code of practice

HUME CITY COUNCIL
INDUSTRIAL STORMWATER
CODE OF PRACTICE

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HUME CITY COUNCIL

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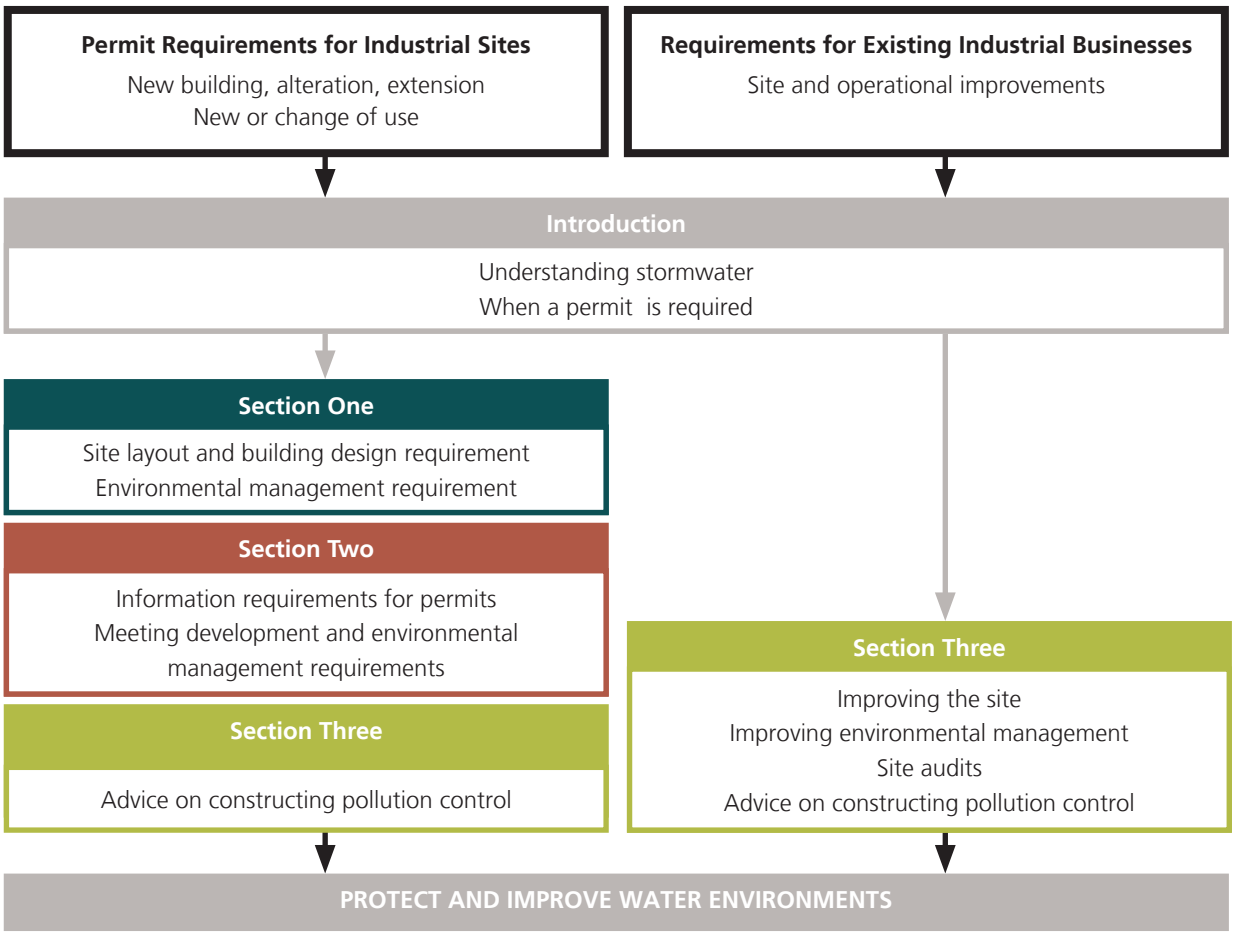
WHEN THE CODE OF PRACTICE APPLIES



This Code of Practice provides requirements and guidance for stormwater management on industrial sites. It applies to industrial and warehousing businesses, including businesses that are leasing properties.

Council requires industrial land owners and business operators to protect water quality, by preventing and removing pollution from stormwater before it reaches the stormwater drain. The Code of Practice sets outs how to meet these requirements through the design of site drainage infrastructure and business operations.

Compliance with the Code of Practice will help protect the environment and meet legislative responsibilities contained in the Environment Protection Act 1970. It will also assist with meeting obligations under the Planning and Environment Act 1987, the local planning scheme and any planning permit governing existing use and development.

The Code of Practice requirements will be used to assess planning applications for industrial businesses. This includes applications for new business uses, new development, or whole or partial redevelopment of existing premises. The Code will also be used when evaluating the environmental performance of existing businesses against the requirements of legislation and any planning permit previously issued for the site.

The Code of Practice should be used by all industrial and warehousing businesses. The principles can be adapted by mobile operators.

Talk to Council to find out if you need a planning permit for changes to your business activities, a development proposal or a change of location. Also talk to Council if you require an EPA license or works approval to find out how this Code or Practice will apply.

CONTENTS

INTRODUCTION

Stormwater on industrial sites

Stormwater is rain water that runs off land and buildings. Hard surfaces—buildings, work areas, storage areas, carparks, roads and other sealed or impervious surfaces—prevents water from soaking into the soil as it would in a natural, undeveloped area. Hard surfaces create rainfall runoff that collects in drains for transfer to the nearest creek and eventually to bays and seas.

Stormwater picks up pollution when it runs over land. On an industrial site, stormwater can pick up organic matter (animal faeces, dirt and leaves), litter, chemicals, oils and residues, detergents, vehicle debris and emissions, and wastewater. When outdoor industrial work surfaces are not sealed, some polluted stormwater may seep into the groundwater, the extent of which is dependent on local soils and geology.

Most stormwater flows over land to the local drain, and then through underground pipes to an outfall, with little if any treatment to remove the pollution it has picked up along the way. Stormwater runoff can move great distances. It is an important source of water for creeks, rivers, wetlands and aquifers but the pollution it carries can cause serious harm to the environment of receiving waters.

Managing stormwater is everyone's business.

Pollution can reach stormwater drains even when it is not raining by spilling or blowing into the drain or through wash-water or other improper discharge of liquid wastes.

Changing the way stormwater is dealt with, through pollution prevention and reduction, will improve its value as an important water resource. The increasing need to find alternatives to potable (drinking quality) water is focusing attention on stormwater as a supplement to our water needs. Keeping stormwater clean for the environment and using it for non-potable (non-drinking) purposes are two aspects of good stormwater management.

Stormwater is a precious shared resource that can be heavily impacted on by human activity if the simple guidelines outlined in this Code of Practice are not followed.

Two types of pollution and stormwater infrastructure required

On most industrial sites, there are two types of pollution:

1. Industrial pollution

Industrial pollution is common to industrial sites. It includes dangerous and hazardous chemicals, oils and residues, and solid materials that can leach pollutants into water. Even products found on industrial sites that are not considered dangerous can cause significant environmental damage if they reach local waterways, wetlands and bays.

Industrial pollution is generally too dangerous to go into the stormwater drain.

Some industrial pollution is even too dangerous to go down the sewer.

Industrial pollution can happen in processing, when storing raw and finished materials, through spills and by carrying small amounts around the site on equipment, vehicle tyres and shoes. It is difficult to remove from stormwater and therefore should be kept away from areas where it can move into stormwater drains.

Stormwater is protected from industrial pollution by using structural isolation. Structural isolation describes the physical means of separating industrial materials and practices that can harm the environment from groundwater and stormwater. Structural isolation is most effective when also using environmentally sound operational practices, which are documented in an environmental management plan.

Structural isolation definition: Glossary
Use on industrial sites: Site example 1, Site example 2, Site example 3
Information sheets: Sump, Trench grate

Interim solutions for existing sites: Interim structural solutions
Information sheets: Isolation valves and spill control, Oil, grease and water separators (triple interceptors), sand and media filters

2. Typical urban pollution

Typical urban pollution is common to roofs, carparks, roads and other surfaces. It includes litter, nutrients, sediment, and some metals and chemicals that are produced by everyday activities. These are pollutants that are just as likely to be found within any densely developed site, whether it be residential, commercial or industrial.

Urban pollution can be generated from a site or be carried there by wind and rain. It is difficult to keep out of the stormwater drain but there are treatments available to remove it from stormwater so that it does not harm the environment.

Urban pollution can be removed from stormwater using water sensitive urban design treatment. Treatment occurs before stormwater is released to the stormwater drain or allowed to infiltrate into the earth as groundwater. Water sensitive urban design copies natural systems in order to remove pollution. It can also collect water for non-potable use instead of mains drinking water.

Section One
sets out planning requirements.

Section Two
explains structural isolation and water sensitive urban design.

Section Three
explains interim solutions for existing premises.

Water sensitive urban design definition: Glossary
Use on industrial sites: Site example 1, Site example 2, Site example 3

I**nterim solutions for existing sites:** Interim structural solutions
Information sheets: Bioretention raingarden, Gross pollutant trap (litter trap), Buffer strip, Rainwater tank (for roof water), Infiltration bed

If developing a site either wholly or partly, or if changing the business type or location, you will need to consider structural isolation and water sensitive urban design when preparing site plans in order to receive a permit.

Stormwater versus sewage

Drains located inside flow to the sewer.

Water that runs from outside surfaces flow to the creek and the river or bay.

The stormwater system and the sewer use two separate systems of underground pipes. Each is designed for a specific purpose. It is critical to make sure that the correct system is used and there is no overlap, eg. sewer feeding into stormwater pipes.

On an industrial site, the sewer system typically collects wastewater from amenities such as toilets, bathrooms and kitchens. There may also be a sewer connection for internal work areas, and in limited cases, for small outdoor work areas. If so, this connection requires a trade waste agreement with the local water authority. Some pre-treatment may be required before water enters the sewer system. If you have a trade waste agreement, then structural isolation is achieved for the areas on the site serviced by sewer.

The stormwater system collects rainfall runoff from roofs, car parks and other outside areas. It is designed to cope with the larger flows from rainfall and heavy storms. Managers and owners of existing premises should check the plumbing to ensure that all wastewater is directed to sewer and that only stormwater goes into the stormwater system. The stormwater system downstream of industrial sites (in established urban areas and some greenfield areas) generally has no treatment. Any pollution generated on the site will enter waterways, wetlands and bays, causing harm to these environments.

Principles of stormwater management used in this Code of Practice

- Good stormwater management is based on the following principles:
- Preserve and maintain existing, valuable elements of the natural drainage system such as natural channels, wetlands and streamside vegetation.
- Limit changes to the quantity and quality of stormwater as near to the source as possible.
- Use water sensitive urban design devices to achieve best practice stormwater quality through removing pollution and controlling streamflow discharges.
- Prevent industrial pollution from entering the stormwater flow.
- Retain stormwater for non-potable, beneficial use.

Finding the right site

Each business (type of use at an industrial site) has its own way of doing things. Is the potential site the right size and shape for the business? Is entry and exit access adequate? Is there enough room to build so that activities are able to be conducted under cover? Is there enough space for storage areas to be enclosed or covered? Is there room for expansion if needed in the future?

A correctly chosen development site will influence a business's ease of compliance with the Code of Practice. If a planning permit is not required to establish a business at a new location, or the site is already developed, a properly selected site will still help the business meet all environmental obligations and avoid prosecution.

Choosing the right site can make it easier to comply with your environmental responsibilities. Speak to existing business owners.

When is a planning permit required?

The Code of Practice will be used to assess planning applications lodged for approval under the local planning scheme.

The local planning scheme sets out different types of requirements for industrial sites. A planning permit may be needed to establish the business at a newly constructed premises or to change the use at an existing premises. A planning permit for buildings and works is needed for new construction and for most building alterations and extensions.

Generally, the need for a planning permit regarding site use is determined by the zone within which your site is located and the permissions and conditions of any existing planning permit. Additional requirements may need to be met if planning overlays apply to your land or the planning scheme contains particular provisions relating to your proposal.

You should confirm all permit approval requirements with the local Council before proceeding.

If you are not sure where your business fits in the planning scheme definitions, ask the Council planner for help.

Industry definitions

Many kinds of businesses fall into the statutory definitions of industry and warehouse. These are commonly referred to collectively as industry. The local planning scheme defines these terms as follows:

Industry is defined as:
Land used for any of the following operations:

a) any process of manufacture;

b) dismantling or breaking up of any article;

c) treating waste materials;

d) winning clay, gravel, rock, sand, soil, stone, or other materials (other than Mineral, stone, or soil extraction);

e) laundering, repairing, servicing or washing any article, machinery, or vehicle, other than onsite work on a building, works, or land; or

f) any process of testing or analysis.

If on the same land as any of these operations, it also includes:

a) storing goods used in the operation or resulting from it;

b) providing amenities for people engaged in the operation;

c) selling by wholesale, goods resulting from the operation; and

d) accounting or administration in connection with the operation.

If Materials recycling, goods resulting from the operation may be sold by retail.

The term Industry includes the more specific definitions of materials recycling, refuse disposal, refuse transfer station, research and development centre, rural industry, and service industry.

Warehouse is defined as:
Land used to store or display goods. It may include the distribution and the wholesale selling of the goods.

The definition of Warehouse includes the more specific definitions of commercial display area, fuel depot, mail centre, milk depot, and store.

