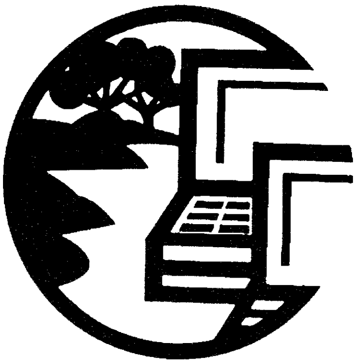

Your results and the next steps

After conducting your chosen tests, you need to interpret your results. Remember the assessment your stream's water quality needs to be based on a combination of tests and surveys, since one test or survey will not give you an accurate and conclusive result. Base your interpretation on a combination of habitat, biological, physical and chemical results for your site(s). If you are not able to collect all these results yourself, search for second-hand data about your site from local water authorities .

Record Keeping - Write up your results for each sampling time

Draw up a table to show which test(s) you conducted, the dates, and their result. Keeping records in electronic form can also be useful when you wish to graphically represent results. A variety of spreadsheets and databases exist which can be used for this process. The National Waterwatch Offline data entry can also be used to generate files for use in a national database being developed.

Compare your results over time to see if they are consistent or if a trend emerges. Using the combination of these results, together with the table of indicators at the end of this section, make a broad assessment of water quality.

Offline Data Entry/Waterwatch database

A National Waterwatch data entry program has been developed for use on both IBM and Macintosh computers. All data can be entered using this 'easy to use' program and then passed on to regional co-ordinators so that information for the whole of catchment can be consolidated.

All Waterwatch co-ordinators have access to a Waterwatch database program which runs on Microsoft ACCESS. By passing on results to co-ordinators, information for the whole of catchment can become available to you.

During 1996, a number of Waterwatch internet sites in development as well as a means of sharing data electronically. Contact your local co-ordinator for more information on record keeping, offline data entry, the Waterwatch database or internet sites.

Cross-checking your results

If your assessment indicates poor or very poor water quality, the first step is to repeat your tests and survey to verify their result. It could be that you conducted the tests incorrectly.

If after repeating the tests yourself, you still get a poor or very poor water quality assessment, then ask a local water authority to test your monitoring site(s) with their equipment and expert staff. This will cross-check that your result is accurate.

If your local water authority confirms the poor or very poor rating, then you can interpret your result with confidence and begin to investigate possible causes for the decline in water quality and plan appropriate actions to improve it.

Interpreting your results

The results from your monitoring program need to be interpreted according to the location of the monitoring site(s) within the catchment. Review the Getting Started section of this manual for details.

How does your waterway rate? Is it polluted or clean?

Do any particular tests show high readings that may indicate high levels of pollution?

If so, what do you think may be causing this to happen?

Discuss this with your monitoring team and local water authorities and interested people, and decide how the matter could be investigated further.

If you detect pollution, try to find out where it is entering the waterway.

What could be the causes of your stream's poor water quality? Look at your individual test results for clues. For example, if your test for phosphorus showed a high reading, and your macro-invertebrate survey showed low variety and a predominance of high-tolerance species, what may be some possible cause(s)?

Look up further information such as:

- the table on 'Some types of pollutants, common sources and their effects on water quality' in this section;
- the notes on land use practices in this section for information on possible sources of pollutants
- the notes on point- and non-point-source pollutants in this section
- the introductory notes to each chemical test
- second-hand data from water authorities

Continuing with this example, try to identify possible sources of phosphorus in your catchment. Can you identify any point sources that may be contributing high phosphorus outputs in the waterway? Look at your base map with local land uses marked on it for possible clues of non-point-source phosphorus inputs into the waterway.

To interpret the data you gather during your surveys and tests you need to know the normal values for your water body. In some cases they may not be known and so it may be that the purpose of your monitoring is to establish such baseline data.

If some baseline data already exist for your water body you can use these as a reference point against which to interpret your readings.

