercutting the surrounding area down to stable ground and backfilled with suitable compacted hard fill to provide an adequate foundation bearing capacity. Alternatively, the manhole could be founded on hard fill/reinforced concrete base. The dimensions of this base will require specific design, (refer Section Four, Schedule B) but will not be less than 150mm thick, and twice the area of the manhole.

Where manholes are to be constructed in areas of high water tables and there is a possibility of flotation, specific design shall be undertaken to ensure the manhole is stable under all conditions.

Pipe Main Connections to Manholes

On all rigid pipes (i.e. concrete or earthenware) entering and leaving manholes, a flexible joint must be provided as detailed in Drawing SEW – 1302.

Pipe junctions in manholes shall be aligned to ensure streamlined flows through the manhole, unless specifically approved otherwise by Council.

Drop Connections for Service lines

Drop connections at stormwater manholes will not normally be required.

Manhole Requirements for Pipe Inter-Connections

Manholes are required at all public drain pipe junctions.

Clause 4.3.7 Connections to the Public System

Each residential stormwater connection shall be capable of providing drainage from the whole building area of a lot (including all surface water from the yard), at grades and cover complying with the New Zealand Building Code and any Council requirement to meet the network level of service. However, under special conditions, and subject to certification by the designer and approval by Council of an adequate soakage or stormwater attenuation system, the requirement to include the yard surface water in the capacity of the connection may be waived. The certification from the designer shall include adequate proof that the soil and ground water on the lot can provide sufficient soakage. The designer shall provide a maintenance programme for the facility and compliance with the maintenance programme will be a requirement of the building WOF.

The point of discharge from any property shall be within 500mm of the boundary. The connection shall discharge into a rider stormwater main or the road channel (provided that

the road channel is suitable) but may be connected to a manhole, main pipeline or road sump subject to Council approval. (Refer Section Four Schedule C)

Connections to pipelines must include an access point for cleaning and inspection at the boundary. This access point shall be brought to the surface in a proprietary service box. Connection pipes larger than 100mm diameter shall discharge direct to a pipeline, manhole, or enter the kerb via a back entry sump. The maximum allowable size of connection to a rider main is 200mm diameter.

Where a connection is deeper than 1.8m below ground level, a ramped riser shall be constructed to bring the connection to within 1.2m of ground level, as shown on Drawing CM – 005.

The connection provided for each residential lot shall be capable of taking the spigot end of a 100mm nominal internal diameter PVC pipe.

Connections for commercial and industrial lots shall be specifically designed to accommodate the design flow after any construction, from the area served by the connection to the service level approved by Council, and meet the minimum requirements for stormwater as defined by the NZ Building Code. Connections larger than 100mm diameter shall be made directly to a rider main pipeline, manhole, or road sump. Maximum allowable size of connection is 200mm diameter. Any connection larger than 200mm diameter must go to a manhole.

The end of each connection shall be marked by a 50mm x 50mm timber stake (treated pine) with top painted green, extending from below invert level to 400mm above ground level. The pipe end shall be sealed either by a factory sealed stopper or a plug fixed with a rubber ring and held with stainless steel wire.

Location of Public Pipelines and Other Council Infrastructure

In residential areas stormwater pipelines should be laid within the road reserve. (Refer to Drawing C6 in Section Four: Schedule C) When locating all pipelines, due account should be given to the location of other services, and kerb and channel, when defining pipeline alignments. Space limitations usually require that drainage pipes (sewer and stormwater) must be laid in or nearby the carriageway. Drains shall be laid so that future maintenance access is provided for as described in Council's Bylaws.

Pipelines on private land shall be sited to minimize reduction of the building area available (i.e. within side and rear yards as defined in the District Plan). Pipelines shall be laid at least 1.0m clear of existing buildings, and consideration shall also be given to the width required for maintenance access and interaction with building foundations when locating pipelines. Drainage structures including manholes shall be located clear of boundaries and kerb lines. Design consideration shall be given to providing and maintaining an unobstructed route for any associated secondary flow path, and ensuring that these are located in public open space.

Stormwater services shall be extended to each upstream boundary of a subdivision unless otherwise approved, and shall allow for the future potential development of the upstream

land. Easements shall be provided for any public drainage pipelines located on private property. Any existing secondary flow path should either be secured by creation of public open space as a reserve, or used as a road.

Vicinity of Other Services

The reasons of providing guidelines for separation distances between underground utility services are:

- To prevent damage to either utility service or their function
- To permit access for future maintenance/renewal, and minimise the need for temporary support
- Allow for the two situations, these being where two services cross each other (in which case vertical separation is important and the crossing angle shall be as close to a right angle as possible, with shallow angle oblique crossings to be avoided) and where the two services run in parallel where both vertical and horizontal separation is important

For normal trenching and trench less technology installation, clearance from other service utility assets shall not be less than (and preferably exceed) the minimum vertical and horizontal clearances shown below in Table D3 for services laid within 1m vertically of the surface. For deeper services, the horizontal separation will vary as a function of service depth and ground conditions.

Written agreement on reduced clearances and clearances for shared trenching shall be obtained from Council and the relevant network utility operator.

The clearance shall be measured between the two closest parts of the underground services (e.g. collar to socket).

Table D3: Clearances between Stormwater and other Underground Services

Utility (Existing service)	**Minimum horizontal clearance mm**		**Minimum vertical clearance [1] mm**
	New stormwater size		
	≤DN 300	**>DN 300**	
Sewers ≤DN 300	300	600.	150[2]/300
Sewers >DN 300	600	600	300
Low pressure Gas mains	300[3]	600	150[2]/300
Telecommunication	300[3]	600	150[2]/300

Utility (Existing service)	**Minimum horizontal clearance mm**		**Minimum vertical clearance [1] mm**
conduits and cables			
Electricity conduits and cables	500	1000	225[2]/300
Other drains	300[3]	600	150[2and4]/300[4]
Water mains	1000[5]/600	1000[5]/600	500[4]

Notes:

Minimum vertical separation between stormwater pipe and other service
A minimum vertical clearance of 300mm applies if the size of either the existing service or proposed pipe is >DN 300
Clearances can be further reduced to 150mm for distances up to 2m when passing installations such as poles, pits and small structures, providing the structure is not destabilized in the process
Clearance from kerbs shall be measured from the nearest point of the kerb
A smaller clearance can be accepted if the upper pipe is suitably supported on a pedestal either side of the lower service pipe.

Clause 4.4.2 Information to be provided

The information requirements outlined in the first set of sub-paragraphs (a) to (e) and subparagraph (a), (c) and (d) from the second set are to accompany resource consent applications. The other information requirements are generally required for design review and approvals, and may be required for assessment of resource consent applications.
The information is additional to any that is required under Parts 2 and 3 of this document.

Clause 4.5 Construction

In general, the design principles outlined in Clause 4.5 of Section 4 of NZS 4404 are to be followed. The following text provides additional comments and some specific changes that will take precedent over Section 4 in NZS 4404.

Cover to Pipelines

The cover provided to pipeline systems shall be in accordance with the specifications listed above, the manufacturers' published recommendations, and will need to take into account the following:

- Imposed loads during construction of the pipeline or reconstruction of the road or other infrastructure assets above the pipeline (including possible reshaping of the road profile)

- Imposed loads during the lifetime of the pipeline system from backfill, expected traffic, and any surface structures

If the required cover cannot be provided for technical reasons, then other means of protecting the pipeline such as spreading the imposed load should be implemented.

Pipe Strength, Bedding, Surround and Backfilling

In general, with good ground conditions, bedding and other trench details shall be as shown in CM – 001 to CM - 003. In poor ground conditions, potentially unstable ground, or where extreme loadings will be encountered; pipe strength and bedding shall be specifically designed and certified.

Other additions to these drawings are:

- Drawing CM – 002 : Note 7 should also include the use of geotextile separation between granular trench fill (e.g. road basecourse) and the underlying pipe embedment if required to prevent migration of fines

Rigid Pipes up to 525mm diameter (Reinforced Concrete)

Pipe strength and bedding shall be selected for suitability under the design loading conditions. The type of bedding and class of pipe adopted shall be in accordance with *NZS/AS 3725:2007– Design for Installation of Buried Concrete Pipes*, and the appropriate pipe material standard (e.g. *AS/NZS 4058:2007 Precast Concrete Pipes (pressure and non-pressure)*).