Zones requiring a use permit

The following table lists the common industry uses (categorised under the broad terms of Industry and Warehouse in the planning scheme) for the zones where industry is encouraged.

	Business 3 Zone	Business 4 Zone	Industrial 1 Zone	Industrial 2 Zone	Industrial 3 Zone
Industry	|	|	|	|	|
Materials recycling	|	|	|	|	|
Refuse disposal	|	|	|	|	|
Refuse transfer station	|	|	|	|	|
Research and development centre	|	|	|	|	|
Rural industry	|	|	|	|	|
Service industry	|	|	|	|	|
Materials recycling	|	|	|	|	|
Warehouse	|	|	|	|	|
Commercial display area	|	|	|	|	|
Fuel depot	|	|	|	|	|
Mail centre	|	|	|	|	|
Milk depot	|	|	|	|	|
Store	|	|	|	|	|
Shipping container storage	|	|	|	|	|

\| Permit required.

\| Permit not required for most uses where amenity protected and minimum distance to sensitive uses is met.

\| Permit not required if certain conditions are met.

\| Permit not required.

Requirement for a building and works permit

A planning permit is usually required for buildings and works in the above zones. Check with your Council about other zones.

PLANNING PERMIT PROCESS

Section 1
Requirements

Before making the planning application
- find out about planning scheme requirements
- talk to the Council planner
- talk to neighbouring premises
- consider getting professional advice

Section 2
What information to include with the planning application

Prepare and submit the application
- application information
- application form
- fee

Council checks the application
- further information
- referral authorities

Application is advertised if required
- for at least 14 days
- usually sign onsite and letters to
- neighbouring premises

Application is referred if required
- for at least 28 days
- Council sends information to referral authority

Council assesses the application
- considers any objections
- considers any referral comments or requirements
- assesses planning scheme requirements
- negotiates with permit applicant
- prepares report

Council decides the application

Section 3
Operating businesses

Notice of Decision with conditions

Review by VCAT if applied for
- by the permit applicant against conditions or refusal
- by an objector against notice of decision

Permit with conditions **refuse**

Adapted from Planning: a Short Guide, revised 2005, DSE.

In Summary

In every business, there is a risk that stormwater can become polluted by industrial materials. The risk can be minimised by using good work practices and being prepared. But it is equally important to design the site well. New development or redevelopment provides an important opportunity to create a well laid out site, or improve an existing one. This is the time to incorporate structural isolation to prevent industrial materials from entering the stormwater drain. Water sensitive urban design should also be part of site infrastructure, to treat and remove typical urban pollution. Sites seeking planning approval will need to supply plans showing both structural isolation and water sensitive urban design infrastructure.

When structural isolation and water sensitive urban design is used, the actions of employees, contractors, visitors, etc. will still play an important role. An environmental management plan provides these people with the knowledge that is needed to prevent spills and other accidental pollution, and what to do if an accident occurs. An environmental management plan is even more important on existing sites where structural isolation and water sensitive urban design are lacking.

REQUIREMENTS

Site layout and building design

These requirements apply to Industrial and Warehouse development requiring a planning permit for buildings and works.

Guidance on meeting the use and development requirements is provided in Section Two.

Issue

Small amounts of industrial pollution are generated from everyday activities. This pollution contains concentrations of harmful elements beyond those normally found in urban areas, necessitating additional attention to pollution prevention. Good site planning and building design can reduce reliance on operational practices to prevent industrial pollution of stormwater. Stormwater runoff must still be treated to remove common urban pollution before it leaves the site.

Performance objective 1

To minimise increases in stormwater runoff and protect the environmental values and physical characteristics of receiving waters from degradation by industrial activities and urban runoff.

Performance requirement 1-1

The development must be designed to structurally isolate work areas and materials in these areas from groundwater and stormwater drains and flows.

An active work area means an area on the site where any of the following activities take place:

- any process of manufacture
- dismantling or breaking up of any article
- treating waste materials
- winning clay, gravel, rock, sand, soil, stone, or other materials (other than Mineral, stone, or soil extraction)
- laundering, repairing, servicing or washing any article, machinery, or vehicle
- onsite work on a building, works, or land
- any process of testing or analysis
- loading or storing goods used in industrial operations or resulting from it
- storing goods onsite for service or sale

A permitted outdoor work activity area means an area on the site where:

- the activity is restricted to those involving only solid inert materials, and
- it is unfeasible to locate the activity within a roofed and sealed area

Acceptable solution 1-1

The site layout and building design makes clear distinction between active work areas, permitted outdoor work activity areas and non-work areas such as office and amenities, access ways or internal roads, carparks and landscape.

Each active work area is enclosed in a building or a roofed area with a sealed floor or ground surface which drains to a sewer or a storage sump.

Where the floor drainage is not connected to a sewer, the waste must be disposed of by storing for use onsite, evaporation or later collection by a licensed contractor for offsite disposal. The stored contents cannot be disposed of or drain to the site's stormwater management system.

The active work area must meet any special safety requirements of EPA Victoria or other regulation including bunding.

Note: A trade waste agreement may be needed with the local water authority for a sewer connection.

Each permitted outdoor work activity area must drain first to an onsite gross pollutant trap that is designed with a sediment trapping function capable of capturing particles size 125 microns and larger and then to a water sensitive urban design device before connection to the site's stormwater drainage system.

The permitted outdoor work activity area must meet any special safety requirements of EPA Victoria or other regulation including bunding. The gross pollutant trap is not needed if bunding is required and the area is not connected to the site's stormwater management system.

Performance requirement 1-2

The site's stormwater management system must be designed to meet the current best practice performance objectives for stormwater quality as contained in the Urban Stormwater – Best Practice Environmental Management Guidelines (Victorian Stormwater Committee 1999) as amended.

Current performance objectives for development are:

- suspended solids: 80% retention of the typical urban annual load
- total phosphorus: 45% retention of the typical urban annual load
- total nitrogen: 45% retention of the typical urban annual load
- litter: 70% reduction of the typical urban annual load
- flows: maintain discharges for the 1.5 ARI at pre-development (natural) level

The stormwater management system should be integrated with the overall development including the landscape design.

The responsible authority may waive this requirement if:

- the stormwater runoff from the site meets the best practice performance objectives through offsite treatment, and
- the impervious area assumed on behalf of the development site in the design of the offsite treatment is generally consistent with the impervious area of the development proposal.

Acceptable solution 1-2

The proposal demonstrates compliance with current best practice performance objectives for stormwater quality through:

- use of water sensitive urban design, and
- an overall site STORM rating of 100% or better, or MUSIC (or acceptable equivalent) assessment.

The site plan must describe the type, constructed dimensions and location of water sensitive urban design devices, and the area (location and size) that will drain to each device. Adequate detail of the levels of pavements, pipes and the inlet and outlet levels of treatment devices must be provided to demonstrate that there is a feasible means of connecting the area to the device and of connecting the device to the local stormwater drain.

The on-line STORM rating tool is at www.storm.melbournewater.com.au.

Environmental management of business operations

These requirements apply to Industrial and Warehouse development requiring a planning permit for use, buildings and works.

Issue

How well a business manages its everyday activities will determine if it effectively avoids polluting local aquifers, waterways, wetlands and bays. An environmental management plan is an effective way for a business to systematically record how it will operate to meet its environmental responsibilities. Ideally an environmental management plan should be fully reviewed and updated at least every five (5) years, with supplemental improvements as new issues arise.

Performance objective 2

The applicant must ensure ongoing operational practices will prevent materials and wastes from reaching groundwater and stormwater drains.

Performance requirement 2-1

An approval for use or development must include an environmental management plan that addresses at minimum:

- materials selection and identification
- materials handling
- materials storage

- cleaning, washdown and maintenance
- storing and disposing of wastes
- transporting materials and wastes
- emergencies
- staff and contractor training

The environmental management plan must demonstrate that potentially polluting goods will be stored and handled, and that site activities will be undertaken in an environmentally responsible manner, to eliminate or reduce as far as practical spills, leaks and other means of polluting stormwater. Equipment and training on spill containment must be provided.

Acceptable solution 2-1
Use the sample environmental management plan at page 27 of the Code of Practice to prepare an environmental management plan for Council endorsement. A template is available as a Word document.

Permit conditions

When an application is approved, the Council will include conditions on the use and/or development of the site. Below is a sample of permit conditions the Council will use for the stormwater elements of a proposal when preparing the permit.

Site layout

Amended plan standard condition with plans modified to show:

(a) areas within the site and the purpose for which they will be used including industrial and warehousing activities [as relevant], wash bays, loading and unloading areas, holding facilities for the storage of bulk liquids including new and waste oils and dangerous or hazardous substances, waste storage and collection areas, carparking areas, internal roads, and storage areas for solid inert materials.

(b) structural isolation measures including waste bin enclosures.

(c) water sensitive urban design devices including rainwater tanks, gross pollutant (litter) traps and landscape elements.

(d) existing drainage lines and associated vegetation.

(e) modifications to areas of cut or fill so that the natural overland stormwater flow and associated vegetation is not interfered with.

(f) the surfacing of open areas including the surface of the car parking and access area(s).

[Other requirements may be included in this condition regarding other aspects of the proposal.]

Detailed design and building construction – stormwater

Before the development starts, a detailed drainage and stormwater infrastructure plan to the satisfaction of the responsible authority must be submitted to and approved by the responsible authority. When approved the plan will be endorsed to form part of the permit. The plan must be drawn to scale and three copies must be provided. The drainage and stormwater infrastructure plan must demonstrate that the site will meet the Victorian urban stormwater best practice performance objectives and show:

(a) location of sewer connections and sewer pre-treatment.

(b) details of structural isolation devices including constructed dimensions, and the location and use of the area(s) serviced by each device.

(c) details of water sensitive urban design devices including type and constructed dimensions, and the location, use and dimensions of the area(s) draining to each device.

(d) STORM rating and calculations, or MUSIC calculations or equivalent.

(e) schedule of establishment and maintenance procedures for structural isolation devices and water sensitive urban design devices.

(f) hydraulic design computations for the proposed drainage system.

(g) maximum discharge to stormwater drains of [specify rate].

[Where there is a concern that the local drainage system might be overloaded, a maximum flat rate at the point of discharge can be specified.]

The stormwater infrastructure plan must provide details adequate to demonstrate the feasible installation of the proposed water sensitive urban design devices.

Runoff or discharge from any internal area or external work area including loading and storage facilities shall be isolated from the site's stormwater drainage system.

Drainage works between the subject land and the nominated point of discharge must be designed and constructed to the satisfaction of Council's Engineering Design Section and at no cost to Council.

Environmental management plan - stormwater

Before the development is completed, an environmental management plan to the satisfaction of the responsible authority must be submitted to and approved by the responsible authority. When approved the plan will be endorsed to form part of the permit. Three copies of the plan must be provided. The environmental management plan must address at minimum:

(a) materials selection and identification

(b) materials handling

(c) materials storage

(d) cleaning, washdown and maintenance

(e) storing and disposing of wastes

(f) transporting materials and wastes

(g) emergencies

(h) staff and contractor training

and satisfy the requirements contained in this Industrial Stormwater Code of Practice.

The environmental management plan shall be readily available to staff and contractors working at the site.

The environmental management plan shall be reviewed and updated every [no.] years. [include when appropriate]

A notice shall be prominently displayed in all work areas and adequately maintained. The notice will inform staff, contractors and visitors to the premises of the discharge arrangements for work areas, any special conditions or requirements of discharge, and the operation of the environmental management plan.

Land owner obligations

A copy of the planning permit and environmental management plan shall be provided to all lessees and upon sale of the land.

The owner of the land shall ensure that effective arrangements are included in the lease to adequately maintain stormwater isolation and water sensitive urban design devices.

WHAT INFORMATION TO INCLUDE WITH THE PLANNING APPLICATION

Information requirements of zones

The planning scheme sets out information requirements for applications in each of the zones. Requirements may also be found in other parts of the planning scheme. In industrial and business zones the Council must be supplied with the following information:

In addition, the requirements of the Industrial Stormwater Code of Practice must be met.

You should confirm all permit application requirements with the local Council before proceeding.

Industry 1 Zone, Industry 2 Zone, Industry 3 Zone

An application to construct a building or construct or carry out works must be accompanied by the following information, as appropriate:

A plan drawn to scale which shows:

- the boundaries and dimensions of the site
- adjoining roads
- relevant ground levels
- the layout of existing and proposed buildings and works
- driveways and vehicle parking and loading areas
- proposed landscape areas
- external storage and waste treatment areas

Elevation drawings to scale which show the colour and materials of all buildings and works.

Construction details of all drainage works (including underground pipes), driveways and vehicle parking and loading areas.

A landscape layout which includes the description of vegetation to be planted, the surfaces to be constructed, site works specification and method of preparing, draining, watering and maintaining the landscape area.

Business 3 Zone, Business 4 Zone

An application to construct a building or construct or carry out works must be accompanied by the following information, as appropriate:

A plan drawn to scale which shows:

- the boundaries and dimensions of the site
- adjoining roads
- relevant ground levels
- the layout of existing and proposed buildings and works
- driveway, car parking and loading areas
- proposed landscape areas
- external storage and waste treatment areas
- the location, height and purpose of buildings and works on adjoining land
- areas not required for immediate use

Elevation drawings to scale showing the colour and materials of all buildings and works.

Construction details of all drainage works (including underground pipes), driveways and vehicle parking and loading areas.

