

**APPENDIX B**

**COMMUNITY CONSULTATION**

# PUBLIC FORUM

## AGENDA

WELCOME SPEECH  
CHAIRPERSON  
STORMWATER MANAGEMENT  
COMMITTEE

COMMENTS FROM EPA  
MR CHRIS MARSHALL  
BATHURST

PROJECT BRIEF  
DR DHIA AL BAKRI  
THE UNIVERSITY OF SYDNEY  
ORANGE

MANAGEMENT PLAN  
SADEQUR RAHMAN  
ORANGE CITY COUNCIL

COMMUNITY CONSULTATION  
FACILITATED BY  
CLAIRE HAMILTON  
DEPT LAND & WATER CONSERVATION

## ITEMS FOR CONSIDERATION

- ◊ How clean is the stormwater in the urban area of Orange ?
- ◊ What are the most important stormwater issues in Orange ?
- ◊ If major structures, such as gross pollutant traps are required, how should they be funded ?
- ◊ What strategies could be considered to educate the community on stormwater issues ?
- ◊ What quality of water should we aim for in Blackman's Swamp Creek and Ploughman's Creek.

## STORMWATER MANAGEMENT FORUM

*INVITATION*

CIVIC CENTRE FORUM  
BYNG STREET  
ORANGE

MONDAY 15 NOVEMBER 1999  
7.00 PM



An Orange City Council Initiative



*Please bring along  
any ideas you may  
have .....*

## STORMWATER MANAGEMENT FORUM

Stormwater is the water that flows into drains and waterways during and after rainfall in urban areas from our gardens, roads, footpaths and roofs of buildings.

Many of our daily activities influence the quality of water as it passes through our stormwater systems. Washing cars on roads, fertilising our lawns, littering and pet droppings all have the potential to degrade water quality.

Pollutants arising from such activities ultimately discharge into our waterways resulting in an unsightly mess causing devastating impacts on aquatic ecosystems.

It is generally easier and cheaper to prevent many of our stormwater pollution problems at the source rather than to correct the consequences later.

In April 1998, the NSW EPA issued a notice under section 12 of the Protection of the Environmental Administration Act 1991 requiring all NSW councils to develop urban stormwater management plans.

The primary objectives of these plans are to improve the health of urban waterways, to provide for more effective management of urban stormwater and to increase community awareness about stormwater issues.

To satisfy the requirement of this Act, Orange City Council in collaboration with the University of Sydney - Orange, is undertaking a project to develop a Stormwater Management Plan by April 2000. This project has already seen the development of a Stormwater Management Committee consisting of key stakeholders from our community.

The successful management and protection of our water resources and aquatic ecosystems depend heavily upon community participation, as it is the attitudes and actions of people that influence the health of our waterways.

On 15 November 1999, Orange City Council will be holding a public forum which will give the community the opportunity to raise their concerns and aspirations regarding the management of stormwater in Orange.

*Stormwater .... how clean  
should it be ??*

With this knowledge, Council and the Stormwater Advisory Committee can tailor the Stormwater Management Plan to address the needs and desires of our community.

All members of the community are invited to attend the *Stormwater Forum*.

Should you wish to attend please RSVP to Mrs Sandie Henry on 6361 5269 by 10 November 1999.

*A J Dwyer*  
General Manager

Minutes of the Stormwater Management Forum held on 15 November 1999 at Civic Centre Forum, Byng Street Orange

PRESENT: Mayor – Richard Niven, Mr Marc Kiho, Mr Borry Gartrell, Councillor Martin Gleeson, Mr Wayne Beatty, Mr Clive Cashen, Ms Martha Carlsan, Mr Zamir Hossain, Mr Dennis Murphy, Mr Dave Zinga, Mr Bob Healy, Mr Sadequr Rahman, Mr John Marshall, Mr John Boyd, Councillor Reg Kidd, Mrs Kay McNamara, Dr Dhia Al Bakri, Mr David Beck, Mr Colin Corben, Councillor Peter Hetherington, Ms Lee Bowling, Ms Jill Campbell, Mr Bill Miller, Mr Tom Cole, Ms Abb Cantrill, Mr Chris Marshall, Mr Glyn Carpenter, Mr Geoff Porter, Ms Jennifer Kenna, Mr David Clothier, Mr Robert Parr, Ms Nahla Matti, Mr Michael Ryan, Mr Andrew Sloan, Ms Alison Banks, Mr Ian Davidson, Mr Ian Carpenter, Mr Stephen Sykes, Mr John Dumbrell.

APOLOGIES: Councillor Jim McArdle, Mr Joe Donnelly, Mr Domonic Conaughton, Mr Croucher, Mr Garnet Halliday, Mr Bill Simpfendorfer, Mr Stuart Trengrove, Councillor Brenda Davies, Ms Maureen Horth, Mr Glen Cooper, Ms Jane Shearing, Councillor Russell Turner, Dr Geoff O’Laughlan, Councillor Dave Shearing, Ms Jane Paul, Mr Kim Mitchell, Mr Brian Maloney, Mr Tim Gardiner.

## **TOPICS ADDRESSED BY SPEAKERS**

The forum was opened by Councillor Reg Kidd, Chairperson of the Stormwater Management Committee.

Councillor Kidd welcomed the participants and stressed the importance of public input in the development of the Stormwater Management Plan.

The Public Forum was facilitated by Claire Hamilton from the Department of Land and Water Conservation, Mudgee.

Mr Chris Marshall outlined the need of the development of a Stormwater Management Plan in the urban area in NSW and the role and contributions of the EPA in developing the Management Plan. He also spoke about funding possibilities for the implementation of the project. (Stormwater Trust Fund).

Dr Dhia Al Bakri of the University of Sydney, Orange delivered a short presentation on the project structure and explained that this project is a joint venture between Orange City Council and the University of Sydney. Dr Dhia Al Bakri then described the resources, expertise and wealth of new information that will be used for the development of Orange’s Stormwater Management Plan.

Copies of the overheads are attached.

Sadequr Rahman gave a presentation on work undertaken to date. Works have included investigation into:

- Water quality
- Pollution
- Litter control
- Salinity
- Nutrients
- Use of waterways.

## COMMENTS AND FEEDBACK FROM PARTICIPANTS.

The Forum Facilitator asked the participants to form into groups and put forward their ideas and concerns relating to the following 3 questions.

### 1. *What Do You Want To See?*

Effectively asking participants to describe what they want to use the City's waterways for and how healthy they would like to see streams and creeks.

### 2. *What Are The Problems?*

Participants were given the opportunity to express their current concerns with respect to the waterways.

### 3. *What To Do?*

Participants offered possible solutions to numerous concerns.

