Chapter B5 – Stormwater Management (Drainage System Design)

1.0 Introduction

1.1 Scope of this Chapter

This chapter applies to all development in the Kempsey Shire local government area where establishment of sustainable stormwater management and infrastructure is required.

1.2 Relationship to Other Chapters of this DCP

The provisions contained in Chapters included in Parts C, D, E and F of this DCP override the provisions of this Chapter to the extent of any inconsistency.

This chapter should be read in conjunction with Chapter B6 – Water Sensitive Urban Design.

2.0 Chapter Objectives

The objectives of this Chapter are:

a) To preserve and improve water quality of both surface and ground water within the development, comparative to the pre-development state.

b) To preserve the total water cycle balance within the development comparative to the pre-development state.

c) To maximise stormwater reuse in areas outside the water recycling network to conserve water.

d) To preserve natural drainage systems and ecosystem health.

e) To minimise the risk to the community.

f) To reduce the initial and ongoing operating and maintenance cost of stormwater management systems.

g) To protect the built environment from flooding and water-logging.

h) To adopt best practice stormwater management incorporating the principles of Ecologically Sustainable Development (ESD).

i) To maintain social, cultural and aesthetic values.

3.0 Guidelines

3.1 Sustainable Stormwater Management

Sustainable Stormwater Management involves treating, intercepting and delaying the discharge of rainfall from a parcel of land before it flows off the site to an adjacent natural waterway.

There are generally three strategies for on-site stormwater management:

a) Techniques that encourage the infiltration of stormwater into soils;

b) Techniques that encourage the temporary storage of stormwater on-site, instead of transporting it off-site for centralized detention within a development project; and

c) Techniques, such as the construction of artificial wetlands, which also allow some degree of longer-term retention and treatment of the stormwater by natural processes before it is discharged.

3.2 Integrated Water Cycle Management

Integrated Water Cycle Management (IWCM) assists local water utilities manage urban water services collectively, not as individual components, saving resources and improving services. The three components of urban water – potable water, sewage and stormwater – share common issues, as well as individual problems. Cost effective and efficient water management needs to consider the entire water cycle – from catchment to the tap.

3.3 Relationship to Council Policies and Other Documents

This chapter may reference relevant Australian Standards and adopt their requirements.

The following Council Policies and procedures, or their current equivalent, are relevant to the issues addressed in this chapter:

- Council Policy No. CPOL-28: Contributions to Works for Kerbing and Guttering;
- Council Policy No. CPOL-43: Flood Risk Management Policy;
- Council Policy No. CPOL-60: Guide for Certification of Civil Engineering Design Work;
- Procedure No 1.1.2: Developer Servicing Plans;
- Procedure No 1.1.7: Development Contribution Plans; and
- Procedure No 1.1.11: Flood Risk Management.

The requirements of the following design and construction specifications from Council's Engineering Guidelines for Subdivision and Development, or their current equivalent, will apply to stormwater management:

- DQS – Quality Assurance Requirements for Design;
- D4 – Subsurface Drainage System;
- D5 – Stormwater Drainage Design;
- D7 – Erosion Control and Stormwater Management;
- D13 – Land and Street Scape Design;

- C101 – General;
- C220 – Stormwater Drainage – General;
- C221 – Pipe Drainage;
- C222 – Precast Box Culverts;
- C223 – Drainage Structures;
- C224 – Open Drainage including Kerb and Gutter;
- C230 – Subsurface Drainage – General;
- C231 – Subsoil and Foundation Drains;
- C232 – Pavement Drains; and
- C233 – Drainage Mats.

The following documents are also applicable to the matters addressed in this chapter:

- Kempsey Shire Ecological Sustainable Development Strategy;
- Kempsey Shire Council Integrated Water Cycle Management Strategy; and
- Any relevant Estuary Management Plans;
- Any relevant Flood Management Plans including associated studies;
- Any relevant Coastal Management Plans including coastal hazard assessments; and
- Kempsey Stormwater Management Plan.