A landscape layout which includes the description of vegetation to be planted, the surfaces to be constructed, site works specification and method of preparing, draining, watering and maintaining the landscape area.

Information requirements of the Code of Practice

Sometimes the initial site plan will need to be changed to meet the Code of Practice requirements for industrial stormwater.

The site plan (or plans) supplied with the planning application should meet the applicant's business requirements, the zone requirements and any other planning scheme requirements including those explained in this Code of Practice.

This section deals with the Code of Practice requirements. It is divided into two parts.

Part 1. Development requirements describes the elements that need to be included as part of the development. The site examples show the type of information that should be included on the site plan. The step-by-step guide and summary checklist explains what needs to be recorded on the site plan or supplied in writing with the planning application.

Part 2. Environmental management requirements describes the elements that need to be included as part of the environmental management plan. Use the sample environmental management plan or the Word template available from the Council. The step-by-step guide and summary checklist explains what will be required by the Council.

It is best to review this part of the Code of Practice before making commitments to purchase land. Your surveyor, drafting service or other professional should also review this section.

If the required information is not supplied when lodging the planning application, the Council will ask for further information. This could delay processing of the application.

If possible, review this section before making a commitment to purchase the land.

Always review this section with your surveyor, drafting service or other professional to prepare the planning application.

Part 1. Development requirements

Site examples

The site examples on the following pages provide a guide to meeting the development requirements. The figures in the site examples illustrate the acceptable solutions for performance requirements 1-1 and 1-2 set out in Section One. The steps that a designer needs to follow when developing a site plan are:

1. Identify a 'point of discharge' for the site's stormwater as provided by the Council and consider the paths that overland flows may take during major storm events. For large sites, consideration should be given to enhancing or preserving the form of remnant natural drainage lines through the property.
2. Identify areas that will be used solely for 'typical urban' uses (office, amenities, roads and access ways, carparks, landscape). All remaining areas are then categorised as 'active work area'.
3. Identify all other site area as 'active work areas' and whether there will be activities falling into the category of 'permitted outdoor work activity area'.
4. Select structural isolation devices for 'active work areas'.
5. Select water sensitive urban design devices for remaining site areas with 'typical urban' uses.

Once all areas within the site are placed into either of these two categories (active work area or other), the designer can select from among acceptable solutions to incorporate on the site plan for the planning application. Active work areas will be structurally isolated and water sensitive urban design solutions will be applied to all other areas.

Structural isolation

Structural isolation involves physically separating the materials used in production and waste products from groundwater and the stormwater drain. At minimum, structurally isolated areas need to have a roof beyond the area and sealed floor or ground surface that extends beyond the active work area. Engineered structural devices are then used to prevent pollution from these work areas entering stormwater pathways.

The following site examples show use of a sump in an enclosed area. This may be the easiest and least expensive option to construct and maintain (when not connecting to sewer). Other options include trench grates or permanent bunds separating internal and external areas.

Water Sensitive Urban Design

Water sensitive urban design copies nature to cleanse stormwater before it is released to the stormwater drain or else captures stormwater for local use. The site examples show use of rainwater tanks to capture roof water for onsite toilet flushing and bioretention raingardens to capture and treat stormwater from both roof and ground surfaces. Raingardens are connected to the stormwater drain.

Rainwater tanks and raingardens are the most commonly used and effective devices for single sites. If sized correctly, this combined solution will ensure sites can meet the best practice performance objectives for stormwater as measured by STORM or MUSIC (or acceptable equivalent) software. The STORM tool can only assess rainwater tanks with use for toilet flushing. More specialised assessment software such as MUSIC will be required where other onsite use is proposed.

Managing stormwater pollution risk at an existing site which does not cater for good stormwater management can be more complex. Section Three provides guidance for reducing pollution risk at existing sites using both interim structural solutions and water sensitive urban design.

The on-line STORM rating tool is at www.storm.melbournewater.com.au.

Information about water sensitive urban design can be found at www.wsud.melbournewater.com.au.

In selecting the number, type and placement of water sensitive urban design devices for a site:

- Include devices that remove litter, sediments, phosphorus and nitrogen to ensure stormwater leaving the site will meet the best practice performance objectives required for development.
- The size of each device will be determined by the size of the area draining to the device. A tabulation may be used to specify the sizes and critical dimensions of the devices and the areas draining to them.
- Include a pollutant trap with sediment trapping function for permitted outdoor work activity areas to capture particles of size 125 microns and larger in stormwater before it is directed into a water sensitive urban design device. These are purchased from the manufacturer who will help you select the right product for your site. Alternately, a 'pre-treatment cell' can be added to the inlet of a bioretention raingarden to provide this sediment trapping function. This is sometimes needed on a flat site where the outlet of a gross pollutant trap is too low to be directed to a raingarden. Details of a 'pre-treatment cell' are included in the information sheet for gross pollutant traps.
- The overall effectiveness of pollution removal for the site is assessed using STORM or MUSIC (or acceptable equivalent) software. The STORM tool calculates the percentage of compliance with the best practice performance objectives – a minimum rating of 100% is needed. MUSIC calculates the percentage of specific pollutants removed – this is then compared to the best practice performance objectives for each pollution type. The requirement must be met for each pollutant type.

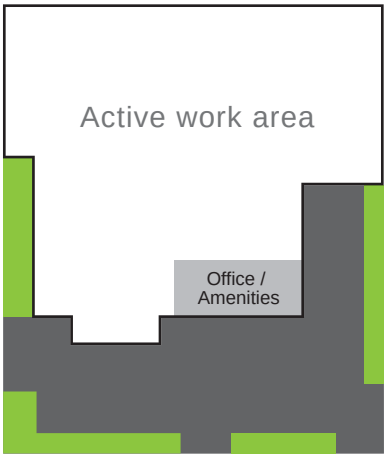
How to use the site examples

For each site example, three figures are used to describe an acceptable solution for the sample development. Together, the figures describe the type of information that needs to be included on a site plan for a planning application.

The first figure defines the extent of active work areas. These are the areas left after taking account of office and amenity areas, roads and access ways, carparks and landscape.

The second figure describes how structural isolation has been achieved for the active work areas.

The third figure describes water sensitive urban design that will be used to treat stormwater from other areas.



Active work areas are displayed in white.

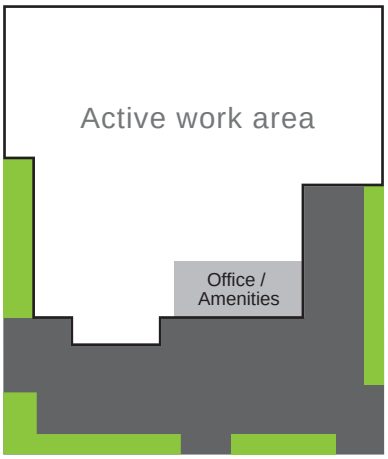
Office and amenity areas are displayed in light grey.

Roads and access ways and carparks are displayed in dark grey.

Lawn and vegetated areas are displayed in green.

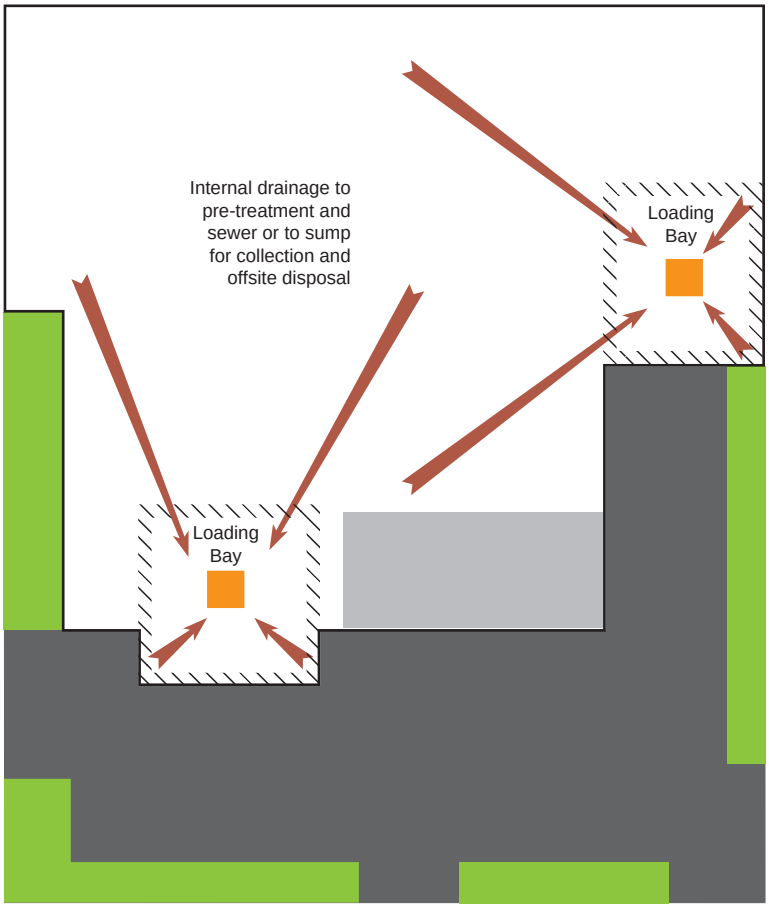
Site example 1 Smaller site

Defining the site areas



Structural isolation using floors that are drained into a sump or to a sewer after pre-treatment. All active work areas are undercover, including the loading bays which are roofed and paved. One of the loading bays is roofed because it is not fully enclosed within the building. Design detail ensures stormwater cannot run in under its roofline.

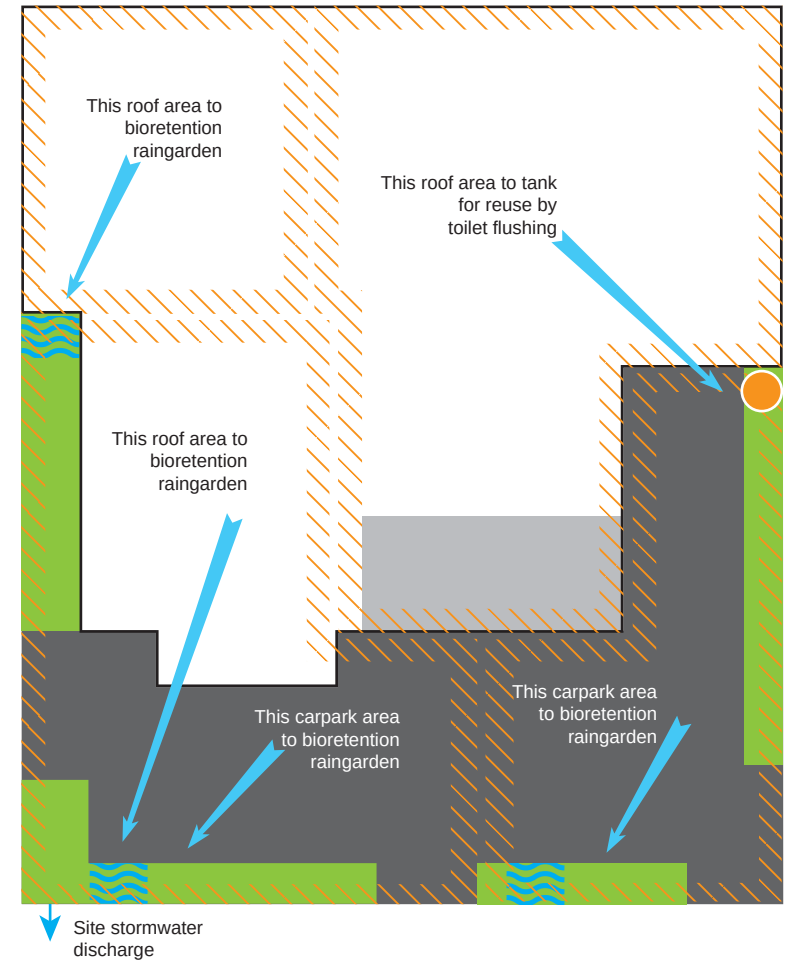
Active work area drainage



Legend

- Active work areas
- Internal drainage
- Sump

Exterior drainage



Legend

- Roof
- Stormwater
- Rainwater tank
- Bioretention raingarden
- Boundary of area that drains into each WSUD device

Water sensitive urban design using a rainwater tank to capture roof water for toilet flushing and bioretention raingardens in landscaped areas to capture and treat stormwater before release to the stormwater drain.

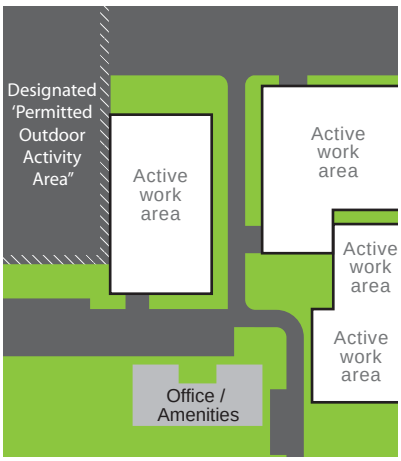
A rough guide for arranging drainage areas and bioretention sizes is to size the devices at approximately 1% of their catchment area. Then use the STORM tool to optimise the sizes and layout through a series of quick performance assessments and adjustments.

The pollution removing performance of rainwater tanks in industrial buildings is often limited by the demand for the harvested water. The limited demand created by toilet flushing will limit the roof area that can be effectively treated by a tank. However, the tank water can also be used for other purposes or simply overflow into the stormwater drains.