## COMMUNITY INPUT

Following are the attendees responses to the three questions asked:

### 1. *What Do You Want To See?*

- No shopping trolleys or rubbish in the creeks
- To be able to enjoy the waterways by being able to:-
  - Walk along the banks
  - Wade in the creek
  - Find tadpoles and yabbies
  - Fish
  - Swim – others argued that creeks are too shallow.
- We should aim to have a better ecosystem by:
  - retaining wetlands
  - reducing litter
  - having cleaner water
  - better embankments
  - reducing the number of willows
- Revegetation/stabilisation of the banks along the creeks
- Drinking water; the possibility of being able to drink water from the creeks was raised, however it was considered by the meeting in general that this was an unrealistic target.
- Ability to fish in creeks.
- We would like to see the creeks are safe for kids if they wish to play or wade in the creeks

- One member raised the need to have pristine waterways in the catchment. Others argued that this objective may not be practical as it is setting a very high standard for stormwater.
- There is a strong advocacy for the need to have community ownership of stormwater issues.
- A community member suggested that recreation should be permitted by Council on the three water supply dams (Suma Park, Spring Creek and Gosling Creek dams)
- Remove willows and other exotic plants and establish native vegetation
- Swimming downstream - Ophir , Long Point

## **2. *What Are The Problems?***

- There is a lack of community pride in waterways and stormwater
- Erosion gullies along the creeks
- Apathy
- Lack of money for stormwater
- Cumulative small pollutants
- Knowledge of links (lack of)
- Motivation is improving
- Lack of community ownership
- Building sites contribution to sedimentation

## **3. *What To Do?***

- Formulate legislation for bottle refund to encourage returning empty bottles and containers eg South Australia
- Keep Community informed on stormwater issues
- Education - more community/council links.
- Keep sediment out of waterways
- Costs, availability of funds and practicality should be considered when deciding on management strategies
- Increase the communities' knowledge of links between drains and creeks
- Encouraging community ownership of problems
- Erosion / rubbish control on building sites
- Stormwater into sewer - control
- Sewer overflows - reduce
- Existing landcare - more leadership
- Obtain grant money
- Developing and owning outcomes
- Focus on children - influencing parents
- Balance - carrot/stick
- Outcome focus
- Awards/recognition
- Motivate
- Gross pollutant traps
- Section 94 - no contributions or other source of deposit to fund work. Levee - surcharge on rates
- Reporting conditions
- Sludge file – name offenders
- State Of Environment reporting
- Landcare should play a more active role in overall stormwater management

- Keep community informed of the progress and outcome of the management plan
- Cost of capital expenditure should be reviewed over the lifespan of the equipment structure (eg GPT's have a cost of \$200,000. The lifespan is 20-30 years. Their cost will be approximately \$10,000 per year.)

The facilitator then asked the participants to prioritise their ideas.

**1. Education/information/motivation**

- Money
- Children/schools
- Signage
- Media
- Educating people on the cumulative impacts of littering and pollution

**2. Lobby for container deposits**

- Local and regional focus
- Links to recreation

**3. Report progress/outcomes**

**4. Identify sources of funding**

**5. Ongoing – keeping the community informed.**

Councillor Reg Kidd then thanked the participants for their valuable input. He indicated that the Stormwater Management Plan is a living document and any concerns raised would be considered for incorporation in the Stormwater Management Plan.

A copy of the Draft Management Plan, once completed, will be placed on Public Display for public comment.

THE MEETING CLOSED AT APPROXIMATELY 9.00 PM

# **2007 STAKEHOLDER ENGAGEMENT**

## **STORMWATER QUALITY IMPROVEMENT IDEAS**

Results of stakeholder engagement to date include ideas for improving stormwater quality as detailed below. Note that points shown are ideas only, and are yet to be developed into management actions.

### **2020 Vision**

- Best practice / enhancement of wetlands
- Conservation of green areas, more bins, education on litter
- Stormwater harvesting on Council buildings
- Protect/restore watercourses
- Stormwater harvesting for topping up Suma
- Tank rebates for residents
- Open space areas linking city – green corridors (“green belt”)
- Clean up stormwater
- Eradicate basket willows
- Vegetated waterways, increased focus on water re-use

### **Aboriginal Groups and Bowen Public**

- More garbage bins between Jilba Street and CBD
- Billboard and catchment map near Spring Street Bridge
- Clean-up days
- Cleaning reps from the community
- Schools have ownership of sections of Blackmans Swamp Creek, including tree planting
- Nature walk / bike track along Blackmans Swamp Creek, plus exercise course

### **Council staff**

- Carry over non-completed tasks from current SMP
- Investigate possibility of butt bins outside hospital
- De-silt channel from Dalton Street Bridge to McLachlan Street
- Install GPT below Dalton Street Bridge
- Investigate possibility of GPT at northern end of Spring Street
- Generate Stormwater Education Calendar, as per Dubbo – childrens art comp
- Include Netwaste and the CWCMA in education programs
- Develop stormwater quality handbook (for school / general use)
- Investigate impact of hydrocarbons in stormwater adjacent to Peisley Street

- Review SMP following adoption of IWCM Strategy (if required)
- Continue Clean-up Australia Day in north-east Orange
- Review stormwater themes and merchandise ie “Only Nutters Litter Gutters”
- School video or song writing competition
- Re-do signage at GPT
- Longer grass in riparian strips
- Restore banks (include meanders) of Moulder Park channel from Woodward Street to Lamrock Avenue
- Ensure flood management plan takes into account quality issues as identified in SMP
- Identify and rectify stormwater overflow points from pipes/infrastructure
- NDR arch near Molong Road (south) – rehabilitation required
- Burrendong Way south of NDR – Georgian Place rehabilitation required
- Channel stabilisation upstream of Kearneys Drive detention basin (across Hill St)
- March Road Pump Station removal investigation (include alternative pedestrian access)
- Investigate siltation in Ploughmans Creek from Glendale Crescent to NDR
- Revamp internal check list to get mechanisms in place – post construction
- Education of Council staff regarding sed and erosion control
- Develop Ploughmans Lane / Cargo Road wetland area
- Showground / caravan park area – stormwater capture as display for education purposes and flood mitigation
- Development approval / landscaping education / inspection for house block building/changes (must include reference to position of floor levels)
- Corporate sponsorship opportunities for waterways and corporate education campaign
- Review leaf pickup schedule / investigate resourcing / education
- Main breaks – re-educate sediment control
- Health & Building Inspectors reminded to consider impact on stormwater eg Brooklands
- Education regarding load covering / waste
- Interlot systems in backyards – education concerning ownership
- Greater focus from Health & Building Inspectors on stormwater approval especially connection to stormwater mains
- Investigate opportunity to include Spring Hill and Lucknow in SMP
- Investigate private stormwater drainage shortfalls to creek
- Grey water input into stormwater – education
- Rehabilitate scouring from William Street to BS Creek
- Liaise with Railways adjacent to Leeds Parade re stormwater channel



- Investigate Clergate Road – off Rosewood Oval – basin surcharge from pit
- Maintenance of railway land culverts
- Maintenance of banks between Glendale Cr and upstream gabions
- Interpretive site along Ploughmans Creek behind Yarrawong CCC
- Investigate Streamwatch opportunities
- Consolidation of SW measures (subdivision code, green book etc)
- Willow removal adjacent to STP
- Actors to snake up and down street like a creek! It's a Living Thing