For example, is the high phosphorus reading a natural level in your catchment, or does it occur only after heavy rains when run-off carries larger than usual amounts of phosphorus?

Pollution sources

Pollution can enter a catchment from point sources or diffuse sources.

Point-source pollution is waste that comes from a specific site or location. For example, discharge pipes from industry or waste-water treatment plants that lead directly from their waste processes to a waterway. These are easy to identify as coming from one site.

Diffuse or **non-point-source pollution** is run-off from any land use where water flows over the land and picks up pollutants as it travels. These pollutants are then carried to local streams and rivers. It may also involve air-borne pollutants that are deposited in waterways. Run-off can be either rural or urban non-point-source pollution.

While both categories of pollutants can have severe effects, they differ greatly in terms of our ability to control them. Point-source pollution is the easier to identify and control, since not only are the origins of non-point-source pollution much harder to identify, it is often the result of general land use practices across an entire catchment.

Some types of pollutants, common sources, and their effects on water quality

Pollutant	Common sources/land uses	Some effects on water quality
Organic matter (derived from living matter)	Sources include: dairies; stockyards; saleyards; food-processing plants; fish farms; sewage-treatment plants; abattoirs; industry.	Results in expansion of bacterial populations, which then deplete oxygen supplies, leading to the death of aquatic animals.
Suspended solids (particles suspended in the water)	These consist of sediment [dirt, soil, clay, sand] and particulate matter [contained in smog and dust]. Sources include: soil erosion; soil disturbance; smoke and smog; wear and tear of buildings, roads, vehicles, machinery; industry; quarries; swimming pools; agricultural, forestry and construction site run-off; fish farms; mining wastes; boat traffic; storms.	Suspended solids can smother bottom dwelling plants and animals and reduce photosynthesis, thereby limiting aquatic plant growth and reducing available food for herbivores. They reduce visibility and consequently the ability of sight-feeding animals to catch their prey; and they clog fish gills. The accumulation of sediment can increase the risk of flooding and navigation hazards. Sediments can also carry pesticides, nutrients, organic matter, pathogens and toxins.
Plant nutrients (such as phosphate and nitrates)	Sources include: fertilisers; animal wastes, especially from intensive agricultural industries like piggeries, poultry farms, dairy farms or feedlots; sewage-treatment plants; sewage and septic tanks; kitchen scraps; tip leachate; detergents and laundry powders; domestic and industrial waste-water; urban storm-water run-off; run-off following bushfires; removal of natural vegetation; soil disturbance.	An increase above natural levels can adversely effect ecosystem balances; for example eutrophication (over-enrichment of waters) leads to decreased dissolved oxygen levels, tainted water and reduced aesthetic quality as well as increased risks to health from toxins.
Pathogens (micro-organisms that can cause disease, including bacteria such as *E. coli,* viruses, fungi and parasites)	Sources include: animal faeces, garden fertilisers; septic tanks and unsewered houses; sewer overflows; sewage-treatment plants; abattoirs; food-processing plants.	Pathogens can cause disease in plants and animals, including humans.
Toxic substances (like heavy metals; petroleum derivatives; polychlorinated biphenyls (PCBs); cyanides; pesticides)	Sources include: pesticides, herbicides and fertilisers; treated timber; paints, solvents and cleaners; manufacturing processes and by-products; landfill leachate; plumbing and wiring; cosmetics; batteries; vehicles (fuel, tyres, brakes, rust, plating); galvanised metals (roofs, fences, poles); industry (manufacturing; refining); sewage-treatment works; mining wastes.	At certain concentrations, toxins inhibit important biological processes and/or cause physical distress in wildlife. They have a cumulative effect in food chains; and some (such as PCBs) may be mutagenic or carcinogenic
Thermal waste	Sources include: waste heat from industry; power plants.	Reduces dissolved oxygen concentration; interferes with aquatic life cycles; can cause change in invertebrate population composition, with subsequent effects on the food chain. Very hot discharges can kill fish, and cause excess growth of slime and algae.
Litter (any solid discarded material)	People: shopping and commercial centres; industrial sites; landfill sites; rubbish thrown from cars; overflowing bins.	Litter poses a health and safety risk to humans, and to aquatic and marine animals. It reduces the aesthetic value of our neighbourhood and waterways.