3.4 Other Approvals

Stormwater drainage work requires a separate approval under section 68 of the *Local Government Act 1993.*

A separate approval may be required for any stormwater management works within the road reserve under section 138 of the *Roads Act 1993.*

If stormwater works are to be undertaken on or near water front land then a Controlled Activity Approval pursuant to the provisions of the *Water Management Act 2000* and its Regulation must be obtained from NSW Office of Water.

Note - NSW Office of Water's website provides further information on what is a controlled activity.

4.0 Development Requirements

4.1 General

Desired Outcomes

DO1 - All stormwater generated within the development is controlled and managed to an appropriate degree.

DO2 - All stormwater passing through the development from the surrounding catchment is controlled and managed to an appropriate degree.

DO3 - An effective legal point of discharge for all collected stormwater is provided, from the development to a natural watercourse, Council drainage system or approved outfall.

DO4 - Safety and convenience for pedestrians and traffic in frequent stormwater flows is provided by controlling these flows within prescribed limits.

DO5 - Stormwater systems minimise erosion.

DO6 - Each component of the stormwater management system is designed and constructed in accordance with the relevant requirements of Council's Engineering Guidelines for Subdivision and Development.

Note – As a guide, development is to either:
- Maintain pre-development flows; or
- Upgrade the downstream system to cater for the increase.

Development Requirements

4.1.1 General

a) An application for subdivision or development involving significant impervious area must be accompanied by a Stormwater Management Plan, incorporating WSUD, prepared by a certified practicing Engineer.

b) The Designer shall adopt the 'major/minor' approach to urban drainage systems as outlined in the current version of Australian Rainfall and Runoff.

c) The storm water drainage system is to be designed in accordance with:

(i) Council's Engineering Guidelines for Subdivision and Development;
(ii) The current version of Australian Rainfall and Runoff;
(iii) Any relevant Australian Guidelines; and
(iv) Any relevant industry guidelines.

d) Flows through the major system shall follow a designated overland flow path, which shall:

(i) Follow a road if the catchment area is small; and/or
(ii) Follow a natural water course or, as a last resort, a drainage reserve, if it is impractical or unsafe for a road to carry the excess flows; and
(iii) Not increase risk to public safety; and
(iv) Not exceed the capacity to safely transport design flows including minor system blockages and storm flows from events greater than the design event without property damage.

e) Detention and retention basins are to be integrated into public open space such that there is no loss of function, where appropriate.

4.1.2 Site Drainage

f) The drainage system has the capacity to control site specific design surface flows and additional flows entering the site from upstream property to stop stormwater entering dwellings during the design event.

g) Development of the site is situated and designed to eliminate water inundation.

h) The drainage system shall be designed to minimise ponding for protracted periods of time.

i) Various source control measures to minimise the quantity of stormwater runoff shall be deployed where site conditions allow.

4.2 Water Quality

Desired Outcomes

DO1 - Stormwater within subdivisions and development does not detrimentally affect:
- the environment;
- surface and subsurface water quality;
- groundwater infiltration characteristics;
- adjoining and neighbouring properties downstream of the drainage outlet by damage or nuisance flows; and
- watercourses, either upstream or downstream of the subdivision or development.

DO2 - Stormwater runoff meets specified quality objectives during all phases of a development.

Development Requirements

a) On development sites where the existing groundwater level is close to the surface, Council may require submission of a Hydrogeological Report including the interaction between surface and groundwater flows.

b) The current version of *Australian Runoff Quality* (Institute Engineers) design guideline is to be used to estimate urban stormwater contaminants, quality management practices and procedures for estimating performance.

c) Proposed Water Sensitive Urban Design stormwater quality treatment train options are to be assessed using the MUSIC model. In areas where there is an existing and or proposed recycled water system water tanks cannot be used to treat or store water for reuse.

d) Urban Stormwater drainage systems are to be designed and constructed to effectively capture and remove gross pollutants using a combination of at source and inline systems only.

e) The quality of the water retained and or leaving the urban development is to meet the current *Guidelines for Managing Risks in Recreational Water* and *ANZECC Guidelines*.