### **ENRMA Committee members**

- Education – diagrammatic representation of how Orange deals with Stormwater + impacts that community has on the overall system.
- Investigate constructed wetlands in conjunction with / preference to detention basins.
- Decisions about stormwater management should take into account impact on broad catchment, not just the Orange urban area.
- Investigate stormwater harvesting
- Potential for reviving streamwatch/stormwater management (rename??) – using ELF as a base
- Stormwater input into local community groups – encourage new urban groups (based around schools) – look after a specific part of town – identify target areas eg Ploughmans
- Education target areas – East Orange channel for litter, Ploughmans re sediment control (development)
- Investigate GPT's/grates at pipe discharge points (checks and balances) eg Sterling Ave -
- Sediment and erosion control focus on developers and builders – adequate sizing of sed dams
- Process for control of sed detailed for general public – education
- Investigate potential for integrated use constructed wetlands (and retaining natural) and detention basins – link to greenways plan eg to prevent damage adjacent to Sterling Ave – establish detention basin plan. Shall help soluble pollutants.
- Investigate means of getting stormwater planning as a higher priority in subdivision development.
- Innovative stormwater signs (movable, changeable) eg carparks, wetlands
- Ensure follow up on community engagement processes eg Ploughmans POM
- Filter points taken throughout urban area – particularly enforcement in developing areas
- Investigate litter hotspots and follow up with planning for GPT potential eg Ploughmans

- Investigate potential for stormwater harvesting –
- Top detention basin near Emus – longer grass – Council lead by example – link to education

## **APPENDIX C**

### **ENGINEERING DESIGN AND CONSTRUCTION REQUIREMENTS:**

#### **1 WATER AND SOIL EROSION CONTROL**

#### **2 CONTROL OF EROSION AND SEDIMENTATION**

# ENGINEERING CONSTRUCTION REQUIREMENTS

OC2

## CONTROL OF EROSION AND SEDIMENTATION

This document contains some information and the format from a series of DEVELOPMENT DESIGN and CONSTRUCTION SPECIFICATIONS collectively termed the **AUSPEC** Technical Specification Series which have been adapted into The Orange City Council Development and Subdivision Code Volume 3 & Volume 4.

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**ENGINEERING CONSTRUCTION REQUIREMENTS OC2-  
CONTROL OF EROSION AND SEDIMENTATION**

**GENERAL**

**oc2.01 SCOPE**

1. The work to be executed under this section consists of the construction of structures and the implementation of measures to control erosion and sedimentation. These may be temporary or permanent.
2. The Contractor shall plan and carry out the whole of the Works to avoid erosion and sedimentation of the site, surrounding country, watercourses, waterbodies and wetlands.

**Scope**

**oc2.02 REFERENCE DOCUMENTS**

1. Orange City Council Development and Subdivision Code Volume 1 - Guidelines for the Development and Subdivision of Land.
2. Orange City Council Development and Subdivision Code Volume 3 - Design Specifications
3. Orange City Council Development and Subdivision Code Volume 4 - Construction Specifications

**oc2.03 WATER AND SOIL EROSION CONTROL PLAN**

1. The contractor shall construct erosion and sedimentation control measures as per the water and soil erosion control plan before any other construction or earthworks can commence or in conjunction with clearing and grubbing operations.
2. If the work is to be carried out in sections the Water and Soil Erosion Control Plan shall be designed to suit the staged construction.
3. The Plan shall consist of scale diagrams indicating:
  - (a) features of the site including contours and drainage paths,
  - (b) relevant construction details of all erosion and sedimentation control structures,
  - (c) all permanent and temporary erosion and sedimentation control measures, including the control measures to be implemented in advance of, or in conjunction with, clearing and grubbing operations as required under the Orange City Council Development and Subdivision Code Volume 4 - Construction Specification -C212 - CLEARING AND GRUBBING.
  - (d) an order of works based upon construction and stabilisation of all culverts and surface drainage works at the earliest practical stage, and
  - (e) proposed time schedules for construction of structures and implementation of measures to control erosion and sedimentation.

**Staged Plan**

**Plan  
Inclusions**

4. The DLWC publication Urban Erosion and Sediment Control provides guidance on typical permanent and temporary erosion and sedimentation control measures which may

**Guidance**

## **WATER AND SOIL EROSION CONTROL DESIGN**

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be required and guidance in the preparation of an Erosion and Sedimentation Control Plan.

5. No work shall commence until Council has approved the Water and Soil Erosion Control Plan. Such approval shall not relieve the Contractor of the full responsibility to provide whatever measures are required for effective erosion and sedimentation control at all times.

***Contractor's  
Responsibility***

6. The Contractor shall adhere to the approved Water and Soil Erosion Control Plan. The Contractor shall submit a revised Water and Soil Erosion Control Plan for approval by Council fourteen days in advance of intended variation from the approved plan.

***Adherence to  
Plan***

### **OC2.04 EROSION AND SEDIMENTATION CONTROL MEASURES**

1. Erosion and sedimentation control measures shall include, but shall not be limited to, the following:

***Scope***

(a) The installation of permanent drainage structures before the removal of topsoil and commencement of earthworks for formation within the catchment area of each structure.

(b) The prompt completion of all permanent and temporary drainage works, once commenced, to minimise the period of exposure of disturbed areas.

(c) The stabilisation of diversion and catch drains to divert uncontaminated runoff from outside the site, clear of the site. Catch drains shall be installed and lined, as specified in the Water and Soil Erosion Control Plan, before the adjacent ground is disturbed and the excavation is commenced.

(d) The passage of uncontaminated water through the site without mixing with contaminated runoff from the site.

(e) The provision of contour and diversion drains across exposed areas before, during and immediately after clearing and the re-establishment and maintenance of these drains during soil removal and earthworks operations.

(f) The provision of sediment filtering or sediment traps, in advance of and in conjunction with earthworks operations, to prevent contaminated water leaving the site.

(g) The restoration of the above drainage and sedimentation control works on a day to day basis to ensure that no disturbed area is left without adequate means of containment and treatment of contaminated water.

(h) The limitation of areas of erodible material exposed at any time to those areas being actively worked.

(i) The minimisation of sediment loss during construction of embankments by means such as temporary or reverse superelevations during fill placement, constructing berms along the edge of the formation leading to temporary batter flumes and short term sediment traps.

(j) The progressive vegetation of the site, in accordance with the Orange City Council Development and Subdivision Code Volume 4 - Construction Specification - C273 - LANDSCAPING, as work proceeds and as per EPA Guidelines.

### **PERMANENT EROSION AND SEDIMENTATION CONTROL**

## **WATER AND SOIL EROSION CONTROL DESIGN**

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### **oc2.05 EARTHWORKS FOR PERMANENT EROSION AND SEDIMENTATION CONTROL BASINS**

1. Earthworks for permanent erosion and sedimentation control basins shall comply to the Orange City Council Development and Subdivision Code Volume 4 - Construction Specification - C211 - CONTROL OF EROSION AND SEDIMENTATION.

### **oc2.06 INLETS, SPILLWAYS AND LOW FLOW OUTLETS FOR SEDIMENTATION CONTROL BASINS AND SEDIMENT TRAPS**

1. Inlets and spillways shall comply with the Orange City Council Development and Subdivision Code Volume 4 - Construction Specification - C211 - CONTROL OF EROSION AND SEDIMENTATION.

### **oc2.07 DROP INLET SEDIMENT CONTROL**

1. Drop inlet sediment traps and inlet control banks shall comply with the Orange City Council Development and Subdivision Code Volume 4 - Construction Specification - C211 - CONTROL OF EROSION AND SEDIMENTATION.

