



WALLAGA LAKE URBAN STORMWATER REVIEW

JULY 2004

Prepared by

Peter Spurway & Associates Pty Limited

495 Bingi Road

Bingi NSW 2537

WALLAGA LAKE URBAN STORMWATER REVIEW

CONTENTS

INTRODUCTION.....	1
REVIEW OF URBAN CATCHMENTS	2
AKOLELE.....	2
BEAUTY POINT.....	2
<i>Open swale drain adjacent No. 39 O’Connells Point Rd.....</i>	<i>2</i>
<i>Headwall on No. 57 O’Connells Point Rd.....</i>	<i>2</i>
<i>Bottom of Brighton Park Road.....</i>	<i>3</i>
FAIRHAVEN	3
<i>Pipe Adjacent No. 30.....</i>	<i>4</i>
<i>Open easement beside No. 54.....</i>	<i>4</i>
<i>Piped easement through No. 78.....</i>	<i>4</i>
<i>Pit beside No. 108.....</i>	<i>4</i>
WALLAGA LAKE HEIGHTS.....	4
<i>Council Reserve north of village.....</i>	<i>5</i>
<i>Wallaga Street.....</i>	<i>5</i>
STORMWATER MANAGEMENT OPTIONS	5
EROSION AND SEDIMENT CONTROL.....	6
GENERAL DISCUSSION.....	6
COUNCIL DEVELOPMENT APPLICATION PROCESS.....	6
<i>Eurobodalla Shire Council (ESC).....</i>	<i>6</i>
<i>Bega Valley Shire Council (BVSC).....</i>	<i>8</i>
STORMWATER EDUCATION CAMPAIGN	11
GENERAL DISCUSSION.....	11
POTENTIAL TARGETS.....	11
COST OF MATERIALS.....	11
PREFERRED PROGRAM ITEMS.....	12
OTHER EDUCATIONAL MATERIAL	15
<i>Fact Sheets.....</i>	<i>15</i>
<i>State Agency Literature.....</i>	<i>15</i>
CONCLUSIONS	17

LIST OF FIGURES, PHOTOGRAPHS & TABLES

PHOTOGRAPH 1 - DRAINAGE OUTLET - NO. 57 O'CONNELLS POINT RD, BEAUTY POINT	3
TABLE 1 ESTIMATES OF HOUSE NUMBERS IN WALLAGA LAKE CATCHMENT	12
TABLE 2 INDICATIVE COSTINGS FOR STORMWATER EDUCATION MATERIALS.....	12
YEAR 1 POSTCARD (REVERSE SIDE).....	14
POSSIBLE YEAR 2 STORMWATER LOGO FOR FRIDGE MAGNET.....	14
ESTUARY FACT SHEET	16

WALLAGA LAKE URBAN STORMWATER REVIEW

INTRODUCTION

This report covers stormwater issues along the urban foreshore of Wallaga Lake, on the South Coast of NSW. It forms part of a suite of projects related to water quality, foreshore vegetation and soil and water management that was carried out over 2003 and early 2004 by Peter Spurway & Associates Pty Ltd for the Wallaga Lake Estuary Management Committee and Bega Valley Shire Council.

The report focusses on the villages of Akolele, Beauty Point, Fairhaven and Wallaga Lake Heights on the eastern side of the lake. It includes a review of stormwater catchments in these villages based on site inspections. These catchment areas invariably drain to Wallaga Lake.

We include costing details for possible components of a local Stormwater Education Program that Council can utilise for Wallaga Lake, should it so desire. The program could be easily broadened to other areas of the Shire if necessary. Other resources provided to the committee include a Fact Sheet on Sediment and Erosion Control, local to the estuary, for use at public meetings, shows and other events.

REVIEW OF URBAN CATCHMENTS

This review summarises the findings of a series of site inspections of local stormwater outlets around the lake foreshore. These inspections were carried out by the consultants through 2003 and incorporated a period when the lake level was elevated in March 2003 as well as periods of lower levels in the later parts of the year.

AKOLELE

Akolele is the oldest urban area around the lake and consequently disturbance due to building work is less likely to be an issue than newer developing areas. No drainage lines have been inspected by land. From a boat inspection low impacts would be likely from sediment loads from the single major gully that discharges into the estuary from the north of the village.