f) Both temporary and permanent stormwater drainage systems are to be designed to retain sediment generated by development in accordance with Councils *Engineering Guidelines for Subdivision and Development* and the current Landcom publication *Managing Urban Stormwater- Soils and Construction*.

g) Where groundwater recharge is deemed appropriate, the quality of the water collected from the site for this purpose is to meet current *Guidelines for Managing Risks in Recreational Water* and *ANZECC Guidelines.*

4.3 Water Cycle Balance

Desired Outcomes

DO1 - Hydrological processes are managed so that:

- Peak flows do not exceed the natural conditions of the site;
- Environmental flows in relation to surface and groundwater are maintained;
- Flow duration and velocity is managed to maintain downstream waterway morphology; and
- Continuing filtration maintains downstream ground water systems at pre-development levels.

Development Requirements

a) A Water Balance Assessment is to be provided for developments where the water balance will be disturbed.

(i) Where the development drains into a designated wetland, a *Wetlands Water Balance Report* is to be prepared by an appropriately qualified and experienced person having regard to, but not limited to, precipitation, surface water, groundwater etc.

b) No direct drainage to designated Wetlands or associated buffers and or habitat protection zones will be permitted.

c) The development is not to alter the natural water balance of downstream wetlands.

d) All stormwater passing through the development from the surrounding catchment is to be controlled and managed.

e) Identify stormwater quantity management practices and procedures for estimating the performance of these practices in accordance with Council's Engineering Guidelines for Subdivision and Development.

f) Stormwater systems are to minimise erosion.

g) A stormwater system does not adversely detract from the principal function of open space areas where they are utilised for infiltration of runoff and stormwater retention.

4.4 Stormwater Reuse (Harvesting)

Desired Outcomes

DO1 - Proposed urban stormwater harvesting and reuse option planning and design has regard for the current version of the NSW Government publication *Managing Urban Stormwater Harvesting and Reuse*.

DO2 - In developments where it is suitable to install rainwater tanks, the tanks are sized having regard for the area of the roof, soils, rainfall, anticipated usage, the *Rainwater Tank Design and Installation* Guide (Australian Water Commission) and the NSW Department Health requirements.

Development Requirements

a) Stormwater harvesting options will generally not be permitted where the development has or will have access to a Council recycled water supply system.

b) Urban stormwater harvesting and reuse is not to be used as a source of raw water for use in large scale potable water schemes.

c) In developments where it is suitable to install Porous Pavement the area is isolated from sources of sediment during construction and post construction and is not a high or heavily trafficked area.

d) In developments where suitable site conditions allow the installation of infiltration devices are permitted. Design and construction is to be consistent with Councils Engineering Guidelines for Subdivision and Development, the inlet is fitted with a silt trap and overflow pipe connected to the stormwater drainage system.

e) Council will require any proposal to store rainwater in an underground aquifer for later non-potable reuse will require a detailed Design and Management Plan prepared by an experienced and qualified person which addresses elements such as hydrology, hydrogeology, soils, pollutants, public health and any other related matters.

f) In developments where it is suitable to install rainwater tanks the source of the rainwater is to be limited to rooves, the collection system is to have a first flush device for removing pollutants, the water from the tank is to be used in the main for toilet flushing irrigation and laundry, the overflow is connected to an infiltration device (where soils allow) or the stormwater drainage system, noise from pressure pumps do not exceed 5dB(A) above ambient background noise measured at the lot boundary.

g) In developments where it is suitable to install rainwater tanks and the source of the rainwater is other than roof water (driveways, paved areas or grassed surfaces) then there will be no interconnection with the potable water supply network at the site, the collection system has integrated into it first flush pit or oil/grit separator and the fixtures are to be marked “Not Suitable for Drinking”.

4.5 Natural Drainage Systems

Desired Outcomes

DO1 - The impact of stormwater on natural watercourses, aquatic habitat and riparian vegetation mimics the pre-development natural drainage system.