### **oc2.08 CLEANING SEDIMENTATION CONTROL STRUCTURES**

1. The Contractor shall clean out permanent sedimentation control structures, cleaning out whenever the accumulated sediment has reduced the capacity of the structure by 50 per cent or more, or whenever the sediment has built up to a point where it is less than 300 mm below the spillway crest. All permanent sedimentation control structures shall be cleaned out by the Contractor prior to Practical Completion of the Works.

***Contractor's  
Responsibility***

2. Accumulated sediment shall be removed from permanent sedimentation control structures in such a manner as not to damage the structures. The sediment removed shall be disposed of in such locations that the sediment will not be conveyed back into the construction areas or into watercourses. The Contractor shall provide and maintain suitable access to permanent sedimentation control structures to allow cleaning out in all weather conditions.

***Removal of  
Sediment***



**C211.09 REMOVAL OF SEDIMENTATION CONTROL STRUCTURES**

- 1. Towards the end of the contract period, the Superintendent may direct the removal of any or all of the permanent sedimentation control basins, spillways, drop inlet sedimentation traps and inlet control banks constructed. The work shall result in the restoration of the ground surface disturbed by the construction of the permanent sedimentation control basins to approximate that previously existing and shall include:
  - (a) removal of the rock mattresses from the spillway and their subsequent burial into the basin area or their use as scour protection or their removal from site,
  - (b) spreading and compaction of the embankment material into the basin area and
  - (c) removal of access roads.
- 2. The disturbed material shall be compacted to at least the relative density of the material existing in the adjacent ground. **Compaction**
- 3. Landscaping in the restored area shall be carried out in accordance with the Specification for LANDSCAPING. **Landscaping**

**TEMPORARY EROSION AND SEDIMENTATION CONTROL**

**oc2.10 GENERAL**

- 1. The Contractor shall ensure that effective erosion and sedimentation control is provided at all times during the Construction and practical completion of works. **Contractor's Responsibility**
- 2. Runoff from all areas where the natural surface is disturbed by construction, including access roads, depot and stockpile sites, shall be free of pollutants as defined in the Clean Waters Act 1970 before it is either dispersed to stable areas or directed to natural watercourses. The Contractor shall be responsible for all temporary erosion and sedimentation control measures required for this purpose. **Pollutant Free**
- 3. The Contractor shall provide and maintain slopes, crowns and drains on all excavations and embankments to ensure satisfactory drainage at all times. Water shall not be allowed to pond on the works unless such ponding is part of an approved Water and Soil Erosion Control Plan. **Maintenance by Contractor**
- 4. The Orange City Council Development and Subdivision Code Volume 4 - Construction Specification - C211 - CONTROL OF EROSION AND SEDIMENTATION - Annexures C211A, C211B, C211C provide guidance on typical temporary erosion and sedimentation control measures which may be required. **Typical Measures**
- 5. The cost of installation, maintenance, inspection and removal of these measures shall be borne by the Contractor or the Developer. **Payment**

**oc2.11 TEMPORARY DRAINS**

- 1. Runoff from areas exposed during the work shall be controlled by construction of temporary contour drains and/or temporary diversion drains. Generally, a temporary contour drain or temporary diversion drain takes the form of a channel constructed across a slope with a ridge on its lower side. They may require progressive implementation and frequent alteration as the work progresses. **Control of Runoff**
- 2. Contour drains, which follow points on the natural surface of approximately the same elevation, shall be provided immediately after a construction site is cleared to **Contour Drains**

## **WATER AND SOIL EROSION CONTROL DESIGN**

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intercept and divert runoff from the site to nearby stable areas at non-erosive velocities. Contour drains shall be formed with a grade of neither less than 1 per cent nor more than 1.5 per cent and shall be spaced at intervals of neither less than 20 m nor more than 50 m, depending on the erodibility of the exposed soil. Contour drains shall be constructed as shown on the Drawings.

3. Diversion drains shall be provided across haul roads and access tracks when such roads and access tracks are identified as constituting an erosion hazard due to their steepness, soil erodibility or potential for concentrating runoff flow. Diversion drains shall be formed to intercept and divert runoff from the road or track to stable outlets. Spacing of diversion drains shall not be greater than that required to maintain runoff at non-erosive velocities.

***Diversion  
Drains***

### **oc2.12 TEMPORARY SEDIMENT TRAPS**

1. Temporary sediment-trapping devices shall be provided during construction to remove sediment from sediment-laden runoff flowing from areas of 0.5 hectares or more before the runoff enters natural watercourses or adjacent land.

***Sediment  
Traps***

### **oc2.13 BATTER PROTECTION**

1. The Contractor shall take all necessary action to protect batters from erosion during the Contract.

***Contractor's  
Responsibility***

2. Scour of newly-formed fill batters during and after embankment construction shall be minimised by diverting runoff from the formation away from the batter until vegetation is established.

***Scour Control***

### **oc2.14 MAINTENANCE AND INSPECTION**

1. The Contractor shall inspect all temporary erosion and sedimentation control works after each rain period and during periods of prolonged rainfall. Any defects revealed by such inspections shall be rectified immediately and these works shall be cleaned, repaired and augmented as required, to ensure effective erosion and sedimentation control thereafter.

***Contractor's  
Responsibility***

2. The Contractor shall provide and maintain access from within the road reserve or from other suitable areas, for cleaning out sedimentation control works.

***Access***

## **WATER AND SOIL EROSION CONTROL DESIGN**

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### **OC2.15 REMOVAL**

1. All temporary erosion and sedimentation control works shall be removed by the Contractor when revegetation is established on formerly exposed areas before the end of the Works. All materials used for the temporary erosion and sedimentation control works shall be removed from the site or otherwise disposed by the Contractor to the satisfaction of the Council.

***Contractor's  
Responsibility***

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# ENGINEERING DESIGN REQUIREMENTS

OD3

## WATER AND SOIL EROSION CONTROL

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# ENGINEERING DESIGN REQUIREMENTS OD3 WATER AND SOIL EROSION CONTROL

## GENERAL

### OD3.01 SCOPE

1. Virtually all construction activity which requires the disturbance of the soil surface and the existing vegetation, naturally predisposes the construction site to erosion. This in turn leads to sediment loss in the resultant run-off water. *Erosion*
2. Since such soil disturbance is a necessary part of development, it is essential therefore to develop measures which reduce the erosion hazard of any particular construction activity. Having done that, it is necessary to control run-off water, which carries the sediment, in such a way as to reduce the amount of that sediment leaving the site to an acceptable level. *Reduce Sedimentation*
3. After construction is complete and the site fully rehabilitated, permanent water quality control structures and features commence their role. These include trash racks, gross pollutant traps, wet retention basins and the creation of, or increase in size of wetlands. *Water Quality*

### OD3.02 AIMS

1. Limit/minimise the amount of site disturbance. *Site Disturbance*
2. Isolate the site by diverting clean upstream "run-on" water around or through the development where possible. *Diversion Works*
3. Control runoff and sediment movement as its point source rather than at one final point. *Point Source*
4. Stage earthworks and **progressively revegetate** the site where possible to reduce the area contributing sediment. This in turn increases the efficiency and effectiveness of the entire sediment control system while decreasing the number and size of controls required. *Progressive Revegetation*
5. Provide an effective major stormwater system economical in terms of capital, operational and maintenance costs, incorporating water quality controls. *Major Stormwater*
6. Retain topsoil for effective revegetation works. *Topsoil*
7. Locate sediment control structures where they are most effective and efficient. *Sediment Structures*

### OD3.03 REFERENCE DOCUMENTS

1. Orange City Council Development and Subdivision Code Volume 1 - Guidelines for Development and Subdivision of Land.
2. Orange City Council Development and Subdivision Code Volume 3 - Design Specifications.
3. Orange City Council Development and Subdivision Code Volume 4 - Construction Specifications.