Site example 2 Larger site with multiple buildings and carparking areas

Active work area drainage

Defining the site areas



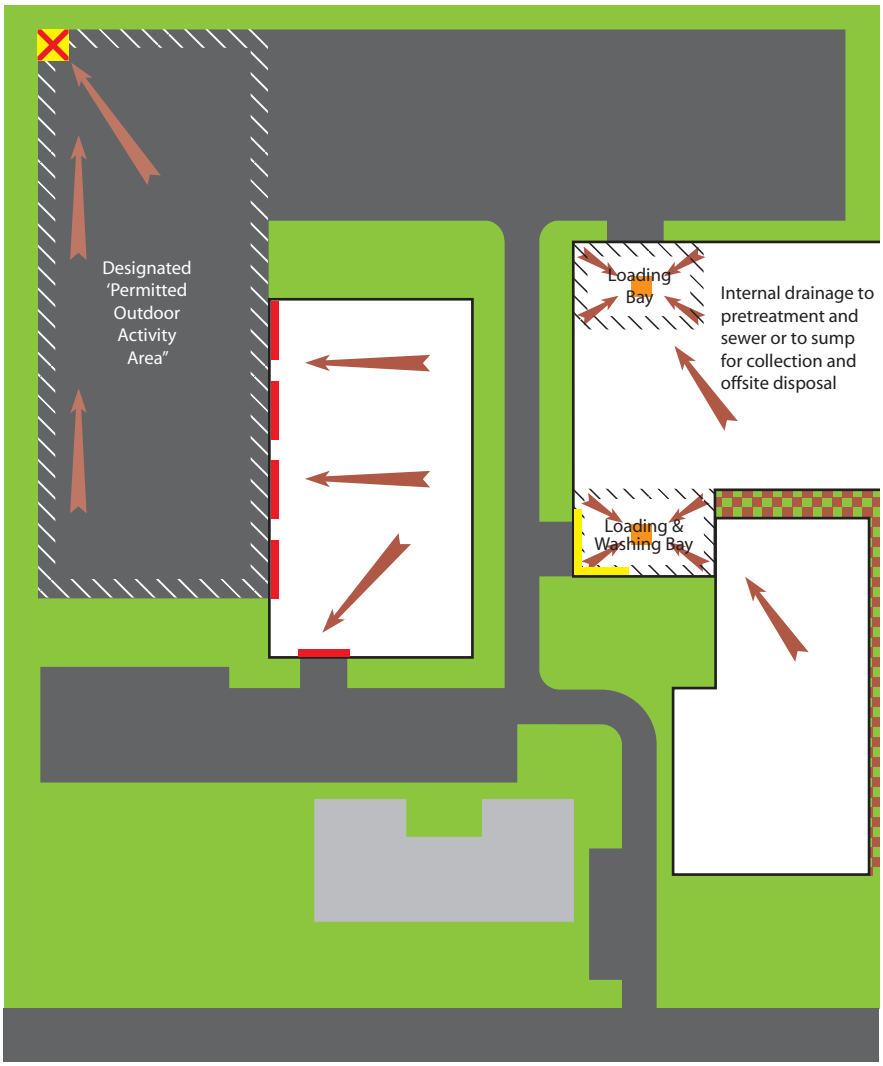
Structural isolation using a sewer connection or sump in the primary building and trench grates around a secondary building where a sump is not practical. A bund isolates the loading and wash bay. All active work areas are internal or else roofed and paved. Design detail ensures stormwater cannot enter these areas.

Trench grates must drain to a sump or bunded/storage area unless an arrangement is made with the local water authority for sewer connection.

Buildings should be extended to site boundaries wherever possible to prevent small unroofed areas being used as informal work or storage areas or as dumping grounds for wastes.

The checkered area in the figure opposite is an example of an undesirable outcome which will be difficult to manage.

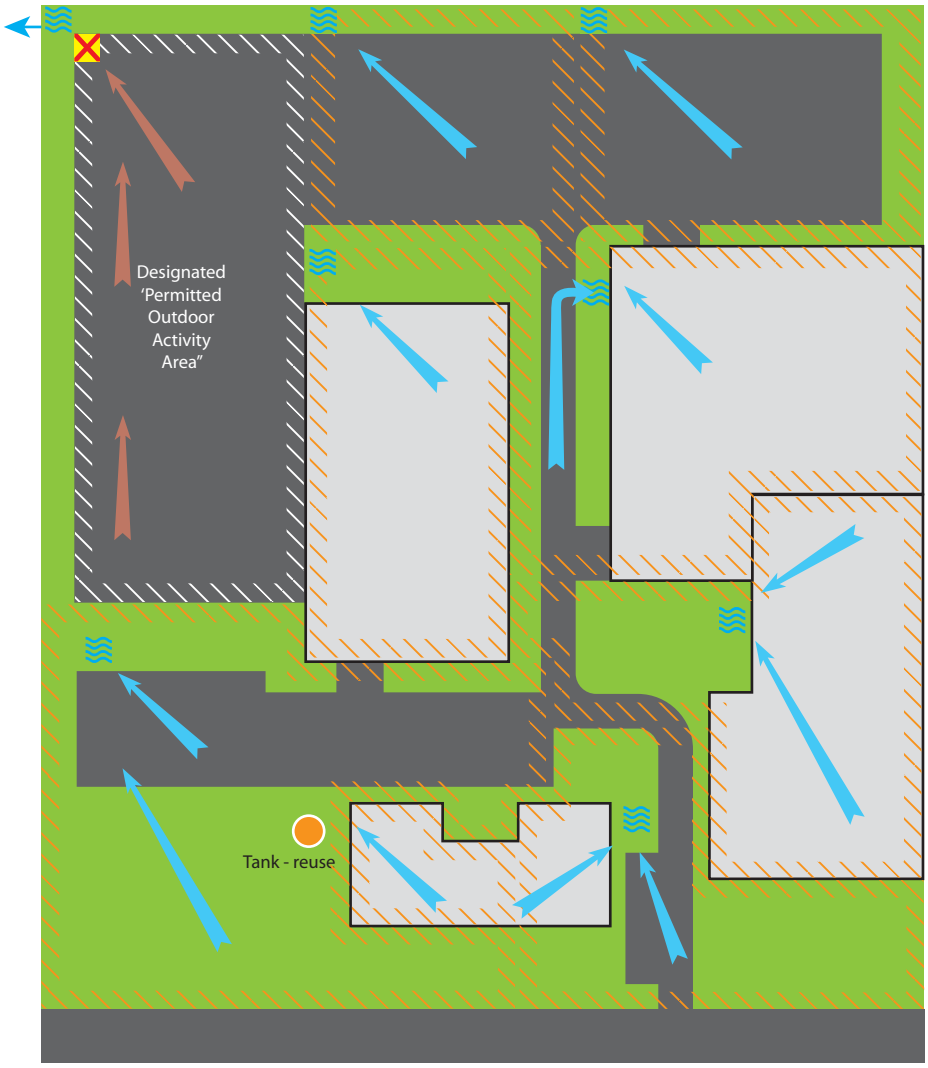
In some circumstances there will be other planning and building requirements affecting building setbacks. You should check this with the local Council to ensure that you can build to the boundary. If you are unable to build to the boundary, fencing these areas may be the best solution.



Legend

- Active work areas
- Internal drainage
- Drainage from Permitted Outdoor Activity Area
- Gross Pollutant Trap for Permitted Outdoor Activity Area
- Bund
- Trench grate at doorways
- Undesirable outdoor area

Exterior drainage



Legend

- Roof
- Stormwater
- Drainage from Permitted Outdoor Activity Area
- Bioretention raingarden
- Gross Pollutant Trap for Permitted Outdoor Activity Area
- Rainwater tank
- Boundary of area that drains into each WSUD device

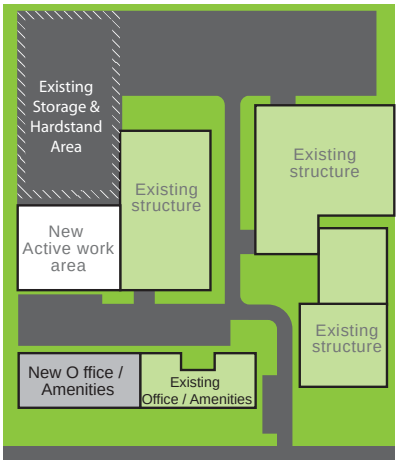
Water sensitive urban design using a rainwater tank, bioretention raingardens and a gross pollutant trap to capture particles of size 125 microns and larger. The gross pollutant trap is a specific requirement of the permitted outdoor work activity area. It is required additionally and regardless of whatever water sensitive urban design device is to be located downstream of it. It provides pre-treatment protection for the downstream device. It therefore must be placed before the water sensitive urban design device in the drainage layout.

The STORM assessment tool does not allow credit for two treatment devices in a series. STORM can still be used to make an assessment by ignoring the gross pollutant trap when making the STORM assessment. The gross pollutant trap provides pre-treatment for a permitted outdoor work activity area which is not a land use accounted for by the STORM tool. Alternately, a more specialised assessment can be carried out using software such as MUSIC.

Site example 3 Partial site redevelopment

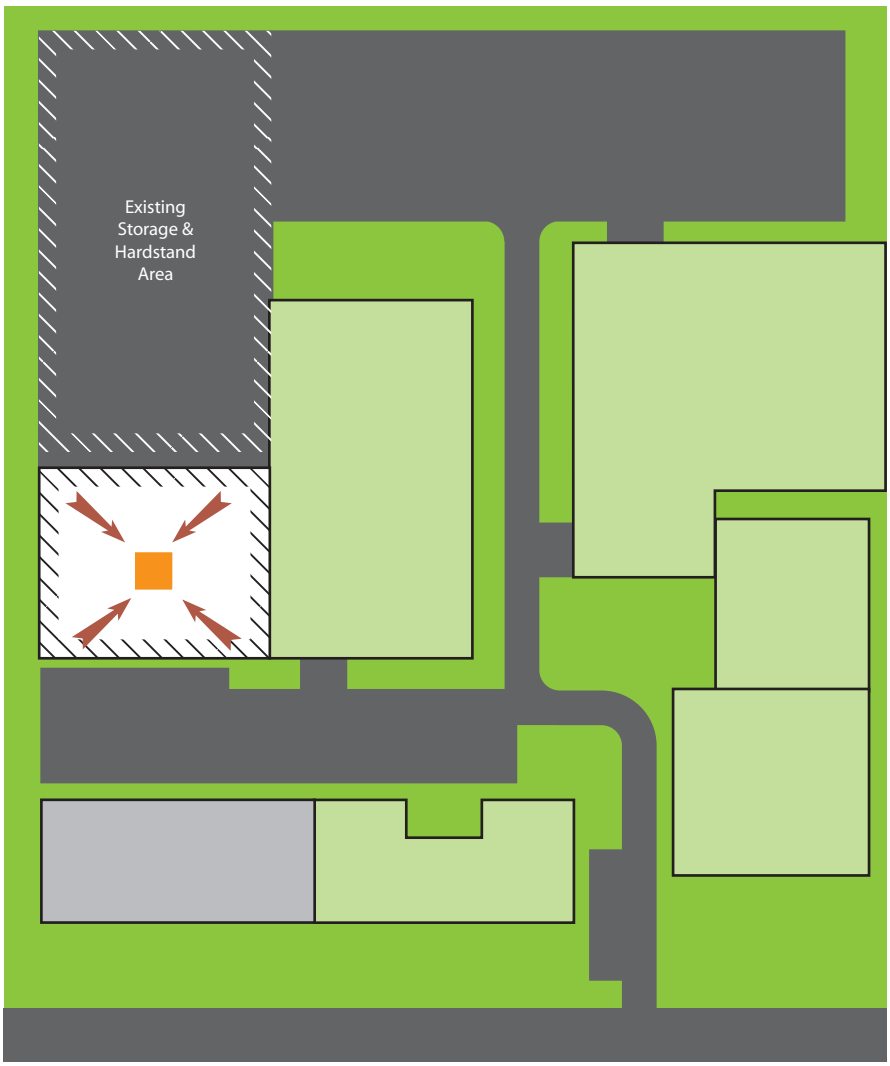
Active work area drainage

Defining the site areas



Structural isolation is a requirement for extensions or alterations which involve active work areas. This can include sewer or sump connections, trench gates and permanent bunds.