Land use practises

The quality and quantity of water in the stream depend on the topography, soil, vegetation and rainfall in the catchment area. Activities within the catchment, such as urbanisation, agricultural or forestry practices, the construction of urban areas and road-building all have the potential to alter the physical condition of the catchment through soil erosion, sedimentation and salinisation. Rural, urban and industrial activities also increase the potential sources of pollutants that can enter the waterways.

Urbanisation

The urbanisation of land concentrates people, and the pollutants that result from their life style, in areas that are largely covered with impervious surfaces - buildings, driveways, roads, footpaths and car parks. This combination of people, pollutants and impervious surfaces produces urban run-off that often carries a greater pollutant load than municipal sewage.

Several factors influence the amount of pollutants carried in urban run-off with storm-water: traffic density, littering, detergent, fertiliser and pesticide use, construction site practices, animal wastes, soil characteristics, topography of the area, percentage of impervious surfaces, smog level and the amount of rainfall.

Pollutants transported via urban storm-water sewer systems to nearby waters include nutrients (especially phosphorus and nitrogen), bacteria, litter, soil, toxic chemicals and organic (oxygen-consuming) materials. Sources include garden refuse dumped in gutters, overflows of sewage and septic systems, run-off from roads and construction sites and discharges from industrial areas.

Forestry

Depending on the methods used, the harvesting of trees can influence local stream quality. Forestry practices that can transfer pollutants from land to water are road construction, clearing land for fire-breaks, stacking and loading operations during harvesting, mechanical site preparation, controlled burning for site preparation and the application of pesticides and herbicides.

A 'Code of Forestry Practices' is now in place in Victoria, and these have improved markedly over recent years. Some consequences of earlier practices, however, may remain visible and active for some time and influence water quality in the catchment.

Forestry operations can affect the quantity and quality of surface water run-off and therefore the condition of streams. Generally, timber-harvesting increases the quantity of surface run-off, at least in the first few years after operations, by reducing evapotranspiration and resistance to overland flow. The increased run-off can cause soil loss through increased erosion. Much of the sediment is washed from the main disturbed areas, such as unsealed roads, stream crossings, log landings, snig tracks and fire-breaks, where soils are exposed and run-off is concentrated. As trees are re-established, evapotranspiration increases and surface run-off decreases.

Establishment of a young forest may require the use of fertilisers, or pesticides and herbicides, which may then enter streams either in solution or attached to sediments.

Fire, often used for reducing forest fuel loads or for encouraging regeneration, can also affect the quantity and quality of run-off. Some soils develop hydroscopic (water-repelling) tendencies when exposed to high temperatures, thereby reducing their initial capacity to absorb water, and so increasing surface run-off. Lines of weakness may be left when organic material is burnt away by fire, increasing the soil's susceptibility to erosion.

Agriculture

Soil erosion following land clearing or overgrazing, and the use of fertilisers and pesticides close to streams, can contribute to the deterioration of water quality.

Trampling by hooved animals can lead to soil compaction, reducing infiltration and increasing surface run-off. Overstocking, especially near waterways, can also increase the availability of nutrient-rich faeces that may be washed into streams.

The addition of fertilisers to improve pasture or crops can lead to a reduction of erosion through the maintenance of a dense, protective ground cover. Fertilisers dissolve readily in water and the nutrients that are not taken up by plants may be carried into streams via surface run-off or groundwater. Under certain conditions this can lead to algal blooms, and the subsequent death of aquatic animals.

Storm-water run-off from agricultural areas (croplands, market gardens, orchards etc.) can carry sediments, nutrients, bacteria, and organic contaminants into nearby lakes and streams. Cropland erosion is the most significant source of sediment pollution.