Pipe bedding and backfilling shall be carried out in accordance with WSA Drawing SEW 1201 and SEW-1202 Types 1 & 2, and AS/NZS 3725:2007 - Design for Installation of Buried Concrete Pipes. The selected fill (free of organic materials, lumps larger than 75mm, and stones larger than 40mm) shall be placed in 150mm layers and compacted to a density of not less than 95% of Maximum Dry Density as determined by NZS 4402 : 1986 Test 4.1.2 – Methods of Testing Soils for Civil Engineering purposes. The compaction shall be completed using a hand operated vibrating compactor with a total static weight not exceeding 0.5 tonne.

Rigid Pipes greater than 600mm diameter (Reinforced Concrete)

As per rigid pipes up to 525mm diameter except backfilling pipe surround shall be carried out in accordance with WSA Drawing SEW-1202 Type 4. The pipe bedding material shall comply with *AS/NZS 3725:2007 - Design for Installation of Buried Concrete Pipes* and a 150mm diameter subsoil pipe shall be laid for the first 30m upstream of every manhole.

All Other Pipes

Pipe strength and bedding shall be selected for suitability under the design loading conditions. The type of bedding and class of pipe adopted shall be in accordance with

AS/NZS 2566.1 – Buried Flexible Pipelines, Part 1 - Structural Design and AS/NZS 2566.2 – Buried Flexible Pipelines, Part 2 - Installation.

Pipe bedding and backfilling shall be carried out in accordance with WSA Drawing SEW 1201 and SEW 1202 Types 3 & 4. Following placement of the pipe, the granular bedding material shall be placed in layers not exceeding 150 mm and shall be carefully tamped with hand or mechanical tampers, with particular attention to compacting under the pipe haunches. The material shall not be dropped from a height of greater than 600mm. The granular fill shall be compacted to a density of not less than 95% of the Maximum Dry Density as determined by Test 4.1.2 of NZS 4402: 1986 – Methods of Testing Soils for Civil Engineering purposes.

Pipes on Steep Grades (greater than 1 in 10)

If the pipeline gradient is steep (i.e. greater than 1 in 10), and/or ground conditions are poor, sufficient cement shall be added to the granular bedding material to provide a weak concrete with a strength of not less than 7 MPa. The depth of bedding shall be as shown in WSA Drawing SEW 1201 and SEW-1202, and shall be cleanly broken at the pipe joints with a 25mm gap formed with expanded polystyrene to maintain flexibility. Where the pipeline gradient exceeds 1 in 10 anti-scour blocks shall be constructed at the spacing's shown in Table D4, or alternatively, metal cut off plates made specifically as anti-scour blocks may be used.

Table D4 Spacing of Anti Scour Blocks

Grade	Spacing (m)
Steeper than 1 in 5	5
1 in 5 to 1 in 10	10

Construction and Backfilling in Road Reserve

The designer and contractor will need to address compatibility between the often flexible pavement design and the more rigid stormwater construction works, in particular the works associated with manholes, service lids etc, in order to avoid cracks or differential movement. The use of basecourse overlays above lids, in associated with standard risers is one means of compliance.

Acceptance and Testing of Stormwater Drainage System

Acceptance will be on the basis of the quality of materials and the general standard of construction. Inspection during construction shall be as set out below.

The pressure testing of sealed stormwater pipelines will be required, including pipelines that are being designed to operate in a surcharge condition. Testing will be to ground level or 50% above the hydraulic grade line head whichever is the greater. Pressure testing will be for leaks, with the acceptance requirement being that the pipeline must pass one of the three drainage leakage tests described in Clauses 8.1 to 8.3 of Section E1/VM1 of the

Compliance Document for *New Zealand Building Code*. Low pressure air testing is the preferred test. Pipeline inspection and recording by CCTV is required for all pipelines over 225mm diameter.

Inspection during Construction

To ensure that the stormwater drainage works are constructed to the required standards, inspection by the developer's agent during construction shall cover at least the following details:

- Qualifications and experience of the staff constructing the works
- pipe sizes, pipe levels and gradient. The designer will need to specify the tolerances required for construction of all stormwater system components, in particular the tolerances required for pipeline line and level. The design grades around the Heretaunga Plains in particular can be relatively flat. Achieving specified construction tolerances is extremely important
- quality, dimensions and reinforcement of all materials supplied, unless these are supplied by a manufacturer accredited to ISO 9002
- trench depth and width, quality of trench backfill material, and compaction data
- materials and workmanship in joints between pipes, manhole risers, etc
- sizes, construction materials and distances of anti scour blocks
- manhole benching and other details.
- CCTV inspection outcomes and defect reports.

Inspection on site shall be done by a suitably qualified person with a good knowledge of drainage theory and construction practice, who shall have reasonable liaison with and instruction from the design engineer for the works being inspected. The inspector shall not have any financial affiliation with the contractor carrying out the work. The written records and certification of these inspections shall be included in the Completion Report, as specified in Part 1 of NZS 4404.

Schedule E – Altered Requirements to Section 5 NZS 4404 Wastewater

The Hastings District Council has adopted Section 5 of NZS 4404 with the following additions and/or alterations to be used in conjunction with NZS 4404.

Drawings

NZS 4404 includes Standard Drawings in Appendix A. Council has opted in this document to make reference back to the drawings produced for WSA 02, and has amended these drawings for inclusion in this document. Within the following text specific reference is made where appropriate to the attached Drawings, referenced as *SEW - *****. Document users are also encouraged to be familiar with and where appropriate utilise the Drawings in Appendix A in NZS 4404.

Clause 5.2.1: Objectives

Under item (m) Council would expect the least "whole of life costs" to be achieved in the preferred design solution

Clause 5.3: Design

Clause 5.3.5.1: Design flow

When calculating the design flows, using the method outlined in NZS 4404, use shall also be made of the following information and tabulated data:

Estimation of Equivalent Population (EP)

Single occupancy lots – the EP per single occupancy shall be based on the following:

- Hastings region general, excluding Waipatiki & Waimarama 3.5
- Waipatiki 5.0
- Waimarama 5.0

Equivalent Populations for Synchronous Discharges

Residential classification - Single occupancy lots - EP per Unit shall use the data above.

Peak dry weather (sanitary) flow - the *ADWF* is deemed to be 250 L/p/EP or 0.0029 L/s/EP.

Commercial/Special Cases classification – where Future Industrial Areas are proposed but the future industry types are not known, a covenant on the title to restrict activities will allow the worst case appropriate EP Classification to be applied to the reticulation design. Without a covenant, the development will be deemed a 'wet' industry and shall be subject to an EP Classification set at Council's discretion.

Sewage quality / Trade waste management - Refer to the "Hastings District Council Water Services and Trade Waster Bylaw 2006" for conditions. A Trade Waste Consent application is required for acceptance or otherwise by Council.

Table E3: EP of Non-Residential EP/ha Classifications

INDUSTRY EP CLASSIFICATION (refer Table A2 in WSA – 02)	**EP PER BUILT UP HECTARE (BU)**			
	N = 1	***N = 2***	***N = 3***	***N > 3***
1	20,830	13,960	12,710	11,670
2	13,890	9,310	8,470	7,780
3	11,110	7,440	6,780	6,220
4	8,330	5,580	5,080	4,670
5	5,560	3,720	3,390	3,110
6	2,780	1,860	1,690	1,560
7	1,390	930	850	780
8	690	465	425	390
9	350	235	210	195
10	140	95	85	80

Flow Estimation for Undeveloped Areas

Peak dry weather (sanitary) flow - the *ADWF* is deemed to be 250 L/p/EP or 0.0029 L/s/EP.

IIF Calculation – The $Factor_{Containment}$ shall be not less than 1.5, unless specifically approved otherwise by Council.

Values of $I_{(1,2)}$ for calculation of *I* shall be taken off Table E4 below:

Table E4: Approximate Values of $I_{(1,2)}$ for Various Locations

Location	$I_{(1,2)}$
Eskdale	19
Hastings	15
Havelock North	16
Ocean Beach	17
Poukawa	19
Waimarama	18
Waipataki	20

Clause 5.3.6: Structural Design

Drawings SEW – 1400 to 1411 provide acceptable solutions for specific design outcomes.

Clause 5.3.7.2: Materials

Council has a list of approved products for use in wastewater construction. This is available from Council's Engineering Division. Where products are specifically stated, this shall be taken to mean that alternative products are not acceptable, unless specifically approved by Council.