Future development potential in Akolele is restricted by the village's sensitive coastal location (as designated under SEPP 71) and the surrounding mainly rural zoning. A small undeveloped area north of the village is zoned Urban 2g residential. Future development of this area would be required to consider the objectives of the NSW coastal Policy, and would be required to demonstrate a 'no nett increase' of pollutants to the lake.

BEAUTY POINT

Beauty Point has some steep areas that could generate fine sediments, if disturbed without sound site management. There is some evidence of organic material such as leaf litter and grass discharging to the estuary, both from open drains and from foreshore reserve mowing practices, particularly when the lake level is high.

The following areas were inspected in late April 2003:

Open swale drain adjacent No. 39 O'Connells Point Rd

There are no issues with this open drain which is well vegetated and discharges onto private property.

Headwall on No. 57 O'Connells Point Rd

This drainage system runs up to Beauty Point Road and discharges through mostly open channel, crossing O'Connells Point Road in 600mm diameter pipe. A new headwall is sited at the rear of house no. 57, situated some 20 metres from the lake in a moderately steep area. Flow discharge is over a newly-constructed rough concrete dissipater to control exit flow velocities and prevent local scour. The photograph of this headwall (**Photograph 1** overleaf) shows temporary silt fencing remaining from the construction period.

There is evidence of leaf litter and mud in stormwater pits on O'Connells Point Road, which would flow to the estuary under most flow conditions. The combination of open drains and well vegetated forest areas in this catchment are a source of organic material which would be difficult to control.



Photograph 1 - Drainage outlet - No. 57 O'Connells Point Rd, Beauty Point

Bottom of Brighton Park Road

Two 450mm diameter stormwater lines discharge to the foreshore reserve at the bottom of Brighton Park Road. The eastern drain has a small catchment and discharges to a 20 metre wide flat grassed buffer strip on the reserve. The western drain shows evidence of having discharged litter to a grassed , recently excavated outlet some 15 metres from the lake edge. The latter 10 metres is well grassed, however this would be submerged by high lake levels and there would effectively be no buffer at these times.

These catchments would prove a potential source of sediment to the lake as the buffers are inoperative at times of elevated lake levels.

FAIRHAVEN

The older urban area in Fairhaven has four main drainage lines which pick up stormwater from Fairhaven Point Way and discharge to public reserves on the lake waterfront. These are reviewed below.

Road drainage from the Endeavour Circuit area passes through forested reserve and is not concentrated into stormwater pits or pipes to any extent. Urban water quality issues are critical from this

area as it drains to Meads Bay, a part of the lake that is not well flushed. Meads Bay has been shown to be particularly vulnerable to low Dissolved Oxygen concentrations. Water quality issues at this part of Fairhaven relate to diffuse sources (i.e. not a point source such as a pipe) and are better managed at the source, by controls such as sediment and erosion on-site management.

The following records inspections of the Fairhaven Point Way area early in March 2003.

Pipe Adjacent No. 30

There were no obvious issues with this pipe, the discharge point was not visible at the time of inspection.

Open easement beside No. 54

This drainage easement comprises buffalo grass with healthy stand of she-oak. Blackberry and bridal-veil creeper were noted as having taken a strong hold. Despite these weeds issues, the easement itself forms an excellent vegetated buffer to the lake. Chemical blackberry control, if performed, should be carried out in an environmentally sound manner in this location. Revegetation with suitable native species should be part of any weed control program to enable treated areas to quickly revegetate.

Piped easement through No. 78

This pipeline drains a section of very flat roadway. The gentle road gradient has caused large amounts of sand and road gravel to collect in the kerb around the inlet pit. There is evidence of this material having discharged into the stormwater pipe, presumably under high flows. Gravel has collected at the discharge point within No. 78 where a shallow scour hole has formed. This is situated some 20 metres from the lake with this strip well vegetated by she-oak. The probability of substantial sediment loads being discharged to the lake is low.

Pit beside No. 108

This pipeline discharges at a headwall through a linear public reserve system to the lake. A second pipeline discharging to this reserve was not located. The vegetated buffer provided by this reserve provides an excellent buffer to the estuary. Garden escapee weeds in this 'drain' are also evident.