Good water-quality and soil-erosion-management practices by individual land managers provide the key to stopping valuable soil loss. They also protect water quality by preventing the movement of sediment and other pollutants from croplands to waterways.

Intensive agricultural activities such as dairies, piggeries and feedlots can create significant pollution problems. Pollutants can include nutrients, oxygen-demanding materials and pathogens.

Stock grazing on steep land can add large sediment loads to streams by causing tunnel erosion, land-slips and farm-track erosion.

Streams unprotected from stock by fencing can suffer from unrestricted stock access, which can lead to major stream-bank deterioration and subsequent loss of stream-side habitat. Stock also pollute the water directly, increase erosion, introduce weeds and disturb the stream-bed.

Construction sites

Construction activities can affect water in three ways. First, excavation and grading operations disturb the natural land cover, and soil stripped of its protective cover can easily be washed into nearby waterways. Second, storm-water run-off often carries materials used on the site, such as oil, grease, paints, glues, preservatives, acids, petrol and solvents, into nearby waterways. And third, inadequate planning - failure to design and construct projects with water quality factors in mind such as peak run-off and flow routes - can accelerate run-off.

Mining

Many physical changes can result from mining activities: changes in water depth; increases in turbidity from extraction; erosion or leaching from stockpiles; depletion of dissolved oxygen; destruction of habitat (for example reed beds, stream-side habitat); disturbance through machinery noise; changes in drainage patterns and natural flood levels; acceleration of erosion and deposition; pollution from run-off of wastes (such as silts or acids); and loss of seasonal fluctuations in wetland water levels through filling.

Lakes, streams and groundwaters can be polluted by sediments, tailings, dust, chemicals and wastes from open pit, strip and underground mines.

Roads

Run-off from sealed roads can pollute streams with lead and other pollutants such as oil and hydrocarbons. Run-off from unsealed roads and tracks with poor drainage may cause stream turbidity or sedimentation if the road crosses or is located near a watercourse.

High-rainfall areas have considerable potential for such erosion where drainage is poor, where tracks are located on slopes and where they are close to streams.

Appropriate road location, the construction of adequate drainage and provision for regular maintenance can reduce the problems that arise from concentrated, high-velocity run-off.

Waterways alterations

Dams and impoundments

These range from relatively low barriers such as those placed across a stream to slow current, through large structures designed for flood control to large water storage reservoirs.

The construction phase can have considerable impact, as described above, and, once in place, the water storage may significantly alter the natural pathway and flow patterns of the waterway.

A dam transforms a flowing stream into a lake-like environment. The current slows and the water warms dramatically, reducing oxygen levels in the reservoir. The dam traps silt and sand, changing the substrate of the river into a lake-like environment, with subsequent changes in aquatic plants and animals.

The downstream environment alters. Most of the nutrients and silt remain behind the dam wall. Water released from the base of a retaining dam may be very cold and low in dissolved oxygen, and so can damage downstream plants and animals. Changes in the size and frequency of floods can affect fringing wetland communities; for example, river red gum forests require periodic flooding to regenerate. Fish reproduction stimulated by changes in water level may also decline.

Channelling

In this process, streams are dug out, straightened and sometimes banked with concrete. It may be done for flood protection, drainage or navigation purposes. The river bottom is dredged out and deposited on the banks, trees and shrub vegetation are removed and the natural river course is straightened.

Channelling has many ecological impacts. Erosion of the straightened river-banks can increase turbidity, and the straightening of the river increases current velocity, which may lead to greater flooding downstream. Aquatic diversity usually drops markedly because of increased water temperatures and the removal of food sources. In urban areas, channels can become conduits for waste.

De-snagging (the removal of fallen trees, logs and debris) can promote erosion by creating erosive eddies and by diverting flow into the banks. Removal of snags can also reduce the habitat available for fish and aquatic invertebrates.