Where no specific products are stated as being acceptable, all of the following product selection criteria shall be met:

- Manufacture by a nationally and/or internationally recognised leader in the applicable product range, and
- Manufactured in compliance with relevant standards, given in descending order of priority below. Should there not be a relevant standard for manufacture of the applicable product found within the standard at the higher level (highest = (i)) as stated below, then compliance with a standard found on the next level down shall be demonstrated unless again no applicable standard exists, moving on down the list until a applicable standard is found to demonstrate compliance:

(i) NZS, AS, AS/NZS

(ii) BS, EN

(iii) Other international standard authority (e.g. JAS, ASTM, DIN, ISO)

(iv) WSAA approved

(v) Australasian material supplier association recommended practice document(s)

Should there be no available standard to which the product's manufacture can be verified, the product will be deemed unacceptable.

- Local maintenance support for the product within the Napier/Hastings district is required
- For Principal Gravity Sewer Pipeline Systems, with reference to PVC-U pipe, SN16 pipe is the only acceptable stiffness class for ductility reasons.

Clause 5.3.7.4: Pipes in private property

Location of Public Pipelines and Other Council Infrastructure

When locating all pipelines, due account should be given to the location of other services, and kerb and channel, when defining pipeline alignments. Space limitations usually require that drainage pipes (sewer and stormwater) must be laid in or nearby the carriageway. Drains shall be laid so that future maintenance access is provided for as described in Council's Bylaws.

Pipelines on private land shall be sited to minimize reduction of the building area available (i.e. within side and rear yards as defined in the District Plan). Pipelines shall be laid at least 1.0m clear of existing buildings, and consideration shall also be given to the width required for maintenance access and interaction with building foundations when locating pipelines. Drainage structures including manholes shall be located clear of boundaries and kerb lines. Easements shall be provided for any public drainage pipelines located on private property.

Clause 5.3.7.9: Clearance from underground services

Table 5.6 in NZS 4404 shall be replaced by Table E1 below:

Table E1: Clearances between Wastewater and other Underground Services

Utility	Minimum horizontal clearance	Minimum vertical

(Existing service)	**Mm**		**clearance [1] mm**
	New wastewater size		
	≤DN 300	**>DN 300**	
Stormwater pipes ≤DN 300	300	600.	150[2]/300
Stormwater pipes >DN 300	600	600	300
Low pressure Gas mains	300[3]	600	150[2]/300
Telecommunication conduits and cables	300[3]	600	150[2]/300
Electricity conduits and cables	500	1000	225[2]/300
Other drains	300[3]	600	150[2and4]/300[4]
Water mains	1000[5]/600	1000[5]/600	500[4]

Notes:

1. Minimum vertical separation between wastewater pipe and other service

A minimum vertical clearance of 300mm applies if the size of either the existing service or proposed pipe is >DN 300

Clearances can be further reduced to 150mm for distances up to 2m when passing installations such as poles, pits and small structures, providing the structure is not destabilized in the process

Clearance from kerbs shall be measured from the nearest point of the kerb

A smaller clearance can be accepted if the upper pipe is suitably supported on a pedestal either side of the lower service pipe.

Table E2 gives minimum cover requirements for wastewater pipes.

Table E2: Minimum Cover over Wastewater Sewers

Location	Minimum cover to top of sewer (mm)
Private residential property/public land	375mm (no vehicle loading)
Private residential property	600mm (subject to vehicle loading)
Road reserve – berms and footpaths	600mm
Un-sealed carriageways	750mm
Sealed carriageways (<1000 vpd)	750mm
Sealed carriageways (>1000 vpd)	900mm
State Highway	Refer to New Zealand Transport Agency

Clause 5.3.8.4: Manholes

In addition to the information in Section 5.3.8.4 of NZS 4404, and Drawings SEW – 1300 to 1317) the following guidelines should be followed:

General

Manholes shall be provided on all pipelines at each change of direction and/or gradient, at each branching line of a diameter between 150mm and 600mm, at the termination of mains, and at a spacing of not more than 90m unless specifically approved by Council. Manholes using pre-cast component are required, unless the design conditions dictate otherwise in which case specific approval will be required. The standard manholes drawings in NZS 4404 (CM – 004 to 006) are to be used, expect that Council will not allow the use of any rungs or permanent ladders. The use of lock down lids is required in heavily trafficked areas, or where a positive barrier to access is required by Council.

On Drawing CM – 005 designers should note that sufficient workspace needs to be available within any manhole utilising an internal drop. In cases where the manhole does not provide sufficient internal space and external drop shall be used. Within any drop inlet, allowance needs to be made for rodding access in line with the entry pipe. One means of achieving this requirement is to use a Tee junction with screw cap.

For manholes located in road carriageways, the finishing of the concrete manhole lid and cast iron frame and cover must take into account the flexibility or otherwise of the adjoining road pavement. If the adjoining road pavement is a flexible pavement, then the manhole lid

needs to be located below the basecourse layer (at least 150mm) and the lid and cast iron frame brought up to the surface using appropriate risers and rings. The lids used in any manhole structure must be compatible with the expected traffic loading.

Manholes requiring person-entry fall within the definition of a "confined space" and the design must facilitate the use of safe operating procedures (e.g. the use of tripods and harnesses) when entry is necessary.

Standard Manholes

Standard manholes (refer Drawing CM – 004) are to be circular with an internal diameter of not less than 1050mm and shall be used on pipelines deeper than 600mm. On shallower pipelines an access chamber can be used. (Refer Drawing CM – 006)

Precast manholes shall consist of 1050mm internal diameter spun concrete pipe to NZS 4058:2007 Class 2 with the holes cast in the side for step irons to be securely plugged with mortar. Precast concrete bases are to be used for manholes with precast barrels. Riser sections shall be jointed as shown on the standard drawing, carried out in accordance with the manufacturer's recommendations, to provide a watertight structure. The top riser is to be made 300mm deep, to allow for easy lowering of the manhole barrel height.

Cast in-situ manholes, where approved shall be constructed using ordinary grade concrete (20 MPa) vibrated to give maximum density and watertight construction.

All holes for pipe entry shall be saw cut. Impact holing is not to be used under any circumstances.

Manholes on Large Pipelines

Manholes on pipelines where the use of a standard manhole is not suitable shall be specifically designed.

Manholes on pipelines greater than 450mm diameter shall be constructed of larger diameter components to ensure benching space can be provided. Chimney style manholes may be used.

Manholes on straight sections of pipelines of 1200mm diameter and larger may be constructed using pre-formed tees.

On pipelines 1m diameter and larger the spacing of manholes may be extended to 200m and curvature on the pipeline may be permitted providing that joint deflections are within the limits of the manufacturer's recommendations.

Deep Manholes

Manholes deeper than 5 metres shall match the wastewater manhole shown on Drawing SEW-1311. Intermediate platforms shall not be used (to facilitate the use of exterior fall restraint and emergency evacuation equipment). Step irons or ladders are not to be installed, unless specifically approved by Council.

Hydraulic Flow in Manholes

Losses in a manhole shall be compensated for by a drop in the invert across the manhole equivalent to 20mm plus 5mm per 10° of change in direction of flow, or as determined from a specific calculation. For a pipeline greater than 1m in diameter the drop shall always be determined by specific calculation.

Benching

The pipe invert and benching through manholes shall either be as detailed in the standard drawings, or can utilise other options (e.g. half pipe) provided that the appropriate energy loss allowance has been made in the design. Edges shall be rounded and the benching given a form and finish which facilitates smooth flow, non-entrapment of debris, and easy access with cleaning rods.

Steps and Ladders

Permanent steps and ladders are not to be used. This policy is to discourage entry to the confined space.

Manhole Lids and Covers

Manhole lids and covers shall be as detailed on Drawings SEW – 1308 and CM – 004 in NZS 4404. The use of precast spacer rings shall be detailed to allow for the slope of the road, and the need to provide for the proper construction of basecourse and surfacing construction, taking into account the need to apply both a first and second coat seal in the case of a chip sealed surface.

Aluminium covers are not permitted.

Manholes in Soft Ground and High Water Tables

Where a manhole is to be constructed in soft ground the foundations will require specific investigation and design. Options for foundation strengthening can include undercutting the surrounding area down to stable ground and backfilled with suitable compacted hard fill to provide an adequate foundation bearing capacity. Alternatively, the manhole could be founded on hard fill/reinforced concrete base. The dimensions of this base will require specific design, (refer Section Four, Schedule B) but will not be less than 150mm thick, and twice the area of the manhole.

Where manholes are to be constructed in areas of high water tables and there is a possibility of flotation, specific design shall be undertaken to ensure the manhole is stable under all conditions.