**OD3.04 PLANNING AND CONCEPT DESIGN**

1. Refer to Orange City Council Development and Subdivision Code Volume 3 - Design Specifications - D7 - WATER AND SOIL EROSION CONTROL.

**OD3.05 DETAILED DESIGN**

1. After development consent is given an erosion and sediment control/water management plan shall be submitted to Council as part of the detailed engineering design. This plan must give all details for erosion, sediment and pollution controls. Note: **This design shall be site specific** and not a generalisation of erosion control philosophy. It may also form part of the contract specifications for a contractor to comply with during construction. **Site Specific**
2. The Design Plan for Erosion and Sediment Control shall be signed by a person with qualifications accepted by the EPA. **Designer Qualifications**
3. For detailed design requirements refer to Orange City Council Development and Subdivision Code Volume 3 - Design Specifications - D7 - WATER AND SOIL EROSION CONTROL. **Detailed Design**
4. No site works shall commence prior to approval of the detailed engineering design. All works are to be carried out in accordance with the approved management plan. Its implementation must be supervised by personnel with appropriate qualifications and/or experience in soil conservation on construction sites. **Approval**
5. Notwithstanding the foregoing, Council may require erosion or sediment control works to be carried out additional to or instead of those works specified in the approved plan, should circumstances change during construction. **Additional Works**
6. An example of a control plan for proposed subdivision detailing locations of water quality structure, sediment and erosion control devices is provided as Figure OD3-1. This may be used as a guide when preparing a detailed design. Guidance from Council Officers should also be sought. **Example Design**



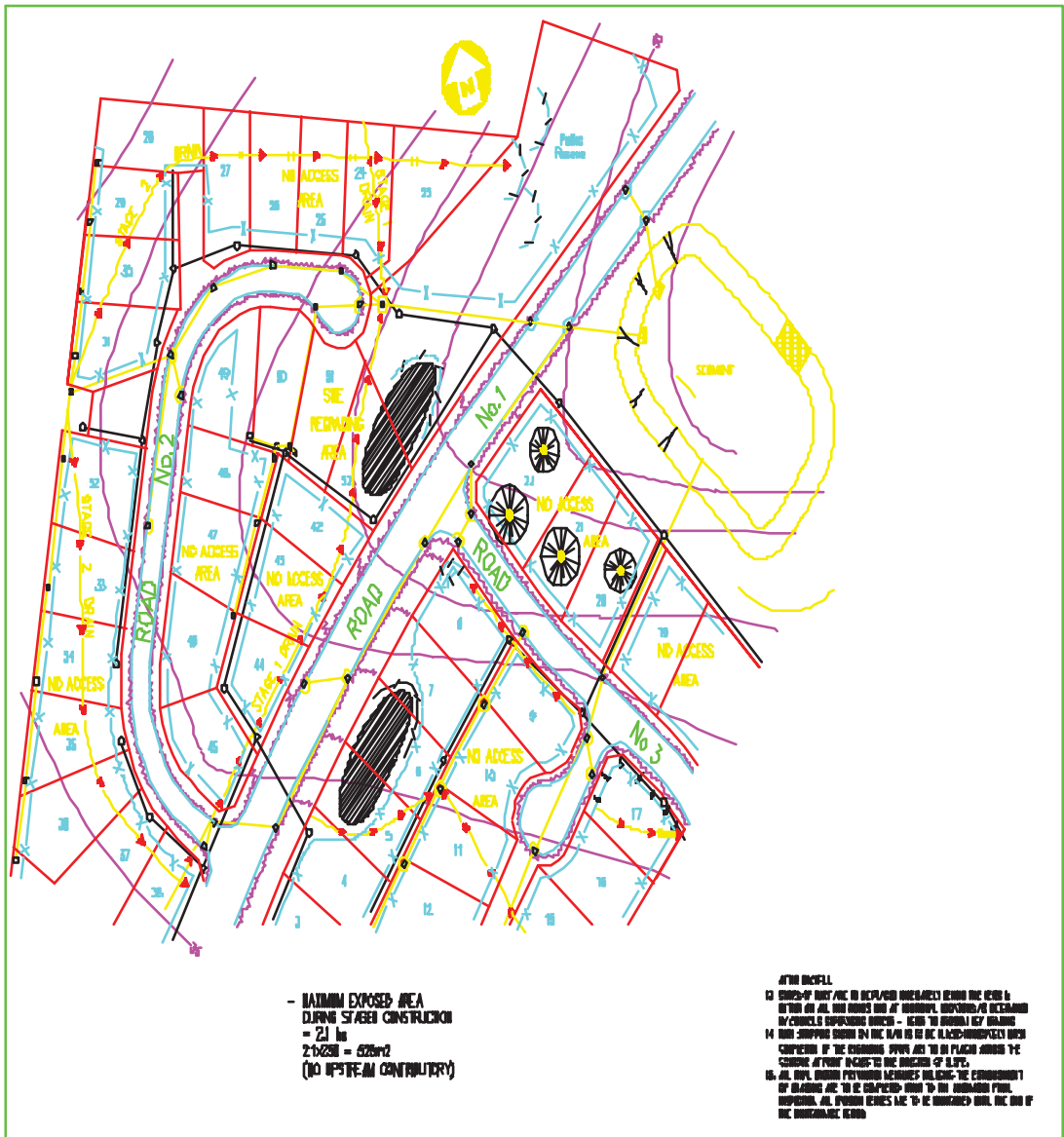


Figure OD3-1  
 Example Plan for Erosion & Stormwater Management

## THE LOCATION, DESIGN AND TREATMENT OF EROSION CONTROLS

### OD3.06 BUFFER ZONES

1. Refer to Orange City Council Development and Subdivision Code Volume 3 - Design Specifications - D7 - WATER AND SOIL EROSION CONTROL.

### OD3.07 "NO ACCESS" AREAS

1. It is Council's Policy to conserve as much existing vegetation in new developments as possible.
2. The landscape plan shall incorporate as much existing native vegetation as possible.
3. The "no access" fence locations shall be shown on the detailed design.
4. Fenced areas shall be clearly signposted "No Access Area".

