

3. STORMWATER

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3. STORMWATER

3.A MINIMUM REQUIREMENTS

3.A.1 The land drainage system shall be capable of serving the entire natural upstream catchment for the land use likely to prevail during the economic life of the system to provide adequate protection against flooding. The design life shall not be less than 50 years.

3.A.2 All subdivisions shall be designed and constructed with a land drainage system that will provide an adequate piped connection (for the primary flow) not less than 100mm diameter to each intended building site and provide a suitable outlet to an approved means of stormwater discharge.

3.A.3 Where a land drainage system has been or is to be installed by the Council to serve the natural catchment, contributions (financial and / or works) on an area basis, determined by Council, shall be imposed as a condition of the resource consent.

3.A.4 For those areas where the Council has applied for a comprehensive discharge permit an area contribution is payable as an administration/monetary charge in respect to the discharge permit.

3.B MEANS OF COMPLIANCE

3.B.1 DESIGN STANDARD

3.B.1.1 Unless otherwise required by section 3.B.1.2 the design of the stormwater system may be in accordance with the following standards:

- i. IPENZ procedure for hydrological design of urban stormwater systems, December 1980.
- ii. Auckland Regional Council (ARC) TP10, TP108 and TP90

3.B.1.2 The stormwater system shall cope with minimum design storms with return periods or annual exceedance probability (AEP) as follows:

- i) Primary piped system in all urban areas 5 year (20% AEP),
- ii) Open channels and overland flowpath 100 year (1% AEP),
- iii) Culvert and Bridge structures on all arterial roads 100 year (1% AEP). Structures on other roads shall be on a specific design basis only.

3.B.1.3 The finished building site level shall not be less than 0.5 meters above the following Reduced Levels (L & S Datum):

- i) 3.39m in catchments draining to the Manukau Harbour, or
- ii) 2.90m in catchment draining to the Waitemata Harbour or Hauraki Gulf.

3.B.1.4 All building sites shall be constructed to have a minimum freeboard above the 100 year (1% AEP) flood level as follows:

- i) Sites adjoining natural open channel systems 1000mm,
- ii) Sites adjoining formed open channels 800mm,
- iii) Sites adjoining formed (grassed) overland flow paths 500mm,
- iv) Sites adjoining small overland flow paths fully formed in permanent materials (e.g. roads and access ways) 150mm.

3.B.1.5 The design rainfall intensity duration curves to be used within the City are as contained in drawing D2.

3.B.1.6 The primary piped system shall be designed to cater for the peak design flow, without surcharge, based on a “Colebrook - White” pipe roughness co-efficient $K_s=1.50$ for pipes up to and including 1000mm diameter and $K_s=0.60$ for larger piped systems.

C1

Floor levels will be imposed by consent notice to achieve minimum freeboards. For cases (iii) and (iv) floor levels will be imposed as minimum building levels unless specific design is undertaken in terms of section E1 of the Building Code.

3.B.2 DISCHARGE PERMITS

3.B.2.1 Subdivision within areas where Council holds comprehensive Discharge Permits, as shown on drawing D11, shall comply with the conditions of the comprehensive Discharge Permit.

3.B.2.2 The developer shall obtain Discharge Permits from the ARC Environmental Management Division for the diversion and or discharge of stormwater before the completed works will be considered for acceptance by the Council.

3.B.3 RETICULATION LAYOUT

3.B.3.1 Primary Drainage

3.B.3.1.1 The primary drainage shall consist of pipelines capable of serving the upstream catchment with a minimum internal diameter of 150mm. Pipes of 150mm diameter shall serve no more than 4 dwellings

3.B.3.1.2 The primary drainage shall be laid to a true grade and line between access manholes located at each change of direction, grade and pipe size. Manhole spacings shall not exceed 90 metres for pipe lines up to 1500mm diameter, above which spacings may extend to 150 metres. Each branch line shall join the main line at a manhole junction.

3.B.3.1.3 As far as practicable, the primary drainage shall be located:

- i. On the low side of the proposed sites having more than 1.0m cross fall,
- ii. With the manholes positioned clear of the road carriageway and property boundaries,
- iii. Within front, side and rear yard areas to maximise the building area available.