Pipe Main Connections to Manholes

On all rigid pipes (i.e. concrete or earthenware) entering and leaving manholes, a flexible joint must be provided as detailed in Drawing SEW – 1302.

Pipe junctions in manholes shall be aligned to ensure streamlined flows through the manhole, unless specifically approved otherwise by Council.

Drawing SEW – 1304 gives guidelines on typical entry/exit arrangements.

Drop Connections for Service lines

Refer Drawings SEW – 1303, and SEW 1306.

Manhole Requirements for Pipe Inter-Connections

Manholes are required at all public drain pipe junctions.

Clauses 5.3.8.5: Maintenance Shafts and 5.3.8.6: Terminal Maintenance Shafts

The maximum depth of any Maintenance Shaft (MS) or Terminal Maintenance Shaft (TMS) shall be 2.0 m. Council will not accept the connection of reticulation sewers and property connections directly into the riser shaft of a MS or TMS.

Clause 5.3.10: Connections

In cases where the reticulation sewer is deeper than 1.5m and the required property connection level is such that the vertical drop from the required connection level to the sewer is greater than 1.2m, then a vertical riser (jump-up) shall be constructed as shown on Drawing SEW-1106 (Vertical riser with single or double connections). Where the reticulation sewer is located in private property, the riser pipe and IO shall be located above the reticulation sewer as shown on SEW-1106 and shall extend to the FSL. The buried interface method is not permitted by Council unless otherwise specifically approved for the development.

Clause 5.3.11: Pumping stations and pressure mains

Refer to Section 6.2 below.

New Section: Alternative Systems

When considering the use of alternative wastewater collection and disposal systems, the designer will need to evaluate and report on the proposal in sufficient detail to allow Council to consider the proposal.

An evaluation of the site on which the system is to be constructed needs to provide sufficient information to determine if the site can support an onsite wastewater treatment and disposal system, what system design concept to use, and what design parameters to follow.

The components of a soil/site evaluation shall include:

- Topography and landscape position
- Soil characteristics: soil texture, structure, clay mineralogy and organic soils
- Soil wetness conditions in all seasons

- Soil depth and permeability
- Seasonal changes in groundwater level
- Restrictive horizons
- Available space (the area of suitable soil, the required setbacks, other site layout factors relevant to the development).

The components of the system design shall include the:

- Design wastewater flow and characteristics
- Type of pre-treatment
- Type of nitrification field
- Type of distribution system
- The location and layout of the proposed system
- The conditions for any site modification

For community based systems a compliance certificate will be required once the system is properly installed. This shall document: system type, system performance, operation and maintenance requirements, as built drawings, operating manuals, and system monitoring and reporting requirements.

Clause 5.5 Construction

In general, the design principles outlined in Clause 4.5 of Section 4 of NZS 4404 are to be followed. The following text provides additional comments and some specific changes that will take precedent over Section 4 in NZS 4404.

Cover to Pipelines

The cover provided to pipeline systems shall be in accordance with the specifications listed above, the manufacturers' published recommendations, and will need to take into account the following:

- Imposed loads during construction of the pipeline or reconstruction of the road or other infrastructure assets above the pipeline (including possible reshaping of the road profile)
- Imposed loads during the lifetime of the pipeline system from backfill, expected traffic, and any surface structures

If the required cover cannot be provided for technical reasons, then other means of protecting the pipeline such as spreading the imposed load should be implemented.

Pipe Strength, Bedding, Surround and Backfilling

In general, with good ground conditions, bedding and other trench details shall be as shown in CM – 001 to CM – 003, or SEW – 1200 to 1202. In poor ground conditions, potentially unstable ground, or where extreme loadings will be encountered; pipe strength and bedding shall be specifically designed and certified, and as shown on Drawings SEW 1203 to 1205.

Other additions to these drawings are:

- Drawing CM – 002 : Note 7 should also include the use of geotextile separation between granular trench fill (e.g. road basecourse) and the underlying pipe embedment if required to prevent migration of fines

Rigid Pipes up to 525mm diameter (Reinforced Concrete)

Pipe strength and bedding shall be selected for suitability under the design loading conditions. The type of bedding and class of pipe adopted shall be in accordance with *NZS/AS 3725:2007– Design for Installation of Buried Concrete Pipes*, and the appropriate pipe material standard (e.g. *AS/NZS 4058:2007 Precast Concrete Pipes (pressure and non-pressure)*).

Pipe bedding and backfilling shall be carried out in accordance with WSA Drawing SEW 1201 and SEW-1202 Types 1 & 2, and AS/NZS 3725:2007 - Design for Installation of Buried Concrete Pipes. The selected fill (free of organic materials, lumps larger than 75mm, and stones larger than 40mm) shall be placed in 150mm layers and compacted to a density of not less than 95% of Maximum Dry Density as determined by NZS 4402 : 1986 Test 4.1.2 – Methods of Testing Soils for Civil Engineering purposes. The compaction shall be completed using a hand operated vibrating compactor with a total static weight not exceeding 0.5 tonne.

Rigid Pipes greater than 600mm diameter (Reinforced Concrete)

As per rigid pipes up to 525mm diameter except backfilling pipe surround shall be carried out in accordance with WSA Drawing SEW-1202 Type 4. The pipe bedding material shall comply with *AS/NZS 3725:2007 - Design for Installation of Buried Concrete Pipes* and a 150mm diameter subsoil pipe shall be laid for the first 30m upstream of every manhole (refer Drawing SEW – 1207).

All Other Pipes

Pipe strength and bedding shall be selected for suitability under the design loading conditions. The type of bedding and class of pipe adopted shall be in accordance with *AS/NZS 2566.1 – Buried Flexible Pipelines, Part 1 - Structural Design and AS/NZS 2566.2 – Buried Flexible Pipelines, Part 2 - Installation*.

Pipe bedding and backfilling shall be carried out in accordance with WSA Drawing SEW 1201 and SEW 1202 Types 3 & 4. Following placement of the pipe, the granular bedding material shall be placed in layers not exceeding 150 mm and shall be carefully tamped with hand or mechanical tampers, with particular attention to compacting under the pipe haunches. The material shall not be dropped from a height of greater than 600mm. The granular fill shall be compacted to a density of not less than 95% of the Maximum Dry Density as determined by Test 4.1.2 of NZS 4402: 1986 – Methods of Testing Soils for Civil Engineering purposes.

Pipes on Steep Grades (greater than 1 in 10)

If the pipeline gradient is steep (i.e. greater than 1 in 10), and/or ground conditions are poor, sufficient cement shall be added to the granular bedding material to provide a weak concrete with a strength of not less than 7 MPa. The depth of bedding shall be as shown in WSA Drawing SEW 1201 and SEW-1202, and shall be cleanly broken at the pipe joints with a 25mm gap formed with expanded polystyrene to maintain flexibility. Where the pipeline gradient exceeds 1 in 10 anti-scour blocks (refer Drawing SEW – 1206) shall be constructed at the spacing's shown in Table E5, or alternatively, metal cut off plates made specifically as anti-scour blocks may be used.

Table E5 Spacing of Anti Scour Blocks

Grade	Spacing (m)
Steeper than 1 in 5	5
1 in 5 to 1 in 10	10

Construction and Backfilling in Road Reserve

The designer and contractor will need to address compatibility between the often flexible pavement design and the more rigid stormwater construction works, in particular the works associated with manholes, service lids etc, in order to avoid cracks or differential movement. The use of basecourse overlays above lids, in associated with standard risers is one means of compliance.

Acceptance and Testing of Wastewater System

Acceptance will be on the basis of the quality of materials and the general standard of construction. Inspection during construction shall be as set out below.

The pressure testing of sealed wastewater pipelines will be required, including pipelines that are being designed to operate in a surcharge condition. Testing will be to ground level or 50% above the hydraulic grade line head whichever is the greater. Pressure testing will be for leaks, with the acceptance requirement being that the pipeline must pass one of the three drainage leakage tests described in Clauses 8.1 to 8.3 of Section E1/VM1 of the Compliance Document for *New Zealand Building Code*. Low pressure air testing is the preferred test. Pipeline inspection and recording by CCTV is required for all pipelines over 225mm diameter.