**Conserve  
Vegetation**

**No Access**

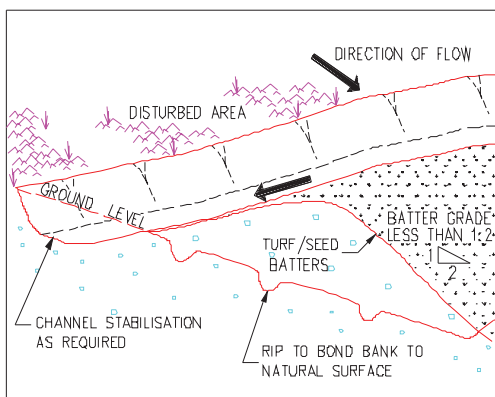
### OD3.08 DIVERSION WORKS

1. Diversion works are a major form of erosion and water control and may be in the form of earth drains and banks, hay bales, sand bags or even pipelines and may be permanent or temporary.
2. Such techniques are used to divert the upstream run-on water around the site. Such flows shall discharge to a formal drainage point or open areas where level spreader banks should ensure a broad water spread.
3. Pipelines may also be used to convey such run-on through the development site, and discharge the flow to a formal drainage point/dissipater if necessary. Such pipelines may also form part of the overall final drainage system.
4. Design of the diversion system should meet the specifications of Orange City Council Development and Subdivision Code Volume 3 - Design Specifications - D7 - WATER AND SOIL EROSION CONTROL.

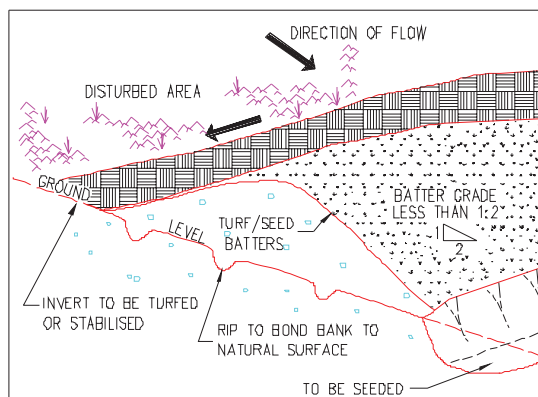
**Diversion  
Types**

**Discharge  
Point**

**Pipelines**



DIVERSION DRAIN



DIVERSION BANK

## Figure OD3-2 Diversion Drains/Banks

### OD3.09 DROP DOWN DRAINS

1. Refer to Orange City Council Development and Subdivision Code Volume 3 - Design Specifications - D7 - WATER AND SOIL EROSION CONTROL for requirements of drop down drains.

2. Drop down drains shall have sufficient capacity for a minimum 1 in 5 year peak flow without eroding. Energy dissipaters may be required to reduce the flow velocity at the outlet of the drop down drain.

**Capacity**

### OD3.10 STOCKPILES

1. Location of stockpiles shall be indicated on the approved engineering plans.

**Approved Plan**

2. Stockpile sites shall be located:

**Location**

i) Clear of existing or proposed drainage lines.

ii) Clear of areas likely to be disturbed during construction.

iii) Clear of the drip zone of trees.

iv) Preferably on reasonably flat areas.

3. Stockpiles must be protected from erosion and sediment loss by:

**Erosion Protection**

i) The installation of diversion works.

ii) The use of silt fences, hay bales etc or other approved controls on the downstream side.

iii) Compaction

iv) Revegetation if left exposed for longer than 30 days (refer to Orange City Council Development and Subdivision Code Volume 4 - Construction Specification - C211 - CONTROL OF EROSION AND SEDIMENTATION for seed mix).

4. Site topsoil shall be isolated from subsoil material in separate stockpiles.

**Separate Stockpiles**

### OD3.11 SEDIMENT BASINS/DAMS (DRY)

1. Refer to Orange City Council Development and Subdivision Code Volume 3 - Design Specifications - D7 - WATER AND SOIL EROSION CONTROL, for Sediment Basin requirements.

**Sediment Control**

2. Basin design must meet the following:

- i) Sediment basins are not the principal measure to mitigate sediment pollution on downslope lands and waterways. They are a backup for preferred prevention of point source pollution.
- ii) Volume/capacity of a temporary basin structure (Design Life < 24 months) for Type C soils shall be designed to contain 6 minutes in a 5 year ARI, one hour storm event.
- iii) Volume/capacity of a temporary basin structure (Design Life < 24 months) for Type F soils or where more than 10 per cent of the soil materials are comprised of dispersible fines, shall be designed to contain the whole of a 2 year ARI, time of concentration storm event.
- iv) Permanent sediment basins (Design Life > 24 months) shall be designed as advised by Council.
- v) The minimum capacity shall be 250m<sup>3</sup>/ha of disturbed site including the building areas.
- vi) The capacity shall be measured below the invert of the lowest incoming flow. Otherwise pipelines and associated works will be affected.
- vii) A secondary or emergency stabilised spillway must be provided to prevent overtopping of the structure. This shall be directed to a safe overland flow path. It shall be designed to an ARI of 20 years for a temporary structure (Design Life < 24 months), or to a ARI of 100 years for a permanent structure (Design Life > 24 months).
- viii) The basin shall have a minimum of 0.5 metres freeboard above the level of the spillway. The primary outlet shall have sufficient width so that water does not exceed 100mm depth during or after a 5 year ARI storm event. In using a riser structure as the primary outlet the size and type of riser used shall ensure a 5 year ARI can be accommodated.
- ix) The basin shall be designed to ensure the safety of the public.
- x) An all weather access must be provided to the basin for maintenance. Plans should have notation stating when the sediment basins shall be cleaned out.
- xi) The basin shall have an arbitrary length to width ratio of 3:1. This encourages soil particle settlement. The entry and exit points should be located at the opposite ends of the basin.
- xii) If this is not possible some form of approved baffles shall be installed to minimise short circuiting of the flow.
- xiii) Design of the basin shall take into account the type of soil at the sediment source. Soils that are significantly (> & = 10 percent) dispersible shall require the sediment basin to be built to allow for flocculation, ie. water to be retained and device in place to allow

**Design  
Criteria**

release of water after treatment.

- xiv) Internal basin batters shall be a maximum of 3:1 and external batters a maximum of 2:1.
- xv) All disturbed areas including batters shall be topsoiled and seeded.
- xvi) Sediment basins shall be oversized by 30 percent to allow for sedimentation.

6. Permanent wet basin designs are referred to in the Stormwater Management Section.

**Permanent  
Wet  
Basins**

**OD3.12 SEDIMENT TRAPS/BARRIERS FOR MINOR CATCHMENTS**

1. These are silt retention/filtering structures of a temporary nature used in situations where the catchment does not exceed 0.5ha.

2. Refer to Orange City Council Development and Subdivision Code Volume 3 - Design Specifications - D7 -WATER AND SOIL EROSION CONTROL.

**OD3.13 LEVEL SPREADERS**

1. Level spreaders are outlets of "sills" having a level cross section. They convert erosive channelised flows into non-erosive sheet flow.

**Convert  
Flows**

2. Level spreaders can only be used to dissipate flows from small catchments. The area below the outlet should be stable and of even cross section so that the water will not re-concentrate into channels.

**Location**

3. To reduce flow velocity before the spreader, the channel grade shall not exceed 1% for a minimum of 8 metres. The outlet or "sill" width depends on contributing catchment, slope and ground conditions. The minimum width should be four metres, and the maximum width 25 metres. Final discharge should be over a level surface, which may require stabilising by turfing or seeding and fertilising or perhaps lining with a geotextile fabric or something similar.