WALLAGA LAKE HEIGHTS

Wallaga Lake Heights discharges to the lake entrance area. This part of the estuary is well flushed and mixed at times when the lake is open. Further, sediments are sandy, making them less likely to hold nutrient loads. As such, there is generally less risk of long-term pollution from this area at times of an open lake entrance. However under the more typical times of lake closure the potential for localised water quality degradation means that this area should be considered seriously in terms of risk to estuary health.

The following areas were inspected in late April 2003:

Council Reserve north of village

Two stormwater pipes (diameters 375mm and 600mm) discharge into this reserve, taking road water from the top end of Lake View Drive. The reserve forms an excellent buffer vegetated mainly by casuarina. Impacts on the estuary from these catchments would be very low.

Wallaga Street

Wallaga Street and the southern part of Lake View Drive drain to stormwater pits which discharge through a 450mm pipe to the grassy foreshore reserve at the carpark entrance. Some scour of the gravel carpark verge is evident at the discharge point. Sediments appear to be contained on the grassy reserve and lake impacts would be expected to be relatively low. Some minor regrading and sealing work could tidy up the eroding gravel shoulder at this location.

STORMWATER MANAGEMENT OPTIONS

The discussion in the section above makes mention of a number of relatively minor local issues around the lake foreshore, each of which could make some improvement to stormwater quality.

In summary, the issues from Wallaga Lake from urban stormwater relate to potential catchment disturbance on steeper slopes. Areas around Beauty Point are most vulnerable as slopes are generally steeper in this area, foreshore buffers are narrow (or at high lake levels, non-existent) and the village's mostly shaley soils can generate fine sediments that would be mobile over potentially long distances.

One advantage that many of these developed areas have over other urban areas is that their urban creek lines are mostly in a natural state and well vegetated. This is considered appropriate best practice and replacement of these vegetated channels with hard-lined culverts or drains should be resisted.

Management of future catchment disturbance by the imposition of erosion and sediment controls for roadworks, building and other development-related works is the most appropriate response to stormwater management in these mainly developed areas. Options are discussed in the next section of this report.

EROSION AND SEDIMENT CONTROL

GENERAL DISCUSSION

Local government has a leading role to play in the issue of soil and water management on building sites. Rates of soil erosion will logically be highest where vegetation cover has been disturbed or removed, and where water has been artificially concentrated. Sediment pollution, associated increased nutrient loads associated with sediment discharge, and turbidity are all issues that can be managed with sound site planning and maintenance.

Best management erosion and sediment control practices should apply to the catchments of sensitive waterbodies such as Wallaga Lake.

COUNCIL DEVELOPMENT APPLICATION PROCESS

Councils are able to impose conditions at the time of development consent to make owners, contractors and builders aware of their responsibilities for these issues. We have compared the practices of both Bega Valley and Eurobodalla Shires in dealing with development consent for an urban dwelling.

Eurobodalla Shire Council (ESC)

ESC has for some years routinely issues an information pamphlet on erosion and sediment control with development consents. This outlines contractors' and owners' site responsibilities throughout the construction project. Council does not routinely require erosion control plans to be prepared, unless the development involves major site disturbance in a sensitive location.

ESC has introduced additional site requirements late in 2003. At the time of consent, two A4 size plastic warning signs are now provided by council. Builders are required to attach these signs to sedimentation fences. The signs are a visual reinforcement of the need to provide and maintain on site erosion control works as the owner's / contractor's responsibility. Under conditions of the approval, these signs must be displayed on the most prominent silt fence for the life of the project.

WARNING - UP TO \$1500 FINE

**This sediment control device
keeps soil out of our waterways.**

**By law it must be
maintained and protected.**

Please report inadequate sediment controls by calling ESC on 4474 1000.

ESC utilises the following standard condition when development consent is given for domestic construction.