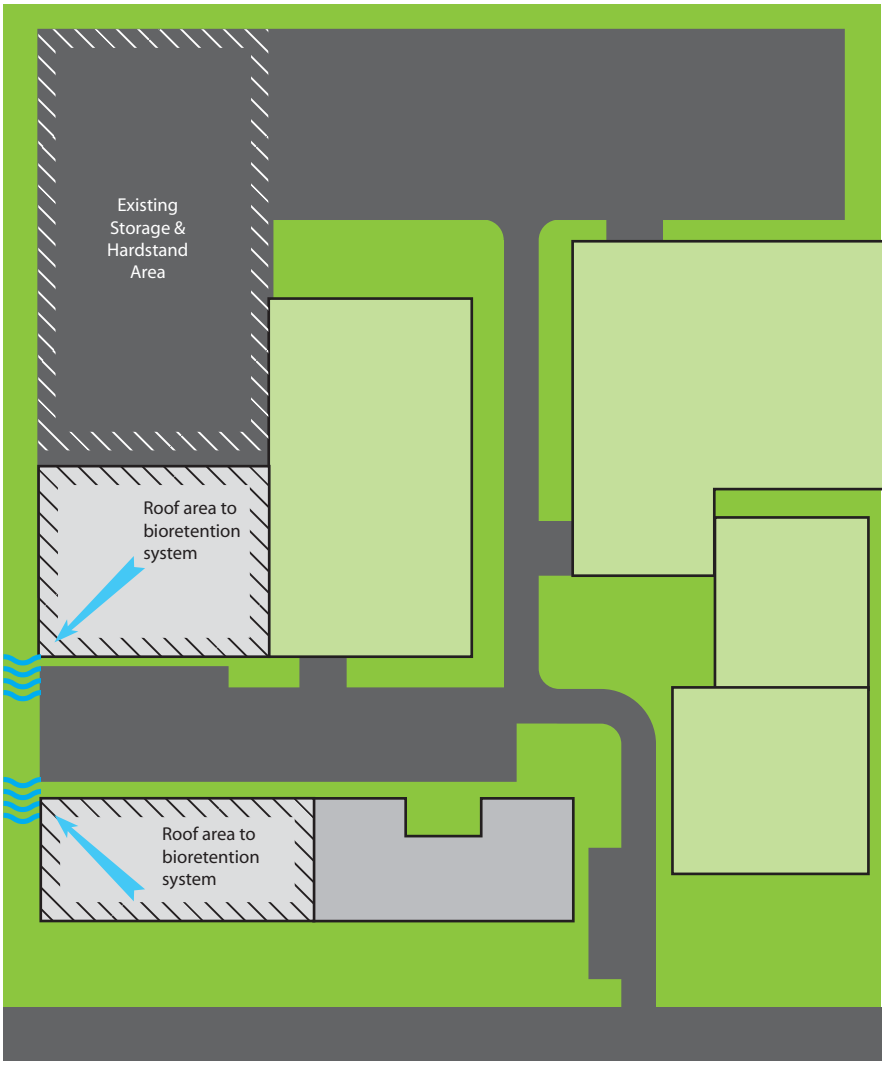
Extensions or new works on existing sites also provide the opportunity to structurally upgrade existing buildings and areas, by providing some form of structural isolation or an interim structural solution. Even building a roof over an existing loading or wash bay would be very valuable in terms of reducing the risk of polluting stormwater.



Legend

- Active work areas
- Internal drainage
- Sump

Exterior drainage



Legend

- Roof
- Stormwater
- Bioretention raingarden

Water sensitive urban design is a requirement for extensions or alterations. Stormwater from the new parts of the development (including roofs) must be treated before release to the stormwater drain.

Extensions or new works on existing sites also provide the opportunity to upgrade existing buildings and areas, by providing water sensitive urban design to treat existing roofs, carparking areas and access ways or internal roads. This can be most easily achieved where an existing area can easily be treated by a new water sensitive urban device such as a raingarden. In this example, the raingardens could be combined as a larger single raingarden that also treats the existing carparking area.

Water sensitive urban design devices can be installed throughout existing sites so long as runoff is avoided from active work areas that have not been structurally isolated.

Steps to complete the information for Code of Practice development requirements

STEP 1. Gather all of the planning provisions and information requirements for the application along with the business requirements ('the brief').

STEP 2. Prepare a preliminary site plan of how to develop the site referring to the zone and other planning scheme requirements.

Identify entries, internal accessways or roads, staff and visitor carparking areas, office and amenity buildings, and landscaping. Then designate the rest of the site as 'active work areas'. This is where production, cleaning, maintenance, storage and loading are to take place.

If you intend to have a 'permitted outdoor work activity area', then mark this on the preliminary site plan. This will fall within the part of the site designated as 'active work areas'. A 'permitted outdoor work activity area' area will be restricted to processing and storage of inert non-soluble solids or granular material, and it must be an area that is too large to feasibly roof.

Are work areas large enough for the size and scope of your business (if you are developing for yourself) or for the type of business likely to buy or lease the premises? Are work activities likely to spill out into carparks, accessways or internal roads? Consider whether another layout would work better, if buildings should be larger or if more of them are needed, or even if the site is too small for the development you have in mind.

If the site is too small, now is the time to find another site or change your site plan.

STEP 3. Prepare a plan showing the levels on the site. A surveyor usually does this. Ask the surveyor to include natural drainage lines on the land and any vegetation growing in and around the drainage lines. Include contours if the site undulates or slopes.

Check the preliminary site plan to make sure that earthworks and other construction will not interfere with the path of overland flows that are likely to occur in major storm events or the remnants of natural drainage lines that may be preserved or enhanced. If this cannot be avoided, talk to Council about how to deal with this and include this information with the application.

STEP 4. Consider any dangerous or hazardous chemicals that will be used or stored on the site. These may have special safety standards such as bunding requirements. Refer to the Stormwater resources pages for where to find these standards. Bunding is a form of structural isolation. This will be important to consider in STEP 5.

Review the preliminary site plan and include any special requirements for dangerous or hazardous chemicals. Tell the Council what chemicals may be used and include special requirements on your plan.

STEP 5. The active work areas are identified in STEP 2. Choose the structural isolation device most suited to each of these areas. For example, a sump located in the loading bay (either within the building or in an attached roofed area) may be most appropriate for a small factory construction. See Site example 1. To effectively isolate active work areas from stormwater, the active work area must be undercover and have a sealed floor.

Mark and label the structural isolation devices on the preliminary site plan. This information must be included with the application. The dimensions and/or volume of each device will also need to be shown.

Tell the Council if you are planning to sewer an active work area and identify this area on the plan.

STEP 6. Look at all the surfaces on the preliminary site plan that are not an 'active work area'. Include the roofs over the active work areas. The stormwater from these areas will need to be directed to water sensitive urban design devices before the stormwater can be released to the stormwater drain. The easiest way to do this is to direct roof water to a rainwater tank or bioretention rain garden and to direct surface water to a raingarden. The raingarden(s) should form part of your landscaping. See Site example 1, Site example 2 and Site example 3. The sizing of your rainwater tank and raingarden can be determined using the publication WSUD Engineering Procedures: Stormwater, by using STORM or by using MUSIC (or other acceptable calculations). A STORM rating of 100% or above means the requirement has been met.

If there is a 'permitted outdoor work activity area', include a gross pollutant trap capable of capturing particles size 125 microns and larger at the drainage outflow. This drainage must then be connected to a bioretention raingarden or other water sensitive urban design device (this is not necessary if the area will be bunded because of special requirements of EPA Victoria or other regulation.)

Mark and label the water sensitive urban design devices on the preliminary plan. Show the area or areas that will drain to each device (including roofs). You will need to include this information with your application. The dimensions and/or volume of each device will also need to be shown. Include a printout of your MUSIC or STORM rating and calculations with the application.

STEP 7. Decide what maintenance schedule and procedures will be needed to keep the structural isolation devices and water sensitive urban design devices in working order. Sumps, trench grates and bunds need to be inspected to make sure they are intact and emptied when required (eg. after spills). Purchased devices should be managed in accordance with manufacturer instructions. Information about maintaining water sensitive urban design devices is found in the publication WSUD Engineering Procedures: Stormwater.

Write down the maintenance schedule and procedures for each measure or device and include this information with the application. If the application is approved, a permit condition (Detailed design and building construction – stormwater) will require this information to become part of the planning approval. The schedule will need to be followed even if you no longer own the land.

STEP 8. The marked preliminary site plan can now be used to draw up the formal site plan to include in the planning application. Be sure to note any extra information when completing the earlier steps and include this information with the planning application.

Summary checklist: information for Code of Practice development requirements

- Natural drainage: Location of any natural drainage lines on the land and associated vegetation. Contours if the land is undulating or slopes. Details of earthworks and other construction that will interfere with natural drainage flows or the path of overland flows that may occur in major storm events and how this will be dealt with.
- Active work areas: Location of active work areas. Provide a list of any known dangerous or hazardous chemicals that will be used or stored on the site.
- Structural isolation: Details of each structural isolation measure – location, constructed dimensions and/or volume. Indicate any active work areas to be connected to sewer.
- Water sensitive urban design: Details of each water sensitive urban design device – type, location, constructed dimensions and/or volume – and the area that will drain to each device.
- Evidence of compliance: MUSIC or STORM rating assessment (or equivalent using calculations acceptable to the Council).
- Maintenance: Maintenance schedule and procedures for each structural isolation measure and water sensitive urban design device.
- Use of stormwater collected in rainwater tanks for non-potable (non-drinking) use.

Part 2. Environmental management requirements

Introduction

In every business, a certain portion of the property or work environment can pollute the stormwater system. The businesses include but are not limited to:

- manufacturing and engineering (electroplating, welding/fabrication, press shops, assembly)
- painting/coating (powder coating, printing, paint manufacturing, painting services)
- chemical related (chemical/fertiliser manufacture and storage, circuit boards)
- food related (abattoirs, food manufacturers/processors, beverage manufacture/ storage, grain handling)
- warehouses and stores (outdoor storage, shipping containers)
- vehicle related activities (car parks, truck depots, fuel filling areas, mechanical workshops, crash repairers, wreckers and vehicle washing areas)
- solid waste storage (rubbish bin storage, composting, recycling)
- liquid waste related activities (liquid waste transport, industrial and municipal wastewater treatment, septic tank cleaning)
- transport centres, waste transporters, transfer stations, landfill operations, rubbish collection, street sweeping, bulk material storage
- landscaping (gardening services, landscaping activities).

Site, building, vehicle and landscaping maintenance can also pollute the environment.

All property owners and business operators are responsible for taking all reasonable steps to prevent stormwater contamination

Sample environmental management plan

A sample environmental management plan for stormwater pollution is included on the following pages. The sample plan provides guidance to land owners and businesses requiring preparation of a plan as part of a planning approval. An environmental management plan ensures a business will meet its environmental responsibilities with respect to stormwater management and will reduce business risk.

Developers should adopt the sample environmental management plan in full if the ongoing tenancy is not known. The sample environmental management plan can be tailored to the specific industry when the tenant is known and by businesses seeking planning approval. However, as the environmental management plan binds successive owners and occupiers, it should be comprehensive enough to cover future occupancies, for example, when the development is not purpose-built for a particular type of industry or tenant.

The sample plan can also be used by existing businesses to evaluate their environmental performance and to make necessary improvements. The audit forms in Section 3 of this Code can also be used to evaluate business performance. The longer audit form is based on the sample environmental management plan.

Businesses are encouraged to prepare environmental management plans in consultation with employees, contractors and suppliers. Plans can be simple or complex, but they should cover all of the relevant objectives and actions of the sample plan. Plans should be reviewed and updated regularly.

Environmental management plan - stormwater pollution

(pollution of waterways, bays, groundwater and other water bodies that receive stormwater flows)

The objective of this plan is to avoid contaminating stormwater or groundwater from any site activity.

The plan includes safe business practices for the following areas of the business:

- selecting and identifying materials
- handling materials
- storing materials
- cleaning, washdown and maintenance
- storing and disposing of wastes
- transporting materials and wastes
- emergencies
- staff and contractor training

Selecting materials

Objective–When selecting materials, select and use materials to minimise damage to the environment.

Actions–When selecting materials:

Follow the principles of Avoid, Reduce, Reuse and Recycle to prevent and reduce waste.

- Avoid: By changing processes or practices to avoid creating waste and purchase only what is needed
- Reduce: By changing product or processes to reduce the amount of pollution or waste produced (replacing disposable items with more durable alternatives)
- Reuse: By using products and materials that can be reused with minimal processing (using waste materials from one process as the raw material for another process)
- Recycle: By converting products back into their constituent raw materials and reprocessing this raw material into new articles and by recycling our site waste
- Choose chemicals that are less dangerous to the environment.

Following the waste hierarchy makes good business sense and can save the business money.

Some chemicals are less damaging to the environment. There may be alternatives to the chemicals you are currently using.

Identifying materials

Objective–When identifying or labelling materials, use the information labels on the materials to prevent storage and handling accidents.

Actions–When identifying or labelling materials:

Use standard labelling information to identify the materials used in the business.

Pay attention to hazardous materials and those that can contaminate stormwater or groundwater. These need to be obvious to people working or visiting the site.

Have all Material Safety Data Sheets (MSDS) for materials used in the business.

Keep the sheets up to date and store the sheets in a central place that everyone can use.

Follow safe storage and handling procedures for hazardous materials.

Display required signs to alert workers and visitors to the use of dangerous goods or hazardous materials. This includes signs outside the building and signs where the materials are stored.

Read the labels on all chemical products to help you to identify the product, what is in it and the hazards or dangers of the product. The label also contains important health and safety information.

A MSDS is an information sheet that covers:

- Safe storage, handling and disposal of a substance.
- Emergency procedures.
- First aid advice.

Hazardous materials contain diamond shields to alert you to danger.

Information displayed on signs will help emergency services such as the fire brigade in the event of a spill or fire.

Handling materials

Objective–When handling materials, avoid contaminating stormwater or groundwater when using or moving materials on the premises.

Actions–When handling materials:

Recognise that solid materials can pollute stormwater and that other substances that come from solid materials can pollute stormwater and groundwater. Solid materials include:

Powders or dust (powdercoat paint, sawdust, sand, cement, flour, etc.)

- Pellets or granules, (plastics, stones, animal feeds, etc.)
- Chipped materials (mulch, wood shavings, etc.)
- Larger objects (timber, sheet metal, angle iron, etc.)
- Finished goods
- Non-essential goods (old machinery, excess stock, empty oil/chemical drums, used packaging materials, etc.).

Many materials can harm the environment if they are blown or washed into the drains or if they leach into the groundwater.