3.B.3.1.4 The pipe system shall be designed with sufficient depth not to interfere with other utility services such as power, telephone and gas and any future driveway construction, particularly for lots with potential basement development. Drainage lines within right of ways or private access shall have a minimum clearance of 300mm from all other utilities.

3.B.3.1.5 All drainage lines shall have a minimum cover from the finished ground level of 0.8m in private land and 1.2m within the road reserve (other than cesspit leads) Where this minimum cover cannot be achieved, additional protection shall be provided in accordance with drawing D1 for PVC and PE pipelines.

3.B.3.1.6 At the time of subdivision, there shall be at least 0.8m between the lowest point in the building site and the service connection invert. Where this cannot be achieved, the site shall be identified on the Land Information Register and may be identified on the title as requiring specific design for stormwater disposal.

3.B.3.2 Secondary Drainage

3.B.3.2.1 Overland flowpaths shall generally be along the road network. Where such flowpaths are required to cross private property an appropriate easement in favour of the Council shall be provided to protect the flowpaths.

3.B.4 OPEN STREAM SYSTEMS

3.B.4.1 Where natural open stream systems or formed channels are to be incorporated in the land drainage system, they shall generally be located within a drainage reserve of sufficient width to contain the full design flood flow together with the freeboard. Such reserves shall generally be a minimum of 20 metres in width.

3.B.4.2 The flow characteristics of particularly natural open stream systems shall be based on the likely long term stream condition in terms of density of vegetation and take due account of blockage under peak flood conditions.

3.B.4.3 To encourage the best use of the open stream systems the drainage reserve shall be linked with other reserve and open spaces such as school sites, to accommodate off road pedestrian and cycle access. Access points for public use and maintenance shall be provided at regular intervals along the system together with footpath and pedestrian bridges, as may be defined in the scheme plan consent.

3.B.4.4 Where natural open stream areas form part of the land drainage system they shall be cleared of all unsuitable plant growth and replanted to an appropriately approved landscape design. These works shall include protection of the low flow channel against scour and erosion of the streambed where necessary.

3.B.5 STORMWATER PONDS

3.B.5.1 Stormwater ponds shall be considered within the drainage system for flood control, water quality treatment and erosion control.

3.B.5.2 The stormwater ponds shall be designed in accordance with the following:

- i. MCC - Stormwater Ponds
- ii. ARC TP10 – Stormwater Treatment Devices: Design Guidelines Manual and
- iii. ARC TP108 – Guidelines for Stormwater Runoff Modelling in the Auckland region.

3.B.5.3 The stormwater ponds design shall consider the following outcomes.

- i. **Water Quality:** 75 % removal of total suspended solids on a long-term average of the runoff from 1/3rd of the 2 year 24 hour rainfall.
- ii. **Extended Detention Volume:** Runoff from a rainfall event of 34.5mm shall be stored and released over 24 hour period with an outlet device designed for twice the average rate of release for 24 hours. Control of peak rates of runoff may also be required.
- iii. **Flood Control:** Limiting the post development peak discharges for the 50% AEP and 10% AEP rainfall to their predevelopment peak discharge rates. Quantity control shall be achieved by designing the post development peak discharge rate of a 1% AEP rainfall at 80% of the predevelopment rate for that rainfall.
- iv. **Water Balance:** Design for wet ponds shall incorporate a volume of permanent pool for the pond to remain wet in a dry season.

- v. **Emergency Spillway:** Shall convey flows beyond the service outlet capacity of at least the 1% AEP rainfall with a minimum 300mm freeboard. N.B concrete lining is not acceptable on the spillway.

3.B.5.4 The pond physical parameters shall include the following:

- Sediment forebay capacity of 15% of the water quality volume (WQV).
- Flow velocity exiting the sediment forebay not more than 0.25m/s for flow from 10% AEP rainfall.
- Length: width ratio of 3:1 or greater.
- Permanent water depth in the pond of 1m to 2m.
- Pond side slopes not steeper than 1(V): 5(H). A planted shelf with slope not exceeding 1:15 shall be provided around the perimeter of the pond at WQV level.
- Avoid dead zones and short circuiting of the ponds.