Wetland drainage

Channelling, the expansion of agriculture, and urbanisation have all contributed to the drainage of wetlands. Loss of wetlands means a loss of habitat for waterfowl and fish. Wetlands act as flood-control sites by slowing and retaining run-off, and promote the recharging of groundwater. By capturing run-off materials, wetland vegetation traps sediment and absorbs nutrients, especially phosphorus and nitrogen.

Some particular products

Fertilisers

Nitrogen, phosphorus, and potassium are the three major fertiliser nutrients applied to gardens, crops and lawns. Phosphorus is mainly transported to streams in sediments from soil erosion.

Phosphorus entering water bodies in run-off from overfertilised areas can cause algal blooms, which in turn can lead to toxicity, bad odour and unsightly scum. High phosphorus and nitrogen levels can cause excessive aquatic weed growth, making streams and water bodies unsuitable for swimming and other recreational uses.

Pesticides

Pesticides used to control undesirable plant growth as well as animal pest species, include herbicides, insecticides, fungicides and rodenticides. They are used on agricultural land, on urban and suburban lawns and gardens, in forest management and to control aquatic weeds. While the use of toxic pesticides is being phased out, some may still be present in the soil from earlier use.

Drift from pesticide spraying, run-off from pesticide-treated soil and contaminated storm-water run-off (from pesticide storage, mixing and spray-tank-cleaning areas) can all contaminate streams.

Some indicators of environmental quality

	Vegetation	Macro-Invertebrates	Physical / Chemical
Excellent	Streamside vegetation intact for minimum 100m width from the bank, with continuous cover essentially unmodified and few exotics. Catchment vegetation substantially uncleared. Less than 10% catchment logged.	Natural abundance and diversity of species.	Water clear, minimal turbidity, natural levels of salinity and nutrient levels, and high oxygen levels. Natural levels of toxicants in water column.
Good	Existing streamside vegetation communities intact, with cover essentially unmodified for, at minimum, 30m width for over 80% of segment. Infrequent exotics. Largely undisturbed by roading. Limited permanent clearing of catchment vegetation.	Macro-invertebrate communities intact, with all species abundance, reflecting low level input of wastes and minor catchment modifications.	Water clear, minimal turbidity, natural levels of salinity, low nutrient and high oxygen levels. Natural levels of toxicants.
Fair	Existing streamside vegetation communities predominantly intact and exotics infrequent Riparian zone intact for 30m width, at minimum, for over 60% of catchment.	Minor changes in macro-invertebrate communities, including changes in . community structure and local loss of some species, corresponding to influence of input of water and catchment modifications.	Slight increases in one or more of turbidity, salinity, and nutrient levels. No substantial change in oxygen levels. Natural level of toxicants in water column.
Poor	Existing streamside vegetation largely fragmented and exotics frequent. Riparian zone of 30m width intact for less than 60% of catchment, and frequently disturbed by roading. Catchment segment largely cleared of native vegetation.	Marked changes in macro-invertebrates communities, including changes in structure and local loss of species reflecting significant inputs of wastes, toxicants and other matter.	Marked increases in one or more of turbidity, salinity, or nutrient levels; Some change in dissolved oxygen levels; or significant presence of cumulative or non-cumulative toxicants present in water column.
Degraded	Little remnant streamside vegetation. Surviving patches fragmented. Exotics frequent. Riparian zone of 30m width intact for less then 25% of catchment, and frequently disturbed by roading, bare or eroded. Catchment segment substantially cleared of native vegetation.	Major changes in macro-invertebrate communities, including changes in structure and massive local loss of species.	Major presence of one or more of turbidity, salinity or nutrient levels, substantial change in oxygen levels. cumulative toxicants present in Cumulative or non-substantial levels in water column.

Source: State of the Environment Report 1988: Victoria's Inland Waters. Office of the Commissioner for the Environment.