**Design  
Criteria**

**OD3.14 THE LOCATION OF SHAKEDOWN AREAS AND ACCESS STABILISATION**

1. Access to construction sites shall be limited to a maximum of two locations.

**Number of  
Accesses**

2. Such access locations shall require Council approval.

**Location**

3. Stabilised accesses reduce or eliminate tracking of sediments onto public rights of way or streets. Should such tracking occur the contaminants must be swept off the road way each day or before rain. Clean off draw bars etc after dumping and before starting journey.

**Approval  
Types**

4. If a shaker grid is used, this should be so placed as to ensure the vehicles when crossing the grid have sufficient speed to "shake the mud" or other contaminants such as gravel from the vehicle. It must not be placed where the vehicle is slowing to enter a roadway. Cattle grids shall be a minimum length of 7 metres.

**Cattle Grid**

5. A stabilised access comprises a vehicular pathway suitably constructed to facilitate the collection of any site debris in order to prevent such material leaving the site. Stabilised accesses are generally used on small sites. The entrance shall be at least 15 metres long with a minimum width of 3 metres for a one way entrance and 6 metres for a two way entrance. **Stabilised Access**

6. Surface water flowing to the street entrance/exit must be piped under the access, or a berm constructed to direct surface flow away from the exit. **Flow Control**

**OD3.15 WIND EROSION/DUST CONTROL**

1. Refer to the Orange City Council Development and Subdivision Code Volume 3 - Design Specification - D7 - WATER AND SOIL EROSION CONTROL.

**OD3.16 EXTERNAL SITE REQUIREMENTS**

1. Sediment control devices or stabilising works shall be provided outside construction sites where necessary or as directed by the Superintendent or Council. **Necessary Controls**

2. Where increased stormwater run-off is likely to accelerate erosion of any downstream watercourse, the necessary remedial work shall be provided concurrently with other sediment and erosion requirements. **Accelerate Erosion**

3. Where sediment is likely to be transported from the site, all immediate downstream drainage inlets shall have appropriate controls installed. **Downstream Controls**

4. If such works require entry onto private property, written permission shall be obtained prior to the entry and commencement of such work. **Written Permission**

5. All disturbed areas on private property to be reinstated to original condition and to the satisfaction of the owner. **Reinstated**

**THE LOCATION DESIGN AND TREATMENT OF STORMWATER MANAGEMENT**

**OD3.17 STORMWATER MANAGEMENT - GENERAL**

1. Refer to Orange City Council Development and Subdivision Code Volume 3 - Design Specifications - D7 - WATER AND SOIL EROSION CONTROL.

**OD3.18 WET RETENTION BASINS/PONDS**

1. Basins designed for water quality control should maximise the extent of settling. In general quiescent conditions and infiltration should be maximised. **Maximise Infiltration**

2. A wet retention basin can be located either on-line or off-line. Its capacity however needs to be considerably greater if it is located on-line. The wet retention basin usually has some form of energy dissipation at the inlet or a sufficient length-to-width ratio (greater than 3:1) to prevent short circuiting of flow across the pond, although its shape may vary considerably. Basins may be installed as smaller multiple units (in series) or as large single units. **Location and Size**

3. Other design guides that will make the basin efficient in removing particles and provide for public safety, include the following. **Basin Efficiency**

i) The minimum depth should be not less than 1.5 metres with an Stormwater Management Plan for the City of Orange – 2008



average depth of 2.5 metres. This discourages macrophyte growth in the deeper portions of the pond and also the breeding of mosquitos.

- ii) The basins should have side slopes of approximately 1 in 8. This provides for safety and encourages microphyte growth around the edges facilitating nutrient uptake.
- iii) The maximum velocity through the pond based on a 1 in 1 year storm should not exceed 0.3 metres per second (at 2.5 metres depth, this is the maximum practical flow velocity at which optimum sediment removal can be achieved).
- iv) A minimum freeboard of 0.3 metres should be provided between a restricted discharge outlet for the pond and a storm overflow weir. This discharge outlet should be designed so that the weir overtops on average three times per year.
- v) Inlet and outlet structures should be located at extreme ends of the basin, with short circuiting of flow further minimised by the use of baffles.

4. They should be constructed prior to the commencement of any site clearing or construction works, and should be de-silted when the level of sediment reduces the average water depth to less than 1.5 metres.

**Construction and Maintenance**

5. i) It may be desirable for the designer of an urban retention basin to incorporate an outlet device that enables dewatering of the basin. This simplifies de-silting, enabling earthmoving equipment to be used for de-silting operations.

**Outlet Design**

ii) An all weather access track shall be provided to the basin for maintenance work.

**Access Track**

6. It is generally necessary to incorporate a gross solids trap and trash rack facility on major discharges into the retention basin. This prolongs the life of the basin and prevents the accumulation of litter.

**Trash Racks**

7. Basins should be surrounded by buffer zones, typically comprising grassed foreshores of not less than 20 metres between the nearest development and the basin. This allows for some infiltration of drainage from developments, permits the drainage authority scope to develop aesthetic surrounds and reduces the likelihood of over the fence dumping of rubbish.

**Buffer Zones**

8. The settling velocity of particles should service as the basis for design. This, of course, can only be found by conducting standard settling tests or from a knowledge of local soil characteristics. The surface area of the required basin can then be determined from design settling velocities (Randall et al 1982).

**Particle Settling**

9. If the soil characteristics of the area show that the soils are significantly dispersible (> & = 10%) then the basin shall be designed to allow for flocculation.

**Flocculation**

10. Wet retention basins are regarded as impoundments and normal dam safety requirements should be met. A dam may be prescribed under the Dams Safety Act, 1978, depending on the recommendations of the NSW Dams Safety

**Basin Classification**

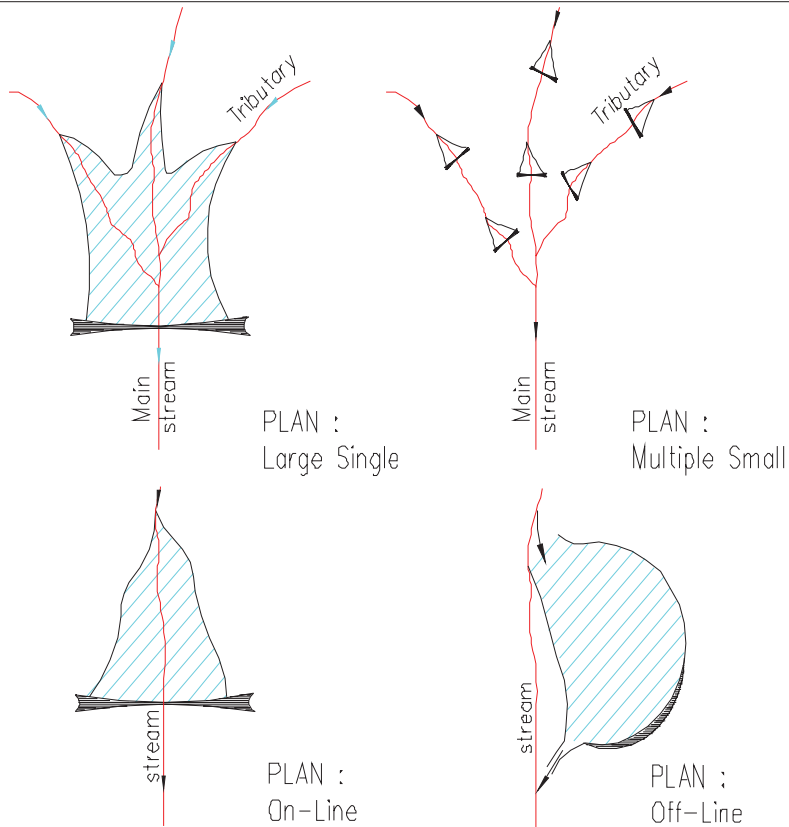
Committee. A dam is normally prescribed if it is:

- i) 10 metres or more in height and has a storage capacity of more than 20 megalitres; or
- ii) 5 metres or more in height and has a storage capacity of 50 megalitres or more.