Development Requirements

a) Incorporate natural water courses within the development as part of the drainage network and integrate into public open space to minimise use of artificial drainage systems.

b) Retain and restore riparian vegetation (Controlled Activity refer NSW Office Water) to improve water quality through bio-filtration.

c) Identify and address future management strategies affecting development having regard for any relevant plans, including but not limited to, Estuary Management Plans, Flood Management Plans and Stormwater Management Plans.

d) Minimise the use of artificial drainage systems and convert drains into natural streams.

4.6 Public Health

Desired Outcomes

DO1 - The stormwater management system is designed and constructed to minimise adverse impacts on public health.

Development Requirements

a) Identify the health effects of the urban development proposal and measures to mitigate those effects having regard to the NSW Government publication *Healthy Urban Development Checklist* guidelines.

b) Safety and convenience for pedestrians and traffic in frequent stormwater flows is provided by controlling these flows within prescribed limits.

4.7 Protection of the Built Environment

Desired Outcomes

DO1 - The built environment is suitably protected from the impacts of flooding and water-logging.

DO2 - The design of the stormwater management system will result in the prevention of stormwater damage to property and the natural environment.

Development Requirements

a) Store and detain excess runoff from large rainfall events in parks and multiple use corridors.

b) Convey excess groundwater to the nearest watercourse.

4.8 Best Practice and ESD

Desired Outcomes

DO1 - Best practice stormwater management incorporating the principles of Ecological Sustainable Development are adopted in the design of stormwater management systems.

Development Requirements

a) Best practice should ensure decisions in relation to development have regard for stormwater impacts on receiving waters and corrective measures are deployed in a cost effective, integrated and organized way. The current *Australian Guidelines for Urban Stormwater Management* represent current best practice in stormwater planning and management in Australia.

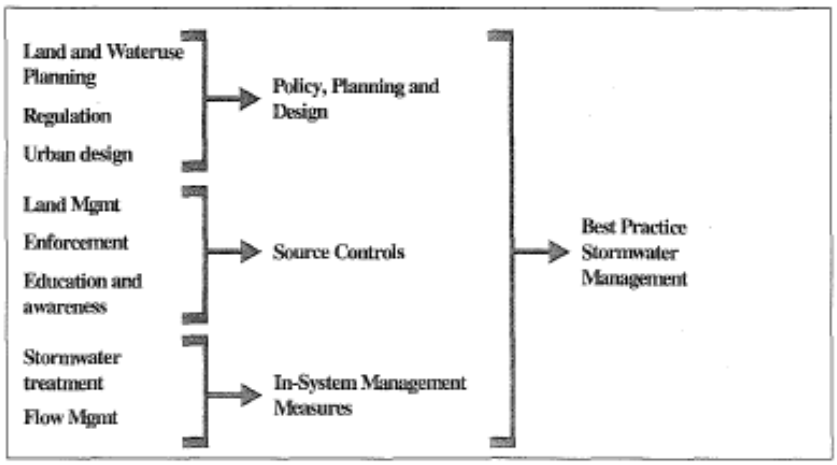

Figure 4 - Best practice environmental management of stormwater requires integration of a range of measures (Adapted from Victorian Stormwater Committee (1999))

Figure B5-1: Integration of Range of Measures for Best Practice Stormwater Management.

b) Ecologically Sustainable Development meets the community needs whilst conserving and improving ecosystems for the benefit of future generations.

4.9 Economic Maintenance

Desired Outcomes

DO1 – The stormwater system will be economical to maintain.

DO2 - Stormwater management is efficient and reduces potable water demand.

Development Requirements

a) Determine the economic viability of the proposed stormwater management practices to be deployed having regard for not only the capital cost but the ongoing operation and maintenance costs over the life cycle of these practices.

b) Stormwater management devices which are not affordable on an ongoing basis and compromise the effectiveness of the device will not be accepted.

4.10 Social, Cultural and Aesthetic Values

Desired Outcomes

DO1 - Sites of cultural or heritage significance are identified and maintained.

DO2 - The stormwater management system does not have a significant adverse impact on social, cultural and aesthetic values.

Development Requirements

a) The stormwater management system complies with the relevant Desired Outcomes and Development Requirements of:

(i) Chapter B12 - Aboriginal Heritage; and
(ii) Chapter B13 – Heritage Areas/Developments.