To minimise soil erosion during construction, the owner and builder shall ensure that the following measures are implemented in the sequence outlined:

- (a) A dish shaped diversion drain or similar structure will be constructed above the proposed construction site to divert run-off to a stable discharge area such as an area with a grass cover. (This diversion drain is to be lined with turf or otherwise stabilised if it erodes after rainfall).*
- (b) A sediment trapping fence using a geotextile fabric specifically designed for such a purpose and installed to manufacturer's specifications is to be placed below the construction area (e.g. "Silt Stop" or similar).*
- (c) Vegetation is to be cleared from the immediate construction site only, other areas are to remain undisturbed.*
- (d) All erosion control measures will require timely maintenance after rainfall. They shall be retained until the site has fully revegetated.*
- (e) Top soil from the construction site or builder's sand is to be stockpiled in a location where it will not be eroded from the site and is not to be stockpiled on the road reserve.*
- (f) If soil or other materials are spilt accidentally onto the road gutter, they shall be removed prior to the completion of the day's work.*

Reason: *The reason for this condition is to avoid pollution of Council's drainage system and waterways.*

ESC has held staff training and information sessions for contractors to assist them to manage these issues. These sessions were very poorly attended by the building industry. Ultimately council staff found the most effective method of information dissemination was by on-site discussion with local builders, when copies of the Hawkesbury Nepean Trust Handbook were supplied.

Compliance with best practice has improved over the past five months. For a four month period up until Christmas 2003 an introductory moratorium period was applied, where council's Building Inspectors would issue a notice for non-compliance. Rangers would follow up with a second warning. Since early 2004 this system has been replaced with the issuing of a Penalty Infringement Notice (PIN) if the first notice is not rectified within one week. Rangers provide the follow-up service on behalf of Building Inspectors and use digital camera evidence in case legal action results. The first fine of \$320 is an Administration Fee allowed for under the Protection of the Environment Operations (PoEO) Act. A second fine for repeat offences can involve \$1500 for a builder or \$750 for an individual (i.e. owner builder).

Council enforces requirements for the control and covering of garbage on a building site, which proactively manages the issue of windblown rubbish. Similar fines can be imposed and vigilance of both Rangers and building Inspectors is utilised.

Bega Valley Shire Council (BVSC)

Bega Valley Shire Council's standard practice is to require the lodgement of a sediment and erosion control plan to accompany a Development Application, if the area of site disturbance is greater than 200 sq. metres. This is an excellent way to focus builders and contractors on the issue before site disturbance commences. Its success will rely on clearing and excavation contractors having access to the plan.

The following standard condition of consent reinforces the necessary control measures:

An Erosion and Sediment Control Plan (ESCP) shall be prepared in accordance with the provisions of the NSW Dept. Housing "Managing Urban Stormwater – Soils and Construction (3rd Edition 1998) and submitted for approval by the Principal Certifying Authority prior to the release of the Construction Certificate. As a minimum the following control measures shall be identified on the plan.

- a) *A temporary constructed exit shall be provided and shall consist of a pad of coarse crushed rock, crushed slag or gravel (25mm to 75mm range) having a minimum depth of 200mm minimum length of 45m (7.5m in residential zone) and minimum width of 4m.*
Or
Alternatively a concrete or similar standard vehicle access crossing shall be constructed to the street (to Council's specifications).
- b) *Fencing shall be used to restrict all vehicular movements to the stabilised entrance.*
- c) *Topsoil shall be stripped and stockpiled for future use.*
- d) *All stockpile locations shall be shown on the ESCP and be at least 2 metres clear of all Areas of concentrated water flow and the driveway.*
- e) *Lands to the rear and side of the allotment and on the footpath shall not be disturbed during works except where essential e.g. drainage works across the footpath. Where works are necessary, they will be undertaken in such a way as to leave the lands unstabilised for as short a period as practicable. They will be rehabilitated as soon as possible. Stockpiles will not be placed on these lands and they will not be used as vehicle parking areas.*
- f) *Approve bins for concrete and mortar slurries, paints, acid washings and litter will be provided and arrangements made for collections and disposal.*
- g) *Provision of mesh and gravel "sausage" protection shall be provided to protect gutter inlets near the allotment.*

- h) Provision of sediment control and barrier fences to the perimeter of the site depending on the fall of the land.*

Where site disturbance is judged to be less than 200 sq. metres, BVSC utilises the following standard conditions of consent for sediment and erosion control.