Inspection during Construction

To ensure that the stormwater drainage works are constructed to the required standards, inspection by the developer's agent during construction shall cover at least the following details:

- Qualifications and experience of the staff constructing the works
- pipe sizes, pipe levels and gradient. The designer will need to specify the tolerances required for construction of all stormwater system components, in particular the

tolerances required for pipeline line and level. The design grades around the Heretaunga Plains in particular can be relatively flat. Achieving specified construction tolerances is extremely important

- quality, dimensions and reinforcement of all materials supplied, unless these are supplied by a manufacturer accredited to ISO 9002
- trench depth and width, quality of trench backfill material, and compaction data
- materials and workmanship in joints between pipes, manhole risers, etc
- sizes, construction materials and distances of anti scour blocks
- manhole benching and other details.
- CCTV inspection outcomes and defect reports.

Inspection on site shall be done by a suitably qualified person with a good knowledge of drainage theory and construction practice, who shall have reasonable liaison with and instruction from the design engineer for the works being inspected. The inspector shall not have any financial affiliation with the contractor carrying out the work. The written records and certification of these inspections shall be included in the Completion Report, as specified in Part 1 of NZS 4404.

Specific Design Requirements for Pumping and Pressure Mains

If the scope of the proposed development is sufficiently large and/or complex to justify inclusion of pumping and pumping stations, then reference should be made to WSA – 04-Sewerage Pumping Station Code of Australia, along with the following amendments and additions to WSA – 04. The Clause numbers in italics below refer to WSA - 04:

Section 2.1 Concept Design Plan – Under 'Maintainability' the last bullet point shall be modified to read "Utilise standard components that are readily available within the Hastings/Napier area and which are interchangeable where possible".

Section 3.4.3 Emergency Structures – Storage volumes shall be a minimum of six hours of ADWF. It should be noted that emergency relief discharge from the pumping station is not permissible.

Section 3.5.4.3 Total Head losses – The energy losses due to friction shall be calculated by a suitably qualified person from the Colebrook-White equation only. The roughness value 'k' used shall be 1.5mm for selecting the pump, but a sensitivity check with a k=0.1mm shall be undertaken to ensure the selected pump does not run off the end of its curve.

Section 4.2.3 Pump Selection – The standard pumps shall be guiderail mounted Flygt pumps with either a C or N impellor, or Tsurumi pumps with a BZ channel impellor. Grinder pumps from the above two manufacturers may be acceptable where the duty flow is < 5 L/s. Approval from Council is required for using grinder pumps.

With reference to (ii), the minimum sphere clearance (through let) shall be 75mm.

With reference to (vi) and Note 4, the overall pump efficiency at the duty point for channel type impellors should be within 10% of the best efficiency point (BEP), with the BEP not

less than 60%. Should the overall efficiency of the duty point be less than 54%, the designer shall provide details demonstrating the basis for the selection and showing why a pump of higher efficiency cannot be used.

Section 4.3 Power System – Where WSA 04 is at variance to Council's pumping station electrical and control specification, the Council specification shall have precedence. This specification is available from Council's Engineering Division.

Section 4.3.5.1 Design – Cabinets shall be constructed from marine grade aluminium alloy, stainless steel or powder coated steel sheet to a colour agreed with Council.

Section 4.3.5.4 Lighting - Incandescent lighting shall be used instead of fluorescent.

Section 4.4 Control and Telemetry System - The requirements of the Council Scada System Design Specification and Recommendations shall take precedence over any conflicting requirements in section 4.4.

Section 4.4.6 Operating Levels and Default Settings – With reference to (c) Cut-in and cut-out levels the maximum number of starts per pump per hour is 12.

Section 4.5.2.4 Soil Investigation – Replace the reference to NATA to read IANZ. Refer also to Section Four, Schedule B of this document.

Section 4.5.2.5 Control Levels – Replace Table 4.4 with the following Table E5.

Table E5: Typical Control Levels

Parameter	Description
Low level alarm	Set at 50mm above the snort level of the pumps
Duty cut-out level	The cut-in/cut-out volume height determines the cut-out level. The cut-out level shall be 100mm above the manufacturer's specified minimum submergence level
Standby cut-out level	Set at 100mm above the duty cut-out level
Duty cut-in level	Set at 300mm below the incoming sewer invert level
Standby cut-in level	Set at 150mm below the incoming sewer invert level
High level alarm	Set at 100mm below the incoming sewer invert level
High level alarm	Set at the higher of the soffit level of the upstream end of the pipe connecting the inlet maintenance hole with the wet well, or the invert of the upstream end of the diversion pipe from the inlet maintenance hole to the emergency storage chamber
Inflow emergency alarm	Set at the obvert to the outlet to the wet well in the collecting

	chamber

Section 4.5.5.3 Emergency Relief Structure – No emergency relief discharge to the environment is permitted.

Section 4.6.1.3 System Curves – Only the Colebrook-White equation is acceptable for determining pipe work friction losses. The roughness value (k) used for selecting the pump duty point shall be based on a k=1.5mm, a sensitivity check with a k=0.1mm shall be undertaken to ensure the selected pump does not run off the end of its curve.

Section 4.6.4.7 Surge and Fatigue Control – Variable speed drives (VSDs) are also acceptable to minimise the development of a transient wave by controlling the acceleration and deceleration of the pump. Programming of the VSD controller shall be undertaken by a suitably experienced person familiar with the ramping requirements.

Section 4.6.4.8.1 Pipe and Fittings within the Pumping Station – Suitable pipe work for use in the wet well and valve chamber are in order of preference:

- ABS (AS/NZS 3518:2004)
- Grade 316 or 316L Schedule 10 stainless steel (to ASTM-A312 specification)
- Ductile Iron (PN 20 classification with internal and external coatings – refer AS/NZS 2280)

Bends shall be standard radius bends.

All valves and fittings shall be ductile iron with thermal bonded polymeric coatings to AS/NZS 4158.

Gate valves shall be compliant with AS2638.2.

All connections shall be via bolted flanges. Flanges shall be a minimum of PN16 as specified in AS 4087. Bolts shall be Grade 316 SS.

Section 4.6.4.8.2 Pressure Main Selection – Further to the requirements of this section, the acceptable materials for rising mains are:

- PE 80B and PE 100 (minimum PN 8)
- PVC-U (minimum PN 9)
- PVC-M (minimum PN 12)
- Reinforced Concrete

Section 4.8.1.3 General Lighting and Power – Further to paragraph two, elevated lighting shall be provided over the wet well to provide illumination of the wet well opening and internals. Lighting units shall be fitted with vandal protection guards.

Low Pressure Sewer Systems

Council will consider the use of low pressure sewer (LPS) systems to join with the Council reticulated network where the cumulative effects of onsite sewage disposal on public health and/or the environment are deemed by Council to be significant, or where risk issues such as infiltration through the use of conventional gravity is high

The use of LPS systems shall be subject to specific site specific Council approval.

For Council to consider approval of LPS systems, the designer will be required to demonstrate the need for the LPS system in terms of at least one of the following criteria:

- Topographical constraints:
  - (i) Steep catchment that makes the installation of conventional gravity sewer systems very difficult

  Presence of watercourse or open stormwater channels within the development area that make the use of onsite disposal impractical

- Difficult ground conditions such as high groundwater table, widespread hard rock within 1.0m of the natural ground surface.
- Density of development not likely to change by greater than 20%

In addition to the above, the development or scheme proposal shall be for a minimum of 50 lots and shall be for the servicing of the full scheme area using LPS systems

Council have adopted the WSA-07 Pressure Sewer Code of Australia as the engineering code of practice for LPS systems.

For grinder pump LPS systems Council will be responsible to the upstream side of the boundary kit. Responsibility for installation and maintenance of the system upstream of this point is the responsibility of the property owner(s).

For LPS systems with a pre-treatment stage, Council will accept responsibility for the maintenance of the pre-treatment unit and the pump. The installation shall be the responsibility of the developer and shall include full responsibility for managing and meeting the costs of a five year operational support agreement with the system manufacturer/constructor. After five years of operation in which the system is demonstrated to be performing satisfactorily, Council will take over the maintenance of the system.

Schedule F – Altered Requirements to Section 6 NZS 4404 Water Supply

The Hastings District Council has adopted Section 6 of NZS 4404 with the following additions and/or alterations to be used in conjunction with NZS 4404.

Drawings

NZS 4404 includes Standard Drawings in Appendix A. Council has opted in this document to make reference back to the drawings produced for WSA 03, and has amended these drawings for inclusion in this document. Within the following text specific reference is made where appropriate to the attached Drawings, referenced as *WAT - *****. Document users are also encouraged to be familiar with and where appropriate utilise the Drawings in Appendix A in NZS 4404.