11. If the wet retention basin is a prescribed dam, the Dams Safety Committee will maintain an interest in the dam, will seek information from its owner and will require that reports be prepared on the dam and submitted to the Committee.

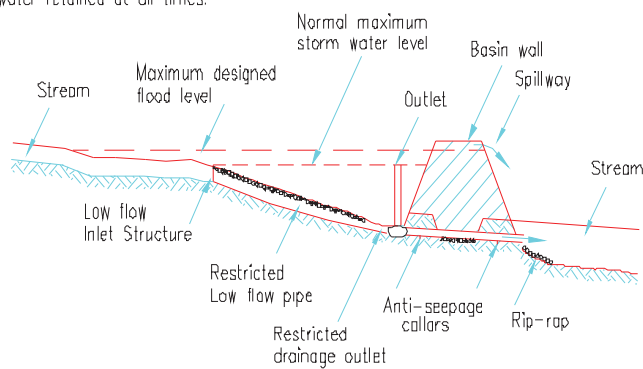
***Dam Safety  
Committee***





**WET RETENTION BASIN**

Water flow dependent upon water level.  
Same water retained at all times.



DESIGN OF WET RETENTION BASINS

## Figure OD3.3 - Configuration and Design of Wet Retention Basins

### OD3.19 TRASH RACKS

1. Trash racks are usually permanent structures which intercept trash and other debris to protect the aesthetic and environmental quality of water. Where appropriate, construct them upstream of all permanent retarding basins and/or wetlands which have a capacity greater than 5,000 cubic metres, and elsewhere as required by Council.

**Environmental Quality**

2. Generally, their design criteria should ensure:-

**Design Criteria**

- i) vertical bar screens with bar spacing of 65mm clear;
- ii) the length of the rack is consistent with the channel dimension and cause minimal damage when overtopped;
- iii) they are as large as practicable while considering all other design criteria - a maximum height of 1.2 metres is suggested;
- iv) a structure which remains stable in at least the 20 year ARI event, and is unlikely to cause flooding on adjacent lands as a result of the rack becoming completely blocked in the 100 year ARI event (analysis should include investigation of backwater effects and any consequent flooding)

3. Where associated with outlet structures for small sediment basins or constructed wetlands, they can be relatively simple in design.

**Associated Structures**

4. Refer to Orange City Council Development and Subdivision Code Volume 3 - Design Specifications - D7 - WATER AND SOIL EROSION CONTROL.

### OD3.20 GROSS POLLUTANT TRAPS

1. Gross pollutant traps (GPTs) are permanent structures used to trap coarse sediments, trash, litter, and other floating materials. Usually, they are located upstream of constructed wetlands and receiving waters. They consist of an energy dissipater at the upper end, concrete sediment trap and trash rack at the lower end. Sometimes a "mini" wetland is incorporated at the downstream end.

**Description**

2. Refer to Orange City Council Development and Subdivision Code Volume 3 - Design Specifications - D7 - WATER AND SOIL EROSION CONTROL.

3. Design traps to intercept at least 75 per cent of sediment with a grain size of 0.04mm or greater under average annual runoff conditions. Further, ensure peak flow velocities are less than 0.3 metres per second in the 1 year ARI storm event, and taking into account any likely backwater effect from a blocked trash rack.

**Sediment Interception**

4. The structure should have sufficient capacity and stability to discharge the Stormwater Management Plan for the City of Orange – 2008

**Capacity**

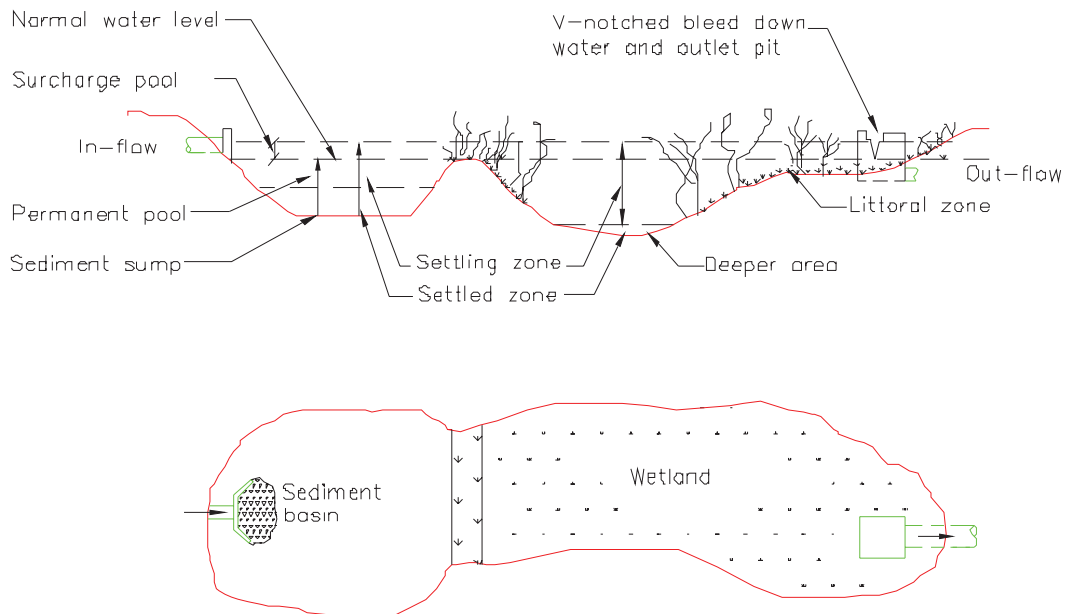
inlet flow with the trash rack fully blocked without flooding adjacent properties.

5. Ensure GPTs are capable of gravity drainage to a dry condition for periodic cleaning and maintenance if at all possible.

**Maintenance Requirement**

**OD3.21 WETLANDS**

1. Refer to Orange City Council Development and Subdivision Code Volume 3 - Design Specifications - D7 - WATER AND SOIL EROSION CONTROL.
2. As wetlands are still in an evolutionary phase the designer should investigate fully the suitability of the area for a wetland.



SEDIMENT BASIN/CONSTRUCTED WETLANDS

**Figure OD3.4 - Example of a Sediment Trap/Constructed Wetland**

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