Participating in an action-planning process

After interpreting your results and assessing the water quality of your stream, you are ready to begin the process of identifying possible actions for maintaining or improving your local water quality.

One possible step in this process is your participation in action-planning workshops with community participants, agencies and local government, to share your monitoring results and identify actions that can be taken to improve the health of your local catchment.

Action plan workshops

Your water-monitoring does not end with the awareness you gain when samples are taken and results of the tests and surveys are known. You can use this knowledge to make plans to carry out specific actions for improving local water quality in the catchment. To help you with this, talk to your water-monitoring co-ordinator and members of your monitoring team.

Workshops can run to bring together water-quality monitoring participants from throughout the catchment to learn from each other and from invited experts.

Before the workshop

Start by examining sampling results collected by monitoring teams within your catchment.

- How do your readings compare with those in other places? Share your results with other monitoring groups in your catchment to compare water quality at different points along the stream and identify points where changes are occurring.
- What are high readings and what are low? What do these values mean? Do they indicate a particular problem area?
- If you think you have a problem area, do some local research. Ask your local water authorities for some guidance.
- Identify possible ways for maintaining or restoring the health of your water source. Draft an action plan for achieving this.
- If you believe some rehabilitation work would help the problem, then find out what other groups are doing locally to see how this fits with your plans. For example, the local Landcare group or Greening Australia.

Bring this information to an action-planning workshop. Here you will be given the opportunity to gain assistance from other knowledgeable people, to further develop your plans for action and to appreciate how your efforts will dovetail with other 'actions' throughout the catchment.

Action plan poster

After a workshop, the monitoring groups could prepare a poster to describe their action plan. The posters will be displayed at a forum, and some monitoring groups may be asked to present their plans formally to the invited guests.

Here are some things you could include:

- data - photos, documents
- problems identified and their urgency
- how problems are currently addressed
- community awareness of the problems (survey to find out), and publicity planned to raise public awareness
- action planned by you: calendar format is useful, noting when you plan to do certain things and if further monitoring is planned
- problems expected in carrying out plans
- resources needed

existing and potential support

how you will evaluate your success

how your action plan fits into the whole-catchment picture

any links made with other areas in the catchment

A team effort is the best way to plan and implement actions to improve water quality, and co-operation and consultation are vital parts of this process. Consult with local land-owners and groups, water authorities and agencies, local council and State government agencies. The sharing of expertise and the development of a co-operative approach among these groups and individuals is the key to identifying and implementing solutions to water-quality problems.

Bring together all the interested parties, including relevant land-owners.

Identify existing water-quality problems and alert current and potential land-owners.

A simple approach may be to look at each issue one at a time and ask the following questions.

- ***What is the problem?***
- ***Where does it occur?***
- ***How is it evident?***
- ***What is the cause of the problem?***
- ***When does it occur? (for example, does it apply year-round; in summer, etc.; or during the construction phase of a development etc.?)***
- ***Is the problem caused by human impact rather than natural factors?***
- ***Whose responsibility is it to act to overcome the problem?***

If you need help to identify possible causes for your water-quality problems, review the information in this manual (such as the summaries of pollutants and their effects on water quality, land use impacts and the summary of physical, chemical and biological indicators of environmental quality).

In identifying the problems of a catchment, you should take care to ensure that the real causes of the problems (and not merely the symptoms) are targeted. Try to target the problem in location and action.

The step of finding actual solutions to each problem needs to be done in co-ordination with all the agencies, local government and companies, individuals and land-owners concerned. Each action should specify exactly what is to be done, identify where it is to be taken and by whom and specify what is to be achieved and in what time-frame.

Although the first task is to address existing problems and identify solutions, it is also important to identify potential future problems.

The following notes describe some actions that home-owners, land-owners and managers, councils and planners can take to overcome some common problems affecting water quality.

Do not dispose of unwanted household and garden chemicals down the sewer or storm-water drains.

Minimise use of fertilisers and pesticides, as these are easily washed off the garden by storm-water and end up in local creeks.