3.B.5.5 Other Issues to consider shall include access for maintenance of critical structures, inflow pipes, pond lining, fish passage, geotechnical investigation, planting, amenity features, erosion and sediment control, pond dewatering, debris control, pond safety and signage, relationship with Catchment Management Plans and Assessment of Environmental Effects (AEE).

Timber retaining walls shall not be constructed within wet perimeter of the pond.

3.B.5.6 Design proposals for the ponds shall be supported by an Operation and Maintenance Manual with appropriate asset life cycle costs.

3.B.5.7 For the ponds to be vested to Council, the developers shall be responsible for the maintenance of the ponds for two years on the completion of the ponds.

3.B.6 PIPE SYSTEMS

3.B.6.1 Pipes

3.B.6.1.1 Drainage systems constructed of the following pipe materials will be accepted:

- i) MANARC approved SN16 solid wall PVC as on drawing MD-26 coloured grey complying with AS/NZS 1260: 2002,
- ii) MANARC approved SN16 sandwich wall PVC as on drawing MD-22 complying with AS/NZS 1260:2002,
- iii) MDPE class 80B or 80C SDR17 coloured black complying with AS/NZS 4130:2003,
- iv) Vitrified clay complying with EN295,
- v) Reinforced concrete complying with NZS3107:1978.

3.B.6.1.2 MDPE material shall be used on gradients steeper than 1:10 in accordance with drawing D13 and for thrusting purposes only. PVC shall be used:

- i. For pipes up to 150mm nominal diameter,
- ii. In residential developments, and
- iii. For depths between 0.9m and 4m

Notwithstanding the above requirements, all pipe materials, arches and box structures may be considered on a specific design basis only.

3.B.6.2 Fittings

3.B.6.2.1 All fittings and service connections shall be factory fabricated of similar material to the proposed system chosen and comply with the relevant standard and MANARC approval.

3.B.6.3 Joints

3.B.6.3.1 All joints on pipes and fittings less than 1050mm in diameter shall be factory made spigot and socket flexible type complying to the following:

- i) Vitrified Clay EN295,
- ii) PVC AS/NZS 1260,
- iii) Reinforced concrete pipes NZS3107.

See drawing D12 for additional materials allowed for thrusting purposes only.

3.B.6.3.2 Joints on reinforced concrete pipes 1050mm and greater in diameter may be “Flush Jointed” as detailed in drawing MD-8, provided no other ground water or geotechnical requirements dictate the need for fully sealed joints.

3.B.6.3.3 MDPE - shall have butt fusion joints jointing pipes of similar material, diameter and wall thickness in accordance with WIS 4-32-08:1994. Jointing shall be carried out by qualified operators to manufacturer’s recommendations.

3.B.7 MANHOLES

3.B.7.1 Location

3.B.7.1.1 Manholes shall be laid out on all drainage lines in accordance with Section 3.B.3 and at the end of all terminal lines greater than 40m in length.

3.B.7.1.2 A 150mm diameter branch line less than 40m long and with no more than four service connections may be terminated with either:

- i) A 150mm blank cap adjoining the terminating ‘London Junction’ or
- ii) A level invert connector.

3.B.7.2 Construction

3.B.7.2.1 Manholes shall be of 1050mm diameter precast concrete with factory fitted bases as detailed on drawings D5. Shallow manholes as detailed on drawing D15 may be installed to a maximum depth of 1200mm on 150mm diameter lines.

3.B.7.2.2 Outlet pipes from manholes shall have a soffit level lower than that of the lowest incoming line of 20mm plus 5mm per 10 degrees of angle change between the two lines.

3.B.7.2.3 All manholes shall be in accordance with drawing D5 and use Manarc approved covers and frames. Non rock heavy duty covers shall be required on heavy traffic carriageways.

3.B.7.2.4 Manholes with a depth exceeding 1.2m shall use Manarc approved step irons. In industrial areas and other highly corrosive environments, only stainless steel steps shall be used.