Recognise that liquids can contain components that can harm the environment. Some chemicals are classified as dangerous goods or hazardous substances.

Pollution from solid materials can be caused by flaking paint, oily residues or rust coming off finished goods, stored drums or new metal, oil leaking from stored machinery or vehicles, chemicals leaching from treated timber, pallets or crates.

This pollution can also cause blockages in the stormwater drain if dusts, soils or pellets are not securely contained.

Prevent spills from loading and unloading operations and when actively using any materials – these have the potential to pollute stormwater and groundwater.

- Where possible, conduct these activities within a roofed area or inside a building.
- Prevent mixing of dangerous and hazardous materials through unintended spills.
- Make sure that runoff from the area cannot enter the stormwater drain or groundwater by sealing surfaces and using appropriate devices (structural isolation).
- Maintain structural isolation devices and ensure they are not blocked.

Liquids can harm the environment if they are washed into the drains or leach into the groundwater. Some liquids contain substances that can kill fish and other life in local streams.

Meet EPA Victoria's guidelines (publication 347) and Australian standards for bunds.

AS1894 - Non-flammable cryogenic & refrigerated liquids
AS1940 - Flammable & combustible liquids
AS2022 - Anhydrous ammonia
AS2507 - Agricultural & veterinary chemicals
AS2714 - Organic peroxides
AS2927 - Liquid chlorine gas
AS3780 - Corrosive substances
AS3833 - Mixed classes of Dangerous Goods
AS3961 - Liquefied natural gas
AS4081 - Polyfunctional isocyanates
AS4326 - Oxidising agents
AS4452 - Toxic substances
AS4681 - Miscellaneous Dangerous Goods

Bunds contain spills from fixed tanks and containers such as 200 litre (44 gallon) drums or 1000 litre Intermediate Bulk Containers (IBC).

Always use the appropriate equipment to move materials.

Move materials in an appropriate container and use safe handling equipment and procedures.

Train employees and use care to prevent accidents.

- All workers will know how to handle equipment properly.
- Operators will constantly check during liquid transfer operations to make sure there is no spillage or leakage.
- High level alarms will be fitted where possible on any tanks which are filled by a liquid transfer operation.
- Full or partly filled drums and containers will not be placed where they may be damaged or knocked over by a forklift or reversing trucks.

Practice good housekeeping so that rubbish and other materials are not left lying around.

- Regularly sweep floors and outdoor work areas.
- Clean up oils and fluids and put oily waste in a general or recycle bin, depending on collection arrangements.
- Provide containers with lids for general and recycled rubbish and for cigarette butts with regular pick up by an appropriate contractor.
- Schedule regular housekeeping checks.

A clean and tidy work place presents a professional image and improves safety.

Make sure that if solid material is spilt, it cannot enter the stormwater drain. In the event of a spill, the material will be swept up and disposed of correctly. Use the information from the Material Safety Data Sheets to dispose of spilt material properly.

Spilt solid materials such as granules (powders, pellets), sawdust or wood shavings can enter the stormwater drain and either block it or break down and cause pollution.

When moving, pumping, loading or unloading liquids, make sure that a spill kit is available for use in case of a spill.

Depending on the type of liquid, spill kits can be as simple as a drum full of sand or sawdust and a shovel.

For hazardous or dangerous liquids, use a manufactured kit suitable for the need (oils, chemicals, etc.) or its equivalent.

Manufactured kits for hazardous or dangerous liquids can be purchased from a number of local suppliers.

Storing materials

Objective–When storing materials, store them in a manner and location so that they do not contaminate stormwater or groundwater.

Actions–When storing materials:

Where the site has been laid out using the principles of structural isolation, store materials within structurally isolated areas. Alternately, store inert solid material that cannot leach, flake, blow or spill into the stormwater drain within a permitted outdoor work activity area that has been connected to a gross pollutant trap with sediment trapping facility.

Where an existing site has areas that are not structurally isolated, and it is not feasible to store all materials in buildings, make sure that solid materials that could otherwise leach, flake, blow or spill into the stormwater drain are secured in a container or under a weatherproof cover.

Clearly designate and sign materials storage areas.

Store liquids that can spill in containers within a roofed area, inside a building or in an approved underground tank. Make sure that runoff from above ground storage areas cannot enter the stormwater drain or groundwater (structural isolation).

Store liquids classified as Dangerous Goods in accordance with government regulations and bunding standards where bunds are used.

For other liquids full or partly full IBCs (Intermediate Bulk Containers) and drums containing fluids (including waste liquids) will be stored in a bunded area or on a suitable spill containment pallet.

Train employees in the correct procedures for storing materials.

Storing goods securely will help reduce the risk of pollution and it will also prevent loss of raw materials and damage to your stock.

Use weatherproof containers for outside storage.

Safety cabinet and chemical storage buildings are used to store chemicals classified as dangerous goods or hazardous substances. Safety cabinets are fire resistant, lockable and have safety features such as self-closing doors and built in sumps. They must comply with the relevant Australian Standard. A wide variety of sizes are available from different suppliers.

Spill containment pallets and other self-bunded storage units are also available. Spill containment pallets are plastic or metal tray-like containers that will capture the contents of a leaking drum. Small individual containers can be stored on a drip tray at their point of use.

Small amounts of pollution can damage the environment.

Cleaning, washdown and maintenance

Objective–When cleaning, washing down and undertaking maintenance, ensure that runoff does not contaminate stormwater or groundwater.

Actions–When cleaning and washing down or undertaking maintenance:

When cleaning the factory floor, forecourt or outside work areas, avoid using hoses. Instead, sweep, vacuum and use absorbent material to remove most of the grime. Then use some solvent on a rag for the remaining cleanup and dispose of it in a bin. Avoid sweeping rubbish into the gutter but instead pick it up and put it in a bin.

When washing vehicles and equipment onsite, collect wash water and dispose of it in one of the following ways:

- Put it into the sewer according to the trade waste agreement with the local water authority.
- Direct it to a sump where it can be collected by a licensed disposal contractor.
- Store it in a drum or tank and then transport it to a licensed liquid recycling or treatment centre.
- Recycle or reuse it onsite, for example, for pre-washing.
- Only degrease parts in a building or area where runoff is contained.

Alternative option: Degrease parts and engines in an approved wash bay where wash water can be put into the sewer.

Collect solvents used for cleaning, such as paint thinners, turps (mineral turpentine) or metho (methylated spirits) to dispose of properly by accredited recycling or waste disposal services or by storing for further use.

When servicing vehicles and machinery, such as trucks, forklifts, conveyors or compressors, safely collect and store all oils, brake fluids, greases, solvents and water bled from compressors or compressed air systems.

Paper air filters will be disposed of appropriately and oil filters will be drained into drums.

If using sand or other dry abrasive media to blast clean equipment, such as dies, check with the supplier about disposal options and use a licensed disposal contractor if necessary.

When doing welding repairs, sweep up weld spatter, grinding waste and spent welding rods and put it in a bin.

Permanent water saving rules in Victoria do not allow areas of paving, asphalt, brick, tiles, timber decking, etc. to be cleaned with water from the mains supply except under special circumstances such as a fire or health hazard.

Painting the workshop floor with a non-slippery paint will make cleaning easier and stop the floor absorbing oils. Stains can be removed using some solvent on a rag.

A trade waste agreement may include a pre-treatment process, keeping to set discharge standards and a regular checking program.

You will be charged a fee according to the volume you discharge and the concentration levels of certain pollutants such as suspended solids.

An alternative method of degreasing is to wipe parts with rags and dispose of in a bin. Or, replace solvent-based degreasing machines with aqueous washer units which use biodegradable soap, are less labour-intensive, and cost less to operate. Despite their reduced environmental impact, biodegradable products are not allowed in the stormwater system.

Most waste oil products and industrial fluids can be recycled.

When stripping, sanding or painting vehicles, buildings, machinery and other equipment, sweep up any dust created, use drop sheets to collect overspray or paint drips and clean up solvents and spills. Thinners, solvents and other paint waste liquids will only be disposed of through a licensed contractor or facility.

Clean grease or other possible pollution off hands over a sink connected to the sewer (not the stormwater drain). If there is no sewer, then pour the wastewater into a drum for proper disposal by a licensed contractor.

Clearly designate and sign cleaning, washdown and maintenance areas.

In grassed areas, instruct the lawnmowing service to make sure grass cuttings are not blown into the stormwater drain or gutter. Clippings and any leaf litter and prunings will be either composted or put in a bag and then disposed of with general waste (to landfill).

Train employees in the correct procedures for cleaning, washdown and maintenance.

Have something nearby to mop up spills – a proper spill kit is best, but even rags or sawdust can be used to prevent pollution. Dispose of used spill materials through a licensed disposal facility.

Do not wash brushes or guns out in stormwater drains or sewered sinks (not even water based paints).

Reduce the amount of cleaning required by:

Painting out the brushes onto newspaper or old rags

Using one container for washing and another for rinsing.

Leaves, grass clippings, soil and stones entering the stormwater drain system can:

block drains and cause flooding,

smother creek bottoms by cutting out sunlight and oxygen to plants and bottom dwelling animals,

reduce oxygen available to fish and plants, when leaves and grass clippings rot down.

end up in our bays and beaches.

Storing and disposing of wastes

Objective–When storing and disposing of wastes, ensure wastes do not enter the stormwater drain or blow off the site.

Actions–When storing or disposing of wastes:

Have enough recycling and disposal bins for staff and customers to use. Make sure open bins are not allowed to overflow and are kept away from outside doors where the wind may blow litter.

Audit waste to know:

- Major types of waste
- Source of the waste
- Volume/amount of the waste
- Cost of this waste – both in product purchase and disposal costs
- Whether the waste can be recycled
- Whether the waste is hazardous and requires special disposal.

Only put dry, solid, inert waste in an industrial waste bin.

Store all waste skips and bins in a designated area, where possible with a roof. Keep lids closed to stop loose litter being blown away. Build waste enclosures to ensure that litter is controlled.

If the skip has splits or holes in it, ask the supplier to repair it or replace it with a skip in good condition. In the meantime, provide some absorbent material around the base to soak up leakage and dispose of in a bin.

With open topped scrap metal skips, use a tarpaulin to keep out rain. Repair or replace leaky tarpaulins.

Tie down or cover solid, dry, inert waste materials that cannot be put in the bin (such as bulky material) but that be blown away.

Store other solid waste within a roofed area or inside a building with a sealed floor or surface area. Make sure that runoff from the waste storage area cannot enter the stormwater drain (structural isolation).

Collect liquid waste in drums or tanks and have the waste transported to a permitted waste disposal facility if not connected to the sewer. Note: This applies to liquid waste that is not legally directed to the sewer.

Store liquid waste the same way as for other liquids.

Store contaminated parts (eg. used oil filters) inside in a covered container or in a covered, sealed and bunded area, even after they have been drained, to stop any residual oil leaking into the stormwater drain or groundwater (structural isolation).

Regularly get rid of outdated stock and equipment.

Clearly designate and sign waste storage areas and not use them for any other purpose.

Train employees in the correct procedures for storage and disposal of wastes.

Most personal rubbish and office products can be recycled. You may need separate recycle bins for different types of waste.

Knowing your wastes will help you to look for opportunities for eliminating, minimising, reusing and recycling the different types of wastes from your operations.

Solid or liquid waste may be hazardous and classified as Group A, Group B or Group C waste.

Material put into your industrial waste bin will generally go to landfill. Bag any dusts or fine materials. Do not put liquid wastes in this bin.

Covering skips and bins also stops rain getting in which can wash oils, solvents and chemicals out of rags and into the stormwater runoff.

Litter floating in creeks such as polystyrene, bubble wrap and cardboard can harm the environment and is unsightly.

Waste materials can still cause pollution in stormwater and groundwater after they have been used.

Outdated or unused machinery, excess stock or materials that are unlikely to be used should be recycled, sold off or correctly disposed of. Not only does this material have the potential to pollute, it may also be taking up useful space.

For large-scale dangerous goods or hazardous substance spills, phone emergency Services on 000

EPA VICTORIA

For spills that may harm the environment, phone EPA Victoria Pollution Watch Line on 9695 2777

Employees, employers, occupiers and contractors all have a duty to contact EPA Victoria.

Absorbent materials are commercially available and should be kept in a clearly labelled easy to get to place.

Quickly clean up the spill and dispose of the material by following the advice in the relevant material safety data sheet (MSDS). Even better, develop your own written procedures based on this information.

Even small spills can easily flow into stormwater drains or be washed there by rain.

Contaminated water or spent fire fighting chemicals should not be allowed to enter the stormwater system, where it can kill fish and other water life and seriously pollute the environment.

If the fire brigade are in attendance, the Officer-in -charge will decide if it is safe to discharge the water to a stormwater drain.

Otherwise call EPA Victoria for advice.

Transporting materials and wastes

Objective–When transporting materials and wastes, transport it in a way that avoids spills that can enter the stormwater drain.

Actions–When transporting materials and wastes:

Cover and secure loads leaving the site to stop loose material or goods falling off or blowing away.

Only use licensed disposal contractors when required.

Emergencies

Objective–When an emergency occurs, respond quickly and effectively.

Actions–When an emergency occurs:

For large-scale dangerous goods or hazardous substance spills, immediately phone emergency services on 000

For spills that may harm the environment, immediately phone the EPA Victoria Pollution Watch Line on 03 9695 2777

For small-scale spills, follow the Material Safety Data Sheet (MSDS) instructions.