Clause 6.1 Scope

This document provides the engineering standards for the design and construction of drinking water supply systems, which come under the Hastings District Council's (Council) jurisdiction and / or ownership. This covers all new residential subdivision, industrial subdivision, land development and infill projects that are to be presented to Council for consent.

The objective of the water supply systems is to distribute water for consumption and fire fighting which meets the appropriate standards for users, in a manner that is fit for purpose over the expected life of the asset.

This document and the text in NZS 4404 are based on the WSA 03 code. This code has been developed by the Water Services Association of Australia (WSAA) and covers the planning, design and construction of water systems. It is presented in "performance based" terms together with "deemed-to-comply" solutions. The text of the WSA 03 code provides a mixture of mandatory and informative statements. Mandatory statements are in plain text, with informative text italicised. Informative text is there to provide context and enable better understanding of the mandatory requirements.

The WSA 03 code is available for purchase from the WSAA website **www.wsaa.asn.au**. A hardcopy of the code is available for viewing at the HDC engineering office, but due to copyright requirements, no copies can be made of pages from this office document.

Design Tolerance

All levels shall be referenced to the Hawke's Bay Datum (MSL = +10m). In terms of horizontal alignment the reference shall be to the Hawke's Bay 2000 Datum.

Future system expansion

Designers are encouraged to discuss the potential of future development expectations with Council staff at an early stage in the development cycle.

Water mains shall be planned with sufficient capacity to cater for all existing, predicted and provided for (zoned) development within the area to be served. The designer shall make allowance for operative and proposed District Plan land use zonings and possible rates of development.

The water demand allowance in the design for large tracts of vacant land may be determined on the basis of either:

(a) population targets established by or agreed with the Council; and

(b) the area to be serviced; and

(c) the number of planned individual allotments or dwellings (whichever is the greater)

Adjustments may be required to cater for the known performance (demand based flows) of the existing parts of the water system.

Future demands are estimated on the basis of;

(i) growth forecasts from the Council;

(ii) the recorded rate of development in recent years;

(iii) operative and proposed town planning zones in particular the number of future allotments and / or dwellings provided for as 'permitted' or 'controlled' activities.

Territorial Authority

Designers are encouraged to discuss with Council the ability of existing or future water supply infrastructure to service a proposed development at an early stage in the development cycle. The designer and Council staff can then together confirm a concept plan for a proposed development, which can be used to guide future design and consent activities.

When considering internal fire fighting designs for buildings (e.g. sprinklers) the designer should confirm with Council the minimum pressure to be used for design purposes, and not just rely on the measured pressure fluctuations on adjoining mains.

The designer should also confirm with Council the minimum pipe sizes required in the design to ensure that consideration is given to future system pressure reductions and the need to provide acceptable levels of service.

Clause 6.3.5.2: Network Analysis

The results of the network analysis shall be submitted to the Council for review with the detailed design documentation and drawings. The correct application of the results of the network analysis will be included as a Condition of Consent when appropriate.

The designer will need to nominate which suitably qualified professional is going to undertake the network analysis, prior to the work being undertaken, and prior to any base

data for the analysis being supplied by Council. The planned demand period shall encompass at least a 25 year growth model.

Clause 6.3.5.3: Peak Flows

Generally the Hastings District experiences much greater demand for water over the summer months than over the winter. The peak day or hourly demands shall be calculated using typical summer peak day or hour demand, with the hour demand rates shown in Table F1 below. Residential demand shall be determined by multiplying the relevant peak hour demand per property or unit and the number of properties serviced.

In existing residential areas, the number of properties serviced shall be determined by either:

(a) a field house count: or

(b) interrogation of census data: or

(c) interrogation of GIS system data: or

(d) a combination of (a), (b) and (c).

For unsubdivided areas zoned for future residential development in the District Plan (operative and proposed whichever greater) as 'permitted' or 'controlled' and where discretions have not been restricted for activity identified as restricted discretionary an allowance shall be made for future potential demand in the area. This allowance shall be based upon the appropriate peak hour demand and advice from Council with regard to the number and type of properties which may be permitted. Care must be taken to avoid overly conservative design.

Attention is brought to the Council bylaws with respect to the specification of domestic and extraordinary water use and also to the residential (less than 1500m^2 and greater than 1500m^2), rural residential and rural / plains designations. Rural residential in particular will be affected as Council supply will be restricted over a 24 hour period to a set upper limit (e.g. 1500 litres over a 24 hour period). The actual demand allowance used for design purposes must be approved by Council, preferably at an early stage in the design cycle.

Table F1: Typical Peak Hour Demand Rates

Location	*Residential (<1500 m^2)*	*Residential (>1500 m^2)*	*Rural Residential*	*Plains/Rural*	*Other*
Hastings & Havelock North					**Fire Demand** To comply with SNZ PAS 4509:2008 New Zealand Fire Service Fire Fighting Water Supplies Code of Practice
Haumoana & Te Awanga					
Clive					
Whakatu					
Omahu					
Waimarama					
Waipatu					
Waipatiki					
Paki Paki					

Clause 6.3.5.6: Minimum Water Demand

Replace (a) with a daily consumption of 400L/p/day

Clause 6.3.5.8: Pressure Zones

Council currently operates three pressure zones:

- Hastings 1
- Tauroa
- Havelock North High Level Zone

Information about these zones can be obtained from Council.

Clause 6.3.6: Water Quality

Where a development includes the use of new water e.g. bores, spring etc, and / or surface storage, the designer will need to confirm that all requirements of the Resource Management Act and the Drinking Water Standards for New Zealand (DWSfNZ), can be met when locating, extracting and using new water supplies, before these are introduced into a new or existing water supply system, and during future use. The designer will also be expected to have considered "whole of life costs" and environmental sustainability when selecting the water source.

Council's first preference for a new water supply is a secure bore hole however other options may be considered.

The Hastings water supply (which supplies both Hastings and Havelock North urban areas) does not have any disinfection residual. It is therefore extremely vulnerable to microbiological contamination by any debris, soil or contaminated water which may be left within the pipe or any fittings following construction. Design provision for thorough flushing, cleaning and disinfection, and backflow prevention is absolutely critical for preventing waterborne disease in the Hastings community.

With regard to stand alone water supply systems the design shall make provision for the sampling requirements of the Drinking Water Standards for New Zealand (DWSfNZ), and that the water supply is registered and approved by the Ministry of Health and has an approved Public Health Risk Management Plan which is also to Council's satisfaction.

Clause 6.3.8.10Crossings of waterways or Reserves

The designer will need to ensure all statutory requirements are met; in particular consent is obtained from the Regional Authority as required.

Clause 6.3.8.11: Location Marking of Valves and Hydrants

Refer to Drawing WAT – 1300.

Clause 6.3.9: Clearances

In Table 6.4 in NZS 4404, the minimum horizontal clearance between DN < 200 mains and existing water mains < DN 375 shall be increased to 600mm, as shall the separation to stormwater mains. Water mains are to be located above sewer mains or laterals.

Clause 6.3.10.3: Pipe Class

<u>Supply Mains and Rider Mains</u>

The following pipes may be used for principal mains providing they comply with the relevant New Zealand Standard.

PVC-M

Concrete lined steel	NZS 4442
Polyethylene	NZS 7601 or NZS 7602 (medium or high density only)
Ductile iron	AS 2280

Gibault joints shall be used whenever a flexible or dismountable joint is required. Steel pipes are normally welded. The pressure rating used shall be one class above the maximum anticipated service pressure, but not less than class D (120m water head).

Joints for PVC-M pipes shall be spigot and socket rubber ring type (Z joint). Solvent cement joints shall not be used.

Steel pipe may use either flanges to AS2129 Table E, drilled to Table D, (Blakeborough pattern) or gibault joints, or be welded by a certified welder.

Polythene pipes as per the manufacturer's recommendations.

Pipe fittings shall be manufactured from high quality grey iron in accordance with AS/NZS 2280 and 2544

Fittings for PVC-M pipes shall be "Milnes" or equivalent approved manufacture. CHECK for local soil conditions…..e.g. DR Brass.

Clause 6.3.10.3.2: Minimum Pipe Class

The minimum pressure class for pipelines shall be PN12.

Clause 6.3.10.3.4: Pumped Mains

Also include:

(c) Consideration of power tariff structures and power factor correction when sizing and selecting suitable pumps. Council is seeking to ensure that the system design is sustainable and provides the "least whole of life cost".