- 3.B.7.2.5** Each line connecting to a manhole shall have an approved flexible joint within 600mm of the manhole wall.
- 3.B.7.2.6** A maximum of 3 invert or 2 internal drop connections (in addition to the through line) shall be allowed into a standard 1050mm diameter manhole. A 675mm diameter concrete access chamber shall have a maximum of 3 invert connections. In other situations, specific designs that increase the manhole diameter will be required to compensate for the reduced access space.
- 3.B.7.2.7** The minimum diameter shall be 1200mm for all manholes greater than 4.5m deep.

3.B.8 BEDDING AND PROTECTION

- 3.B.8.1** All drainage lines shall be thoroughly bedded, haunched and surrounded in accordance with drawing D1 for PVC and PE piping and drawing D8 for Vitrified clay and Concrete pipelines, unless installed by horizontal drilling in accordance with drawing D12. Backfilling shall be carried out as soon as possible after pipe laying has been completed.
- 3.B.8.2** Special bedding and protection shall be considered for pipes subject to special loadings such as traffic, tree roots and buildings.
- 3.B.8.3** All drainage lines shall be designed and constructed to withstand all the likely loads they will be subject to during the life of the system. The load carrying capacity in relation to their installation conditions shall be calculated in accordance with AS/NZS 3725:1989 “Loads on buried concrete pipes” and AS/NZS 2566 “Buried Flexible Pipelines” where appropriate.
- 3.B.8.4** For drainage lines laid at grades steeper than 10% (including service connections) the bedding and surround material shall be of a low grade (5 MPa) scoria concrete. For lines exceeding 20% in grade, anchor blocks located at pipe joints, not exceeding 6m spacing, are required as shown on drawing D13.

3.B.8.5 The minimum clearance between any two crossing pipelines shall be 300mm. Clearances less than 300mm may be considered on a specific design basis.

3.B.9 SERVICE CONNECTIONS

3.B.9.1 To provide a service connection to each building a 100mm diameter line shall be extended in accordance with drawing D7 from the public drainage system to terminate at a minimum distance of 1.0 metres within each site, whether created by cross lease, unit title or subdivision.

3.B.9.2 Service connections shall be brought to within 1.0 metre of the final ground surface and be constructed in accordance with drawing D7. Where sites on which the building works have commenced or are imminent, the threaded access cap shown on drawing D7 is optional, in which case a temporary plug in the 100mm diameter socket may be installed.

3.B.9.3 All service connections from the main drainage line to the site boundary shall form part of the public system.

3.B.9.4 Service connections shall be laid true to line and grade at right angles to the main line and may be connected by a Manarc approved 'London Junction'. Where manholes are conveniently located, service connections shall be directed to the manholes.

3.B.9.5 The maximum length of all service connections shall be 6.0 metres from the main line to the site boundary.

3.B.9.6 Service connections shall not be permitted to connect directly to a main line that is deeper than 4 metres. Connections shall be provided from a new shallower branch line laid from a manhole on the deep main.

3.B.10 CONNECTION TO COUNCIL'S SYSTEM

3.B.10.1 Connections to Council's system may only be made under permit by approved licensed contractors (ALCs). Refer clause 1.B.6.7 and drawing D16.

3.B.11 UTILITY SURFACE STRUCTURES

3.B.11.1 Where it is possible surface equipment and structures for network utility services i.e. Telecom pedestal cabinets should not be located in stormwater management areas. They may be located in road reserves and shall meet the requirements of Chapter 7 of Council's Operative District Plan.

3.B.11.2 Surface equipment and structures shall not be placed adjacent to or within an overland path or a maintenance access-way.

3.B.12 TESTING AND ACCEPTANCE

3.B.12.1 Prior to acceptance of the completed stormwater system, the developer's representative shall have supplied the Manukau Water or Council's Compliance Engineer with "As Built" drawings of the work, including any overland flowpaths and open channel systems. The Engineer's final certificate will be required prior to the release of the 224 certificate or prior to commencement of use.

3.B.12.2 The test for stormwater drainage shall consist of CCTV and visual inspection of manholes and lines.