Erosion and sedimentation control measures are to be applied during site development in accordance with Council's Guidelines as follows;

- a) Erosion and sediment control measures shall be installed prior to the clearing of any site vegetation.*
- b) Site clearing and disturbance shall be confined to the base area of the approved structure, sites of permanent accessways and land extending a maximum three (3) metres beyond the building envelope.*
- c) Topsoil only be stripped from approved areas and shall be stockpiled for re-use during site rehabilitation and landscaping.*
- d) Uncontaminated runoff shall be intercepted and diverted around all disturbed areas.*
- e) The capacity and effectiveness of the erosion and sedimentation control measures shall be maintained at all times.*
- f) All disturbed areas shall be progressively revegetated or stabilised to prevent erosion.*
- g) Stormwater from roof areas shall be collected and linked to a Council approved disposal system immediately after completion of the roof.*
- h) All disturbed areas shall be rendered erosion resistant by turfing, mulching, paving or otherwise suitably stabilised within thirty (30) days of completion of the structure and before erosion and sediment controls are removed.*

Temporary sediment fences (eg hay bales of geotextile fabric). Shall be installed and the site prior to excavation in accordance with Council's Guidelines.

This approach relies on follow-up inspections which are carried out by building staff.

There is some conflict about whether there is distinction given to sensitive areas such as lake frontage blocks. This practice could be refined to recognise that sensitive areas such as lake reserve-frontage properties around Wallaga Lake should warrant special attention. Possibly the 'Sensitive Coastal Location' mapping defined by SEPP 71 could be utilised to flag these properties in the first instance.

There is the added possibility of Council providing information with development approvals, targeting those with little background in the issues concerned. Owner builders would be one such target group.

The Eurobodalla A4 folded brochure may provide a simple starting point for this information. It provides some graphic photographs of what not to do (see below) and simple guidance on common practices.



Should it so desire, BVSC could contact Gary Smith (Environment Planner) at Eurobodalla to gain access to artwork. Gary confirms that BVSC can utilise this material in whole or in part, which could simply be rebadged for BVSC.

STORMWATER EDUCATION CAMPAIGN

GENERAL DISCUSSION

A stormwater education campaign can improve the level of understanding of a community by conveying clear messages about:

- The nature of the problems caused by inappropriate behaviour
- Alternative actions that provide solutions.

Bega Valley Shire's urban areas have benefited over the past two years from regional stormwater education activities participated in by all councils from Bega Valley to Wollongong. The regional program of "The Drain is Just for Rain" television advertisements, radio ads and contests has been successful, having last run over Easter 2003 (Liz O'Farrell ESC pers. comm.).



This message is now familiar to most people in the local area and should be part of any follow-up campaign. Repetition of a consistent message has been found to play a large part in changing human behaviour and raising awareness of issues.

POTENTIAL TARGETS

Obvious targets are the urban villages on the lake frontage. These total some 373 houses with additional potential distribution points at local tourist accommodation centres on the lake (see **Table 1**).

Expansion to rural areas would increase the number of houses targeted to almost 600. However rural matters in the Wallaga catchment are very different to runoff and erosion control issues in the urban setting. We would recommend an initial stormwater education program focus on the urban villages.

COST OF MATERIALS

Assuming we focus on these urban areas, budget estimates for a variety of relevant educational materials follow in **Table 2** overleaf:

Table 1 Estimates of House Numbers in Wallaga Lake Catchment

Area	Number of Houses
Fairhaven	76
Beauty Point	148
Wallaga Lake Heights	61
Akolele (ESC)	61
Koori Village (ESC)	27
Sub-total residential areas	373
Cobargo	150
ESC Rural	15
BVSC Rural	35
Sub-total rural areas (estimate)	200
TOTAL HOUSES	573

Table 2 Indicative Costings for Stormwater Education Materials

ITEM	DETAILS	TOTAL COST
Bumper Stickers	170 x 70 mm - Min. 1000 @ 70 cents each	\$ 700
Small Stickers	70 x 70 mm – Min. 2000 @ 55 cents each	\$1100
Fridge Magnets	500 @ 60 cents each	\$ 300
Colour brochures DL size	500 @ 60 cents each	\$ 300
Fridge Magnet and colour brochure combination	500 with gluing (10c) & delivery (10c)	\$ 700
Postcards - pollutants	500 @ 40 cents each	\$ 200
Calico Bags	500 @ \$4.00 each	\$2000
Stormwater Hats (logo)	20 @ \$10.00 each	\$ 200
T-shirts (logo)	20 @ \$20.00 each	\$ 400

Notes:

- *Cost for 1,000 items is about 1½ times the costs for 500 items.*
- *Some businesses have a minimum order of 1000 or 2000 e.g. stickers*

PREFERRED PROGRAM ITEMS

In developing a stormwater education campaign, the committee needs to be aware of and determine:

- Who is to run the campaign – the costs to hire a campaign coordinator will far exceed the cost of materials.
- Will the campaign be a one-off distribution of materials or a regular event (annual Cobargo show, Bermagui markets etc are possible venues but possibly require volunteer effort).
- How will materials be distributed – mail, direct contact, letterbox drop, with council rate notices etc.
- If voluntary involvement, consider T-shirts and hats for developing an identity to reinforce the campaign theme.
- If based on Cobargo Show or markets, consider calico bags to hold brochures (expensive but visually effective).

We note that no funds have been identified for coordination of the campaign and hence assume a relatively low-key initial program. We make the assumption that the committee wishes to highlight the importance of stormwater issues with a simple, once-off campaign at this stage. We also assume that the committee will look to council for issuing broader educational material to ratepayers from its usual outlets in the longer term.

On this basis, we would recommend the following program:

Year 1

- **A 'Pollutant Postcard'** depicting on its full colour front side stormwater drain locations around the urban areas of the lake. The rear of the card repeats some simple messages about urban pollutants and everyday things to make a difference. Printing cost for 500 postcards is \$200 with letterbox distribution by bulk mail an additional \$50.
- **TOTAL COST \$250.**

The card front would contain an image of Wallaga Lake showing the location of stormwater drain discharge points. Sample text on the back of the card is depicted overleaf.

Year 2

- A folded DL - sized (200mm x 210mm) colour **Brochure** with **Fridge Magnet** combination with a budget price for 500 of about \$700, including folding, gluing and bulk mailing charges. (Note the fridge magnet would benefit from having a logo with local design input, or alternatively the EPA-produced logo could be localised and used as a base - **see example following**.)
- Spare fridge magnets (500) at extra cost of 40 cents each for a further \$200.
- Distribution of spare magnets to caravan parks, bed and breakfasts and motels would be by local volunteers at no extra cost.
- **TOTAL COST \$900.**

Wallaga Lake Stormwater

All rainwater that runs off your roof, driveway, garden and street flows down the nearest drain into Wallaga Lake.

On its way to the stormwater drain, runoff from your house can pick up and take with it many possible water pollutants.

Most people know about damage caused by visible pollutants like litter and dumped rubbish. But did you know that natural waste like leaves, soil and grass clippings plus pollutants you can't see like pesticides, fertilisers, oils, detergents and paints, can also have a devastating effect on water quality and aquatic life in our lake?

Reducing stormwater pollution starts with you

There are many simple everyday things that you can do that will make a difference.



BVSC Logo

It's simple!

- ✓ Sweep up and compost leaves and grass clippings.
- ✓ Protect piles of soil, sand or mulch so they can't wash or blow away.
- ✓ Bin your rubbish and cigarette butts.
- ✓ Sweep - don't hose.
- ✓ Wash your car on the grass or at a car wash.
- ✓ Use non-chemical pesticides and fertilisers.
- ✓ Dispose of paints and chemicals correctly.
- ✓ Always pick up pet droppings.

The health of Wallaga Lake and its residents depends on everyone living and working in its catchment. So please, do your bit to help keep Wallaga Lake healthy for our future.

For more information

Call Bega Valley Shire Council on 6499 2222

Year 1 Postcard (Reverse side)



Possible Year 2 Stormwater Logo for fridge magnet

OTHER EDUCATIONAL MATERIAL

Fact Sheets

We are advised that the committee is in need of local resource material to support its efforts at public meetings. We have supplied a Fact Sheet for the committee's use detailing the importance of Sediment and Erosion Control issues in the Wallaga Lake catchment. The brochure is reproduced overleaf. Similar brochures could be developed explaining the importance of vegetation on the foreshore and creek-banks ('riparian vegetation') as an important buffer for the filtering of runoff.

State Agency Literature

Existing resource information on soil and water management issues can be utilised by council and the committee. This information is of variable quality and relevance, but includes some appropriate resource material. Council may already provide distribution points for this information.