Clause 6.3.10.4: Pipe Material

Refer above under 6.3.7.2.

Service Pressure

The service pressures shown below in Table F2 shall be used. These service pressure limits shall be provided at the property boundary in all cases. If the elevation of the building platform means that the pressures in Table F2 cannot be met at the building platform through a normal connection, then the designer should consider how the system within the property needs to be modified to achieve these pressure limits at the building platform. This will need to be addressed at the Building Consent stage.

Table F2: Service Pressure Limits

Service Pressure Limit	Application	
	Domestic	Industrial/Commercial
Desirable Maximum	800 kPa (80 m)	800 kPa (80 m)
Desirable Minimum	350 kPa (35 m)	350 kPa (35 m)

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Layout of water mains

In all cases water mains must be located within public open space, unless Council approves otherwise, and in accordance with the general layout provisions shown on Drawings WAT-1100 and 1101.

In selecting the water main route the designer shall evaluate its impact on the environment for both construction and operational phases consistent with national, regional, district and local policies, plans, instructions and guidelines.

In some instances Council may specify that an environmental impact assessment should be completed during the investigations stage. Wherever practicable environmentally and culturally significant areas shall be avoided.

Some typical areas which should be avoided are:

1. Waterways, flood ways and aquifer recharge areas e.g. Heretaunga plains unconfined aquifer

Culturally important sites to Tangata Whenua and others
Historic places as recorded on the historic places register
Areas of recognised natural character e.g. coastline or visible surface geography
Areas of significant indigenous vegetation, areas of significant habitats of indigenous fauna and ecologically significant wetlands
Landfill sites and contaminated land
Areas know for aggressive ground conditions
Known hazard zones

Where not practicable to avoid such environmentally sensitive areas consultation and agreement with the effected parties will be required.

The following specific environmental protection issues shall be considered during route selection and discussions with owners, and other affected parties.

(i) Use of alternative excavation technology such as: tunnelling, boring directional drilling and micro-tunnelling.

(ii) Environmental impacts of dewatering

(iii) Environmental impacts of rock excavation

(iv) Type and size of construction equipment

(v) Steep slopes i.e. generally greater than 15% grade

(vi) Unstable areas subject to rock falls, mine subsidence areas, slips and flows

(vii) Local deviations around significant flora, wetland or vegetation

(viii) Local deviations around or protection of Maori important sites

(ix) Minimising the area of disturbance

(x) Time of construction

(xi) Minimising transport of soil borne disease

(xii) Post construction rehabilitation needs.

The layout of a typical water supply system in an urban environment should align to the layouts shown in Drawing WAT – 1101.

Clause 6.3.12: Structural Design

Clause 6.3.12.6: Geotechnical Investigations

Refer also to Drawing WAT-1200.

Clause 6.3.12.10: Embedment

In all cases, the design and construction of trenched pipe systems must make appropriate allowance for all health and safety obligations.

Clause 6.3.12.10.1: Minimum Pipe Cover

The minimum cover to pipelines shall be 600mm in berm and 800mm in road to the top of fittings such as valves and hydrants, min 1m for trunk mains

Clause 6.3.12.10.2: Minimum Trench Width

Refer to Drawings WAT-1201, 1202, 1203, 1204

Clause 6.3.12.11: Pipeline Restraint

Refer to Drawings WAT-1205, 1207, 1208. Council prefers the use of anchors blocks over self restrained pipes. Council will not allow the use of timber and recycled plastic blocks as detailed on Drawing WAT-1206.

Bulkheads

Refer to Drawings WAT-1209, 1210

Clause 6.3.13: Reservoirs and Pumping Stations

Refer to WSA 03.

Prevention of Back Siphonage

All connections to Council's water services shall include a double check backflow device as a minimum. Council prefers the use of the *Acuflo 900S* manifold.

Clause 6.3:14 Valves

General Comments

Valves

All valves shall have a protective coating on all parts subject to corrosion.

The valves on the main shall be sluice valves Class 1 to BS 5163: 1986 16 bar rating, non-rising 2 spindles and anti-clockwise closing. They shall be a "Grade A" construction and suitable for gland packing under mains pressure. Flanges to AS2129 Table E, drilled to Table D (Blakeborough pattern) are preferred.

Valves to individual properties are to be *Acuflo900S* manifolds or other approved equivalent. Hand wheels and retaining nuts shall be of corrosion resistant material.

Valve packing shall Teflon or similar approved.

Valve and Hydrant Boxes

Surface boxes shall be fitted over fire hydrants, valves and other fittings which allow access for operation and maintenance.

Boxes and surrounds shall be constructed so that no load can be transferred to any pipe or fitting. They shall not move under loads. Valve and hydrant boxes shall be thoroughly bedded with foundations prepared that assume saturated low strength soil conditions. Cast iron hydrant boxes are preferred. These must be able to withstand all intended loads, including traffic loading if required.

The lids of valve boxes shall be painted light blue in residential and commercial/industrial areas, and can be black within approved CBD areas. A reference blue mark shall be painted on a 25mm deep saw cut in the road kerb.

Refer also to Drawings WAT – 1101, 1102, 1103, 1104, 1105-1, 1106, 1107 (new fire connection detail), 1300, 1301, 1302, 1303, 1304, 1308, 1309, 1406, and 1407.

Stop Valves/General

Stop vales shall be located where possible in the berm and in locations where these cannot become obstructed (e.g. parking areas).

Clause 6.3.14.3.2: Branch Mains

These will preferably be flanged directly to the adjoining Mains Tee.

Clause 6.3.15 Hydrants

General Comments

Hydrants shall be to NZS/BS 750:1984 with flanges to AS2129 Table E drilled, to Table D (Blakeborough pattern). The tall pattern shall be used although short or medium may be allowed, in specific circumstances with the approval of Council.

The following modifications shall be specified:

- Hydrants shall close by turning the spindle clockwise
- All steel nuts and bolts in the construction of the hydrant shall be hot dip galvanised with bolts of the square headed type to facilitate nut removal in place
- The hydrant shall be coated internally and externally with an approved coating such as “Rilsan”
- The washer shall be nytrone rubber
- Frost plug drains shall not be fitted or alternatively the plug shall not be free draining. If the hydrant is supplied with a frost plug drain it shall be replaced by a plug without a hole.

A hydrant riser shall be used where necessary to ensure the spindle top is between 150 and 250mm below finished surface level.

Hydrant tees shall be flanged for connection to other flanged fittings. Otherwise flexible joints (gibault) are permitted.

The location marking of fire hydrants shall be to NZS 4501, with raised blue reflector in the centre of the street in all cases.

Spacing of fire hydrants on mains shall be in accordance with SNZ PAS 4509:2008

Refer also to Drawings WAT 1300, 1301, 1302, 1305, 1306, and 1409.

Clause 6.3.16: Connections

General Comments

Connections from the new to an existing water supply system shall only be made by a contractor approved by Council, and when all testing and disinfection of the new supply service has been completed to Council's satisfaction, as described in NZS 4404 Appendix C. Refer also to Drawings WAT 1105-1 and 1105-2, and when all conditions of consent have been met.

Property connections shall be made with reference to Drawings WAT 1106, 1107, 1108, 1109 (if required) and 1313-2.

Clause 6.3.17: Termination Points

Council requires all distribution mains to be looped, with no dead ends.

System Review

Once the designer has completed the system review, a written report with the appropriate Producer Statement is to be submitted to Council with the design documentation.

Clause 6.5: Construction

To ensure that the water supply works are constructed to the required standards, inspection by the developer's agent during construction shall cover at least the following details:

- Qualifications of the staff constructing the works
- pipe sizes and locations (lines and level)
- quality, dimensions and reinforcement of all materials supplied, unless these are supplied by a manufacturer accredited to ISO 9002
- trench depth and width
- quality of trench backfill material, and compaction of trench fill material
- quality, dimensions and photographic records of all valve, hydrant, pipeline and service connections
- certified test results from all pressure testing and disinfection works

Inspection on site shall be done by a suitably qualified person with a good knowledge of water supply theory and construction practice, who shall have reasonable liaison with and

instruction from the design engineer for the works being inspected. The inspector shall not have any financial affiliation with the contractor carrying out the work.

The written records and certification of these inspections shall be included in the Completion Report, as specified in Section 1 of NZS 4404.

Clause 6.5.1: Excavation

Application will need to be made to Council's Engineering Division for approval to undertake any road openings on existing Council roads, before works are undertaken. The designer will need to ensure that contractors working on a project are aware of this requirement.