All employees and contractors will be trained in how to clean up spills as part of an induction process – what to do, where to find emergency equipment and how to use it. Clean-up procedures will be prepared and practiced.

Equipment will include mops and brooms, rags, booms to contain liquids and materials to absorb spills to prevent them going into the stormwater drain. Protective clothing will be supplied if this is necessary.

Clean-up steps to be followed:

1. Stop the spill immediately if safe to do so.
2. Make sure no one is at risk of becoming overcome by exposure to the spilled materials.
3. Contain the spill and control its flow or stop the spill getting into the stormwater drains by blocking the drain inlets with barriers (socks) drain mats or pillows (bags).
4. Dispose of materials appropriately. Refer to the relevant Material Safety Data Sheet for safe disposal information. Otherwise, dispose of the spilt material in the general or recycle rubbish.

If there is a fire, then any water used to fight the fire that becomes contaminated will be contained and collected. Contaminated water or other materials will be disposed of properly.

Steps to complete the information for Code of Practice environmental management requirements

STEP 1. Read the sample environmental management plan on the previous pages to understand the management practices required to protect groundwater and stormwater from contamination through poor work practices, accidents and spills.

STEP 2. Use this information or the environmental management plan template to prepare a plan that can be supplied to the Council. All of the matters must be included in the plan because work activities can change on a site over the life of the development. If the application is approved, a permit condition (Environmental management plan – stormwater) will require this information to become part of the planning approval. The plan will need to be provided to any lessee and upon sale of the land. The plan will need to be followed even if you no longer own the land.

Summary checklist: information for Code of Practice environmental management requirements

- Materials selection and identification
- Materials handling
- Materials storage
- Cleaning, washdown and maintenance
- Storing and disposing of wastes
- Transporting materials and wastes
- Emergencies
- Staff and contractor training

OPERATING PREMISES

Interim structural solutions

For most existing businesses, the immediate aim will be to reduce the impact on stormwater quality by reducing industrial pollution from industrial activities. Changing the way people work is part of this; installing interim structural devices that remove some of the industrial pollutants or changing the layout of the site are other ways. The response will depend on the nature of site activities and the cost of the changes.

In an existing site where proper structural isolation cannot be achieved, there are some types of treatment devices which can be installed to help prevent industrial pollution from entering the stormwater drain.

While not achieving best practice, use of interim structural treatment devices is better than no treatment at all and should remove some of the industrial pollution from stormwater. This stormwater is then directed to the stormwater drain.

The priorities for approaching existing industrial sites and management of industrial pollution should be:

Managing stormwater pollution at an existing site with undesirable features in its layout can be risky and demanding. Reduce industrial pollution by combining site configuration, constructed elements and environmental management.

Priority 1: Achieve structural isolation for active work areas and improve environmental management of business operations.

Structural isolation separates industrial pollution in active work areas from groundwater and stormwater. This concept is explained in Section Two. Structural isolation is preferred over other responses because it eliminates pollution risk at the source – but its feasibility at existing sites will often be affected by cost.

The site examples in Section Two show site layouts and constructed elements that provide structural isolation for new and redeveloping sites.

- There may be opportunities to retrofit structural isolation features into an existing site.
- Alternatively, structural isolation may exist for part of the site. High risk activities (active work areas) can be moved to take advantage of this.

Improving the environmental management of business operations involves changing work behaviour – the day-to-day operation of a business and responses to accidental spills. The preferred work practices are documented in an environmental management plan. The sample environmental management plan in Section Two can be used by occupants of existing sites.

Water sensitive urban design should be used to treat non-active work areas such as office and amenities, carparking areas, access ways and internal roads, and runoff from roofs.

Priority 2: Install interim structural devices and improve environmental management of business operations.

If structural isolation cannot be achieved on an existing site, then other remedies are available.

Installing interim structural devices can help prevent industrial pollution from entering the stormwater drain. This makes them different to commonly used sensitive urban design devices which filter pollution found in runoff from typical urban development. There are two types of devices:

Isolation device. A valve or boom that is activated to block off a spill. See the information sheet for 'Isolation valves and spill control' for more details.

Pollutant capture device. These devices filter industrial pollution. See the information sheets 'Oil, Grease and Water Separator', 'Sand and Media Filter' and 'Gross Pollutant Trap' for more details. The following two tables provide a guide to selecting the best device. Use Table 1 to decide what basic pollutant group is relevant for the site, then use Table 2 to select a corresponding capture device.

Table 1 **Basic pollutant groups**

Type of business	Litter	Sediment	Oil, grease hydrocarbon	Organic and other toxicants
Food Beverage & Tobacco Manufacturing				
Textile Clothing Footwear & Leather Manufacture				
Wood and Paper Product Manufacture				
Printing Publishing & Recorded Media				
Petroleum Coal Chemical & Assoc. Product Manufacturing				
Non Metallic Mineral Product Manufacturing				
Other Manufacturing				
General Construction				
Construction Trade Services				
Basic Material Wholesaling				
Motor Vehicle Retailing and Services				
Transport and Storage				

As for Priority 1, improving the environmental management of business operations involves changing work behaviour and documenting preferred practices in an environmental management plan.

Deciding the most appropriate response for the business

The priorities set out above combined with the tables provide guidance on what changes will reduce the risk of industrial pollution. Ultimately the choice will be influenced by cost and whether the arrangements are too complex to be managed by the business. This means that some simple judgement of risk versus effort and cost will be needed when making decisions.

Table 2

	Capture device			
Pollutant Group	Litter enclosure	Gross pollutant Trap	Oil / Grit Sand Separators	Filters
Litter				
Sediment				
Oil, grease hydrocarbons				
Organic and other toxicants				

Stormwater audit

Auditing is an important component of environmental management plans. Even where a formal plan does not exist, property owners and business owners still have responsibilities under the Environment Protection Act 1970 to prevent stormwater pollution. Planning permits for the land or the business often contain permit conditions which require attention to stormwater management if the conditions are to be properly met.

Once a business is operating, then auditing ensures that environmental performance is improved and maintained.

The short audit form gives a quick snapshot of environmental performance and is useful for self-auditing by a business.

The long audit form is based on planning permit conditions for drainage infrastructure and the environmental management plan contained within this Code of Practice. The auditor should use the endorsed drainage infrastructure plans and the pro forma environmental management plan for the detail of each issue covered in the audit. The long form can be used to self-audit a business, or it may be used by the Council or another organisation to see how well a business is meeting its environmental and planning permit obligations. The longer audit will assist a business to more fully identify the areas where improvements are necessary.

The audit notes should be attached to the audit form.

A copy of the audit form should be kept on file by the business and by the Council or other organisation carrying out the audit. The audit notes may need to be filled out over a number of inspections and a copy should be dated and retained for each version.

SITE STORMWATER AUDIT – SHORT FORM

Walk around the premises and complete this form. In just a few minutes you'll have an assessment of your stormwater management.

Stormwater pits & drains

Inspect your stormwater pits and drains.

- Is there any material such as cigarette butts, sand, sediment, raw materials or product inside the stormwater pits or drains?

Remember: The stormwater drains are for clean water only.

Management of materials, products and wastes

Look around your site.

- Is there any loose or unsecured material that could find its way into any of your drains?
- Is all waste securely stored onsite?
- Is there any old or unused plant or equipment onsite?
- Is there any oil, flaking paint or rust that could contaminate the ground or drains?

Storage and management of liquids

Approximately, how much liquid is stored onsite?

- Less than 200 litres
- 200 – 1000 litres
- Greater than 1000 litres
- Are any containers damaged or leaking?
- Are there sufficient devices (bunds, spill pallets, safety cabinets) in place to control any leaks or spills from containers?
- Is there a Spill Kit onsite?
- Are the contents of the Spill Kit complete?
- Are Spill Kits located in the best places?
- Is there a Spill Response Plan?
- Is the Spill Response Plan clear and concise?
- Are Spill Response Plans located in the right places? (eg. with the Spill Kit, noticeboard, office copy)

Cleaning, washdown and maintenance

Do you wash any plant, equipment or product on your premises?

- Are there wash facilities onsite?
- Are these facilities adequate? (eg. good condition, well maintained, correct size)

How is wash effluent disposed?

- Holding tank for licensed collection
- To sewer with trade waste
- Other (please describe)

SITE STORMWATER AUDIT – LONG FORM

Site stormwater audit report

Business name .....

.....

Business address .....

.....

Business type .....

.....

Audit date .....

.....

Auditor / organisation .....

.....

Issue No.	Issue	Complies Yes	Complies No
	Site layout and infrastructure		
1	Drainage and infrastructure plan endorsed (if required by planning permit)		
2	Drainage and infrastructure plan constructed as endorsed (if required by planning permit)		
3	Drains blocked		
4	Structural isolation devices are operating properly		
5	Maintenance schedules for structural isolation devices are in place, documented and followed		
6	EPA / Australian standards for bunding are met and maintained		
7	Water sensitive urban design devices are operating properly		
8	Maintenance schedules for water sensitive urban design devices are in place, documented and followed		
9	Sewer connected to site stormwater and drainage infrastructure, or to the municipal stormwater drain		
10	Trade waste agreement is required		
11	Trade waste agreement is in place, up to date and on display		
12	Locations of site activities conform to endorsed layout plan and planning permit conditions		

SITE STORMWATER AUDIT – LONG FORM

Issue No.	Issue	Complies Yes	Complies No
	Selecting, identifying and labelling materials		
13	Waste hierarchy process is in place		
14	Chemical selection process is in place		
15	All Materials Safety Data Sheets have been acquired		
16	All Materials Safety Data Sheets are kept in a central and accessible location		
17	Required dangerous or hazardous goods signs have been acquired		
18	Dangerous or hazardous goods signs are displayed in required locations		
	Handling materials used in the business		
19	Materials are handled only in work areas with structural isolation of stormwater		
20	Work area(s) is designated and signs are displayed		
21	Materials are moved in appropriate containers		
22	Safe handling equipment is available and used properly		
23	Procedures are in place for handling dangerous and hazardous materials		
24	Procedures are in place to prevent incompatible materials coming into contact with one another		
25	Materials handling procedures are documented		
26	Materials handling procedures documentation is kept in a central location accessible to staff and contractors		
	Housekeeping		
27	Good housekeeping is practiced – the site is clean		
28	Good housekeeping is scheduled regularly and carried out		
29	Good housekeeping procedures and schedule are documented		
30	Good housekeeping procedures and schedule documentation is kept in a central location accessible to staff and contractors		
	Storing materials used in the business		
31	Materials are stored only in areas with structural isolation from stormwater (if required by planning permit) AND/OR		
32	Solid inert materials are stored in a designated and appropriately signed permitted outdoor work activity area (if required by planning permit) OR		
33	Materials are stored in sealed containers or with secured, weatherproof covers		
34	Liquids are stored within roofed areas or in approved underground tanks		
35	Intermediate bulk containers and drums are stored in bunded area or on spill containment pallet		
36	Dangerous goods regulations are kept up to date		

SITE STORMWATER AUDIT – LONG FORM

Issue No.	Issue	Complies Yes	Complies No
37	Dangerous goods are stored in accordance with government regulations		
38	Materials storage procedures are documented		
39	Materials storage procedures documentation is kept in a central location accessible to staff and contractors		
	Cleaning, washdown and maintenance		
40	Appropriate cleaning materials and equipment are onsite and easily available		
41	Disposal method for washdown water and other solids or liquids is in place		
42	Vehicle wash bay is operating properly (if one is installed)		
43	Cleaning, washdown and maintenance procedures are in place		
44	Cleaning, washdown and maintenance procedures are documented		
45	Cleaning, washdown and maintenance procedures documentation is kept in a central location accessible to staff and contractors		
46	Lawnmowning/garden contractor removes grass and pruning clippings, leaf litter for composting or disposal to landfill		
	Storing and disposing of waste		
47	Waste audit undertaken within past 12 months		
48	Waste storage area(s) is designated and signs are displayed		
49	Bins are in designated locations		
50	Bins are in enclosed areas or covered		
51	Adequate number and type of industrial and general bins or containers are onsite		
52	Bins are in good condition		
53	Bins are not overflowing		
54	Contents of each bin is appropriate to its purpose		
55	Regular emptying or pick up of bins is scheduled		
56	Bulky or loose material is secured		
57	Equipment and other items being stored for disposal are in a covered container or in a structurally isolated area		
58	Waste storage and disposal procedures are in place		
59	Waste storage and disposal procedures are documented		
60	Waste storage and disposal procedures documentation is kept in a central location accessible to staff and contractors		
61	Storage area(s) is screened from road (if required by planning permit)		

SITE STORMWATER AUDIT – LONG FORM

Issue No.	Issue	Complies Yes	Complies No
	Transporting materials and waste		
62	Vehicle trays and containers are properly secured and securely covered		
63	Licensed contractors are used for waste removal		
64	Transport procedures are in place		
65	Transport procedures are documented		
66	Transport procedures documentation is kept in a central location accessible to staff and contractors		
	Emergencies		
67	Materials Safety Data Sheets have been used to develop spill procedures		
68	Alarms are fitted on machinery for liquid waste transfer		
69	Adequate spill kit (or kits) are onsite for nonhazardous and non-dangerous materials		
70	Adequate spill kit (or kits) are onsite for hazardous and dangerous materials		
71	Spill procedures are in place		
72	Spill procedures are documented		
73	Spill procedures documentation is kept in a central location accessible to staff and contractors		
74	Fire procedures are in place		
75	Fire procedures are documented		
76	Fire procedures documentation is kept in a central location accessible to staff and contractors		
77	EPA Victoria Pollution Watch Line and MFB or CFA emergency contact numbers are prominently displayed		
	Staff and contractor training		
78	Staff and contractor training content and training schedule is in place (including new staff or contractor induction) to cover the above issues including practice drills for spills and fires		
79	Documentation for staff and contractor training is kept		
80	Documentation shows staff and contractor training schedule is met		

AUDIT NOTES (ATTACH TO AUDIT FORM)

Business name .....