There would not seem to be additional local points of distribution for this type of information that the committee could immediately utilise. However they could be distributed by the committee at public meetings or at events such as the Cobargo Show, should it be interested in this type of future activity.

Some of the more relevant material would include:

- DIPNR provides councils with free brochures for trades such as builders, landscape contractors, bricklayers and others. They also have a general brochure on soil and water management for building sites.
- Generic fact sheets developed by NSW EPA can be made available for distribution at council outlets. These cover such issues of relevance to Wallaga Lake as Nutrients in Stormwater, Sediments in Stormwater, Controlling Erosion and Sediment, and Planning the Job Site.
- An excellent free 24-page booklet suitable for builders and owner builders is available from the Hawkesbury Nepean Catchment Management Trust, entitled "Guidelines for Erosion & Sediment Control on Building Sites" (Second Edition 2001).
- The A4 coloured information brochure developed by Eurobodalla Shire Council to accompany development consents. It may be advantageous for consistency to continue the distribution of this brochure (rebadged as required) into Bega Valley Shire. The contact at Eurobodalla, should BVSC wish to follow up this option, is Gary Smith, Environment Planner.

Estuary Fact Sheet



WALLAGA LAKE

SEDIMENT and EROSION CONTROL

WHY ARE SEDIMENTS A PROBLEM?

- Sediments are solid particles such as sand, soil, silt and clay, sometimes with pollutants such as phosphates and nitrates attached.
- If they reach Wallaga Lake, these sediments can settle on the bed of the lake and smother animals and plants such as seagrasses. Nutrients in sediments can be released to the lake waters during warmer weather. This has led to algal blooms and fish and invertebrates kills.
- Sediments can also cause the lake to become muddy or turbid, which reduces the penetration of sunlight and can have some unfavourable results for seagrass growth.
- Deltas such as the one formed where the entrance to Narira Creek meets the lake have formed over centuries, produced by eroded sediments from the catchment. These deltas can produce cut-off embayments such as Black Lagoon and Meads Bay, which now receive less flushing and experience reduced water quality compared to the main lake basin.
- Sediment infill rates for Wallaga Lake are now estimated to be eight times greater than those prevailing prior to European settlement. At these infill rates, the next 50 years should see the deltas advancing a further 200 metres into the lake.

WHY IS SEDIMENT IN WALLAGA LAKE?

- Estuaries such as Wallaga Lake are natural traps for sediment. Because the lake is often closed to the ocean, sediments will tend to accumulate on the bed of the lake.
- One of the effects of landclearing is to reduce the amount of rain that can seep into the soil. This increases the speed and volume of runoff during a storm. Over time this leads to erosion of topsoil and bed and bank erosion in creeks.
- This erosion adds much more sediment to Wallaga Lake in comparison to natural conditions.
- Impervious surfaces in urban areas such as roads, gutters, roofs, concrete and pavers also increase volumes of runoff, which enter the lake via stormwater drains.

WHAT CAN WE DO?

- Sweep and collect dirt or soil from stormwater gutters and drains or on the road and discard in the garden or garbage bin.
- If building or landscaping, cover stockpiles of sand or soil and place barriers on the downslope side to prevent loss during rain or high winds.
- Reduce the amount of concreted areas in your yard. When landscaping, consider using more porous surfaces such as brick or clay pavers. These techniques can retain up to 80% of sediment.
- Cover bare soil surfaces with mulch to prevent erosion. Planting of groundcovers provides living mulch for longer-term protection.
- The regeneration of trees and shrubs will help to reduce erosion. Vegetation also helps to intercept overland flow and reduce the intensity of runoff.



CONCLUSIONS

Urban stormwater drainage and water quality issues in urban catchment areas of Wallaga Lake have been investigated and some practical remedial measures suggested.

The erosion and sediment control practices of both councils in the Wallaga Lake catchment are compared for domestic urban development. Some ideas for extension of the more recent expansion of the Eurobodalla program into Bega Valley Shire are put forward for discussion.

Future development and associated soil disturbance is judged to potentially have locally significant impact on the waterway from urban lakefront areas unless properly managed. Discharge of organic material, nutrients, oil, pesticides and chemicals are also potential threats in the urban environment at any time.

A two staged program of stormwater education is proposed, focusing on the major issues related to sediment control and urban nutrient loads. Full costing details for materials are provided.