Clause 6.5.2: Embedment

Refer to Drawings WAT – 1201, 1202, 1203 and 1204

Clause 6.5.3: Backfilling and reinstatement

The backfilling and reinstatement of suitable material (refer Drawing WAT – 1201) shall be undertaken by suitably experienced contractors. The required standards for backfill material supply and compaction of fill materials shall be described in the contract specification. The objectives of the backfilling and reinstatement are:

- To prevent undue stress being imposed on the pipelines and associated infrastructure as a result of settlement or lack of foundation support
- Control the movement of water into and along the backfill material
- To control long-term settlement in all materials used to backfill the trench. The specified compaction standards must take into account variations in backfill materials (e.g. granular or cohesive fill) and must ensure that the contractor understands what is required and how conformance will be measured. Useful references in this regard are the New Zealand Transport Agency Specifications F/1 and B/2
- For backfill and reinstatement projects within a road carriageway, reinstatement of the road pavement must at least match the adjoining road pavement, and must deliver a smooth in-service transition across and along the trench line for vehicles using the road. The required reference for pavement construction is New Zealand Transport Agency Specification B/2, with materials being specified from the M/3 and M/4 specifications (refer Schedule C for more information)

Clause 6.5.3.3: Detector Tape

This is not required.

Appendix A – Producer Statements

Refer to PS1, PS2, PS3 and PS4 standard forms provided by IPENZ Engineering Practice Support.

Appendix B - Calculation Example: Estimation of Runoff Coefficient

When a designer is using the "soil profile method" to estimate a runoff coefficient Table D1 provides average runoff coefficient, C for catchments where impervious surfaces dominate the runoff coefficients. The runoff coefficients are relatively high because either the percentage imperviousness is high (> 50%), or the local soils are not free draining, or both.

If catchments are located in the areas where soils are suspected to be free draining, then the pervious surface part of the average runoff coefficient may be estimated using the method below.

The runoff coefficient may be estimated by one of the following methods:

- Designers providing a soil profile and using the data to determine the pervious surface part of the average runoff coefficient from Table AppB1 below. They can then combine this pervious C with an impervious C from Table D1, using the formula from the runoff coefficient section of New Zealand Building Code, Approved Document E1 - Surface Water.
- Council staff may provide the pervious surface part of the average runoff coefficient, if local soil profile data is available on Council records. Then proceeding as per the first bullet point.
- Using Table D1

The soil maps that are available from Council, and Table AppB1 are sourced from the document *Soils and their Infiltration Rates and Permeabilities (Landcare Research, 2006)*. Unfortunately the soil sampling for this investigation was sparse and developers who wish to use the "soil profile method" must provide a site-specific soil profile from an IANZ accredited soils laboratory.

Table AppB1: Infiltration classes for Heretaunga Plains soils mapped adjacent to the Hastings Urban Area

Name	Symbol	Texture	Drainage class	Water-table depth after heavy rain	Infiltration class	Infiltration rate (mm/hr)	Runoff Coefficient, C
Omahu	1	stony gravels	Well	>120 cm	Very rapid	>288	0.15
	1a	10–15 cm sand on stony gravels			Rapid	72–288	0.15
	1b	15–30 cm sand on stony gravels			Rapid	72–288	0.15
Twyford	5	> 45 cm silt loam on sand	Well	>90 cm	Moderate (slow if compacted)	4–72 (<4 if compacted)	0.2
	5s	30–45 cm silt loam on sand					0.2
	6	>45 cm sandy loam on sand		>160 cm			0.2
	6s	30–45 cm sandy loam on sand					0.2
Karamu	13	45–60 cm silt loam or clay loam on sand	Moderately well	60–75 cm	Moderate (slow if compacted)	4–72 (<4 if compacted)	0.3
	13s	30–45 cm silt loam or clay loam on sand			Moderate	4–72	0.3
Hastings	14	>60 cm silt loam on sand	Imperfect	30–60 cm	Moderate (slow if compacted)	4–72 (<4 if compacted)	0.4
	15	30–60 cm silt loam on sand			Slow (very slow if compacted)	1–4 (<1 if compacted)	0.45
Kaiapo	19	>30 cm clay loam on silt loam	Poor	<30 cm	Slow	1–4	0.45

Note 1: Infiltration classes for Heretaunga Plains soils based on measurements made during the Heretaunga Plains soil survey (Griffiths 2001).

Worked Example

A development is planning to remove an old house and build a new house in its place on a flat 700m2 section in the Hastings suburb of Akina. The impervious areas of the new development include house/garage roof 150m2 and driveway/patio 100m2. What is the average runoff coefficient?

Calculation - The developer employs a technician from an IANZ accredited soils laboratory and the resulting auger logs show the average soil profile is >60 cm silt loam on sand. From Table APPB1 above and Table D1 the designer determined that the runoff coefficients for the pervious (gardens & lawn) surface is 0.4 and for the impervious area (roof, driveway, patio) is 0.9.

Using the formula from Table 1 of New Zealand Building Code, Approved Document E1 - Surface Water for the average runoff coefficient, C

C = [(0.4 x 450m2) + (0.9 x 250m2)] / 700m2 or C = 0.58.

Conclusion - The percentage imperviousness was not high (<50%). In this case, Council staff allowed the developer to adopt typical District values for the average runoff coefficient:

0.5 for a 5 year return period rainstorm

0.6 for a 50 year return period rainstorm

Appendix C - Calculation Example: Determining Suitability for Soakage Disposal

Soakage is NOT to be used in the following circumstances:

- for disposal of road runoff
- for disposal of runoff in areas not approved for soakage - for example Havelock North
- for disposal of runoff, where the method in this section shows that soakage is not suitable

Suitability for soakage is to be determined by a two step process:

Step 1 - Designer provide a soil profile and use the data to determine that the permeability of the sand layer and depth to the water table makes soakage suitable using Tables APPC1 & APPC2 below.

Step 2 – Then, follow the soakage design method in Section 9 of New Zealand Building Code, Approved Document E1 - Surface Water. (Note the average runoff coefficient used in the soakage calculation may be adjusted by following the method above).

Requirements for Sampling of Soil Profile

The soil maps and table are sourced from the following document, *Soils and their Infiltration Rates and Permeabilities, (Landcare Research, 2006)*. Unfortunately the soil sampling for this investigation was sparse and developers who wish to use the "suitability for soakage method" must provide a site-specific soil profile data from an IANZ accredited soils laboratory.

Table APPC1: Estimated permeability classes: Heretaunga Plains soils adjacent to Hastings Urban Area

Name	Symbol	Texture	Drainage class	Water-table depth after heavy rain	Ksat class	Ksat (mm/hr)	Suitable for Soakage
Omahu	1	Stony gravels	Well	>120 cm	Very rapid	>288	Yes if calculations approved by Council's Drainage Services Manager
	1a	10–15 cm sand on stony gravels			Very rapid (stony gravels);moderate or rapid (sands)	>288 (stony gravels); 4–288 (sands)	
	1b	15–30 cm sand on stony gravels					
Twyford	5	> 45 cm silt loam on sand	Well	>90 cm	Moderate	4–72	
	5s	30–45 cm silt loam on sand			Rapid	72–288	
	6	>45 cm sandy loam on sand		>160 cm	Moderate	4–72	
	6s	30–45 cm sandy loam on sand			Rapid	72–288	
Karamu	13	45–60 cm silt loam or clay loam on sand	Moderately well	60–75 cm	Rapid	72–288	No
	13s	30–45 cm silt loam or clay loam on sand					
Hastings	14	>60 cm silt loam on sand	Imperfect	30–60 cm	Moderate (>100 cm silt loam); Rapid (>60 cm sand).	4–72 (>100 cm silt loam.); 72–288 (>60 cm sand)	
	15	30–60 cm silt loam on sand			Moderate to slow	1–72	
Kaiapo	19	>30 cm clay loam on silt loam	Poor	<30 cm	Slow	1–4	

Note 1: Permeability classes for Heretaunga Plains soils based on measurements made during the Heretaunga Plains soil survey (Griffiths 2001).

Table APPC2: Permeability classes

Permeability class	Hydraulic conductivity (mm/hr)	
	Range	**Midpoint of range**
Very rapid	>288	150
Rapid	72–288	180
Moderate	4–72	38
Slow	1–4	2.5
Very slow	<1	0.5

Permeability classes and hydraulic conductivity rates: These classes are modified from Griffiths (1985) and are those used by Griffiths (2001).