Use a compost heap rather than throw vegetable scraps into the rubbish or down the drain.

Keep storm-water drains cleared of leaves, stones, and litter.

After changing the oils in your car, do not pour the spent oil down the gutter or into the ground.

Wash your car on a grassy area so that the detergent and water can be absorbed in the soil rather than wash into the drains.

Keep paved, impervious areas to a minimum so that storm-water can soak in rather than run into the drains.

Erosion

Avoid unwise cultivation practices such as overgrazing/overstocking, cultivation or clearing steep lands, downslope cultivation and excessive tree-removal, particularly along watercourses.

Cultivate along the contour and only on slopes of less than 5 degrees.

Retain tree cover and plant more native trees, particularly along watercourses.

Revegetate exposed areas with grass and fast-growing native shrubs as soon as possible.

Establish windbreaks using native trees and shrubs.

Provide vegetated strips of land below cultivated areas to filter out sediment run-off.

Rubbish disposal

Do not place any form of rubbish or dead animals in or near watercourses.

Remove any existing rubbish tip on your property from drainage lines and watercourses and dispose of it at the local refuse disposal depot.

Fertilisers and pesticides

Use fertilisers and pesticides conservatively and only at recommended application rates.

Use only non-residual herbicides.

Avoid spraying weeds less than 50 metres from watercourses.

Do not store dangerous or illegal chemicals. Notify the local water authority immediately to arrange removal if such chemicals are stored on your property.

Avoid storage of animal manure piles for more than 1 week, and preferably cover them with a tarpaulin to minimise run-off.

Avoid fertilising prior to rainfall, in windy periods or less than 50 metres from watercourses.

If possible, sodseed rather than broadcast fertiliser.

Protection of native flora and fauna

Preserve 'wildlife corridors' by retaining at least 50-metre-wide forested buffer strips along watercourses, creek flats and steep slopes.

Retain part of your property as a 'nature reserve'.

Controlling run-off

Design principles to minimise the amount of impervious surface and maximise on-site infiltration of storm-water include the following.

Avoid development on steep slopes. Roads should follow the contours and the landscape should be graded to promote infiltration rather than follow the traditional design, which sought rapid run-off of storm-water.

Sites with poor drainage or seasonally high water tables should be left as open space.

Limit clearing of trees and shrubs using local government regulation and reporting requirements.

Encourage the use of infiltration and detention/retention techniques to promote on-site disposal of storm-water and maintain pre-development run-off rates and volumes.

Keep the percentage of impervious land cover (such as concreted areas) low.

Maximise the use of natural drainage in designing any new development.

Redirect roof rain-gutter outfalls away from impervious surfaces and towards lawns if soil permeability is adequate.

Encourage the use of grass swales and detention basins.

Controlling erosion

Sedimentation and erosion-control efforts to minimise the impact of construction activities on water bodies should be based on the following principles.

Plan any development to fit the site with a minimum of clearing and grading.

Phase the development so that only areas undergoing active development are exposed.

Retain and protect existing vegetation cover wherever possible.

Identify and protect critical areas such as highly erodible soils, steep slopes, stream-banks and drainage ways.

Stabilise and protect disturbed areas as soon as possible.

Keep storm-water run-off velocities low.

Protect disturbed areas of a new construction from storm-water run-off.

Retain sediment within the area of the construction site.

Locating new developments

Place new development in locations that lessen the possibility of creating pollution. Thus you reduce the need for capital-intensive storm-water detention basins or treatment facilities. Other principles include the following.

Where properties are not to be connected to a sewerage system, establish minimum lot sizes based on soil characteristics for proper functioning of septic systems.

Regulate development to protect environmentally sensitive areas such as steep slopes, groundwater recharge areas, floodplains and areas with highly erodible soils through zoning.

Require the preservation of natural vegetation along streams and lake margins by ordinance.

Avoid channelling wetlands and streams.