.....

Audit date .....

Auditor / organisation .....

Issue No. (from Audit form) .....

Part 1

Description of problem identified

.....

.....

.....

.....

.....

Description of solution identified

.....

.....

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Expected implementation date.....

Part 2

Description of solution implemented

.....

.....

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.....

.....

Date solution implemented.....

Checked by / date.....

Stormwater pollution reporting

The pollution report form provides a means to clearly identify the cause of pollution, how it will be cleaned up and how a similar incident will be prevented in the future. This can be followed up at a later date to see that action has been taken and a solution has been put in place.

The pollution report should be filled out at time the pollution occurs. A copy should be kept on file by the business and by the Council or other organisation if the pollution is detected by it. The form may need to be filled out over a number of inspections and a copy should be dated and retained for each version.

When stormwater pollution occurs, it is commonly picked up during auditing or through reporting of the incident.

SITE STORMWATER POLLUTION REPORT

Business name .....

.....

Business address .....

.....

Business type .....

.....

Report date .....

.....

Report competed by .....

name / organisation .....

Part 1

Date of incident .....

Nature of incident

.....

.....

.....

.....

.....

Reported by / organisation / date

.....

.....

Reported to (EPA Victoria, MFB, CFA) / date .....

Clean-up action taken

.....

.....

.....

.....

.....

SITE STORMWATER POLLUTION REPORT

Part 2

Description of preventative action required

.....

.....

.....

.....

.....

Description of preventative action implemented

.....

.....

.....

.....

.....

Date action implemented.....

Checked by / date.....

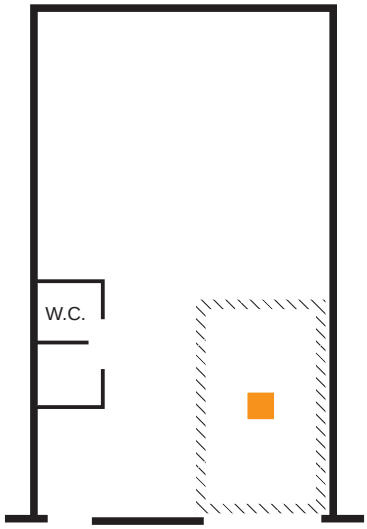
INFORMATION SHEETS

Structural isolation device

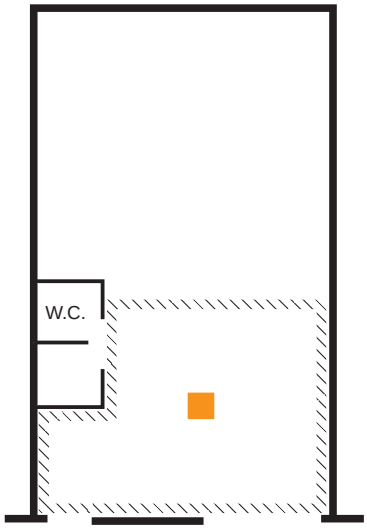
Recessed floor area with sump

An area of floor that is formed during its construction so that it drains to a grated inlet. The inlet directs spills, washdown or other flows into a storage sump; or alternately, (under agreement with local water authorities) to a pre-treatment device connected to a sewer.

To ensure floors within active work areas are isolated from stormwater, a recessed (sunken) floor area can be incorporated into the design of the premises. The recessed floor area would require only a moderate fall to cause the material to flow to a central grated pit inlet. The recessed area could be the entire work area or an area adjacent to access points. An example is a loading bay located at the front of a small factory and adjacent to the doorway; this is also an area of high risk for a spill.



Loading bay only



Front of building

Benefits

Low cost

Suitable conditions

Where good accuracy in the construction of the floor can be assured.

Unsuitable conditions

Where machinery or activities require a dead flat floor.

Further technical information about these devices is available on-line at www.wsud.melbournewater.com.au and in the publication WSUD Engineering Procedures: Stormwater from CSIRO publishing www.publish.csiro.au.

Structural isolation device

Trench grate

A lineal grate across an access point that acts as an interceptor of flows that are shed from the flat floor of a work area.

To ensure flat floors within active work areas are isolated from outside surfaces, a trench grate may be installed across all ground level access points to the work area. This would ensure that any spills or wash water are contained within the premises or flow into the trench grate for appropriate removal. The grate needs to be industrial strength to accommodate vehicles and machinery moving across it. The grate needs to be installed carefully to be flush with the floor and not present an obstacle to forklift operation.

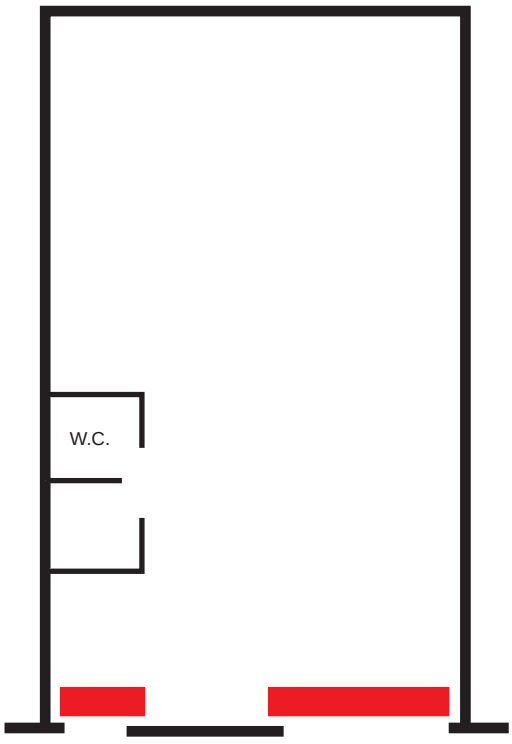
The trench grate can be connected to a storage sump or alternately, (under agreement with local water authorities) to a pre-treatment device connected to a sewer.

Benefits

All floors within premises may be constructed dead flat.

Suitable conditions

Where access to the premises is concentrated to defined points.



Trench Grate across entrances to contain spill material

Interim structural device (isolation device)

Isolation valves and spill control

Devices that are installed or activated to temporarily restrict spills and prevent contaminated flows being discharged to the stormwater or sewer systems.

There are three major types of spill control devices

- Structural low flow
- In-system high flow
- Spill restriction

Bunding
and kerbing

Structural low flow devices include bunding and kerbs aimed at temporarily restricting spills within a certain area. These differ from structural isolation devices that may be incorporated into the building design only in that the contaminated flow is contained on the surface where it was spilt – requiring an immediate clean-up response.

Spill restriction

Spill restriction devices are devices such as spill kits, portable wash pads or temporary bunding. These are for use in areas where the risk of a spill is minimal or can be predicted, and are used only in emergencies.

Interim structural device (isolation device)

In-system high flow devices act as valves and are activated in the event of a spill. They prevent contaminated water from being discharged into the stormwater system or sewer. These can be activated manually or automatically.

Benefits

Lower cost solutions where attaining structural isolation in an existing premises is economically unfeasible

Able to be implemented at any site.

Suitable conditions

Structural low flow devices should be fitted close to point where a spill is likely to occur.

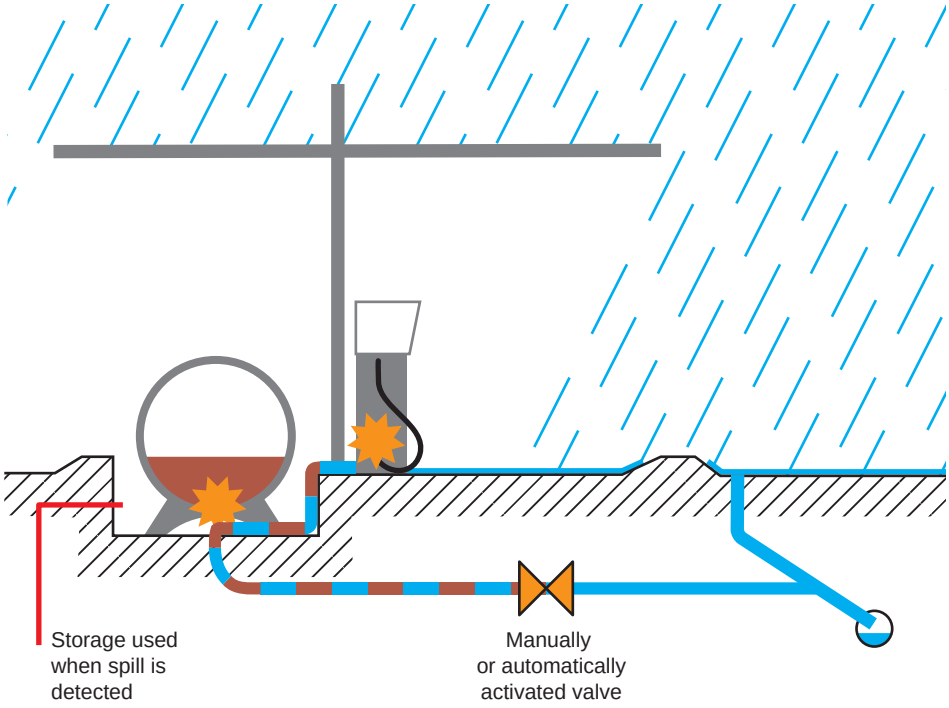
In-system high flow devices may be retrofitted into stormwater and/or sewer systems. They need to be located close to the point where a spill is likely to occur.

Spill restriction kits should be located close to the point where a spill is likely to occur

Unsuitable conditions

All of these devices will be less effective if located where flows have high volume

Should not be considered optional to structural isolation; instead, these devices mitigate risk when structural isolation is not possible



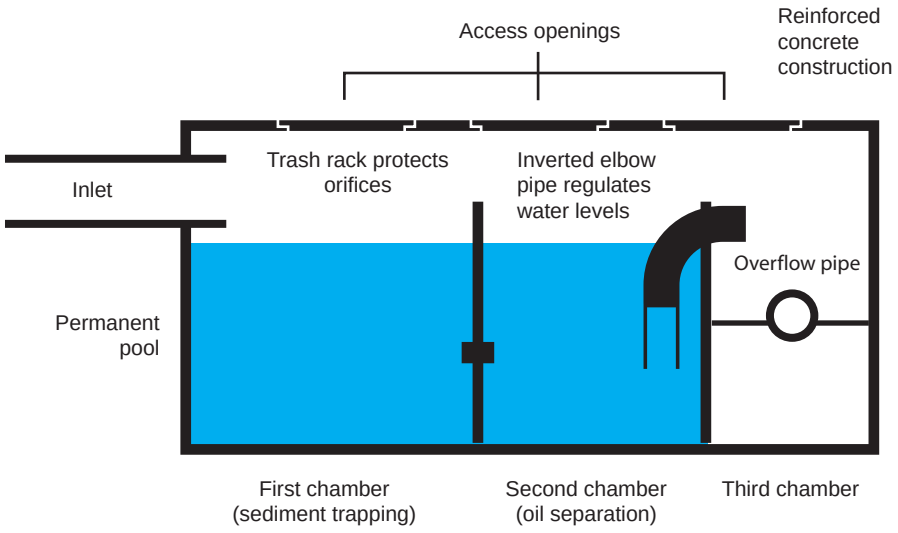
High flow device

Interim structural device (pollutant capture device)

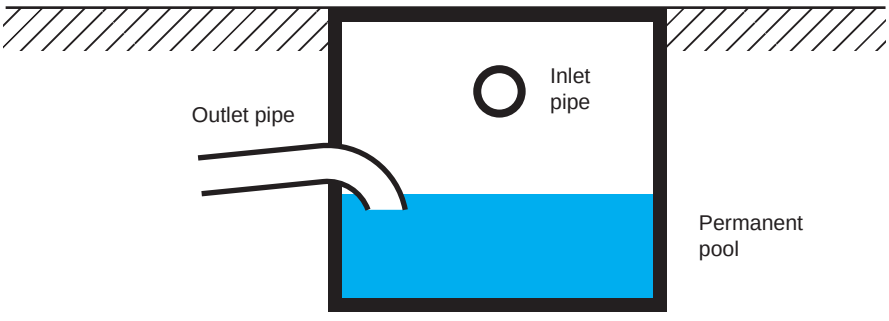
Oil, grease and water separators (triple interceptor)

Devices that aim to trap low solubility contaminants and contaminated suspended solids before flows are discharged into the stormwater or sewer systems

These devices can be installed at existing industrial sites to reduce pollution in stormwater runoff when active work areas cannot be relocated to a roofed area with a sealed floor. They can be used as pre-treatment for discharges to sewer subject to a trade waste agreement.



Separator side view showing chambers



Separator end view

The careful design, installation, operation and maintenance of oil, grease and grit traps is essential to maximize the long term effectiveness of interceptors.

Benefits

Assists in reducing pollution in circumstances where it is not feasible to implement other options

Removal of some sediments that are suspended in the flows

Suitable conditions

100% Impervious areas

Pre-treatment for sewers

Where high volume storm event flows can be bypassed around the separator, allowing some of the water to bypass the trap

Unsuitable conditions

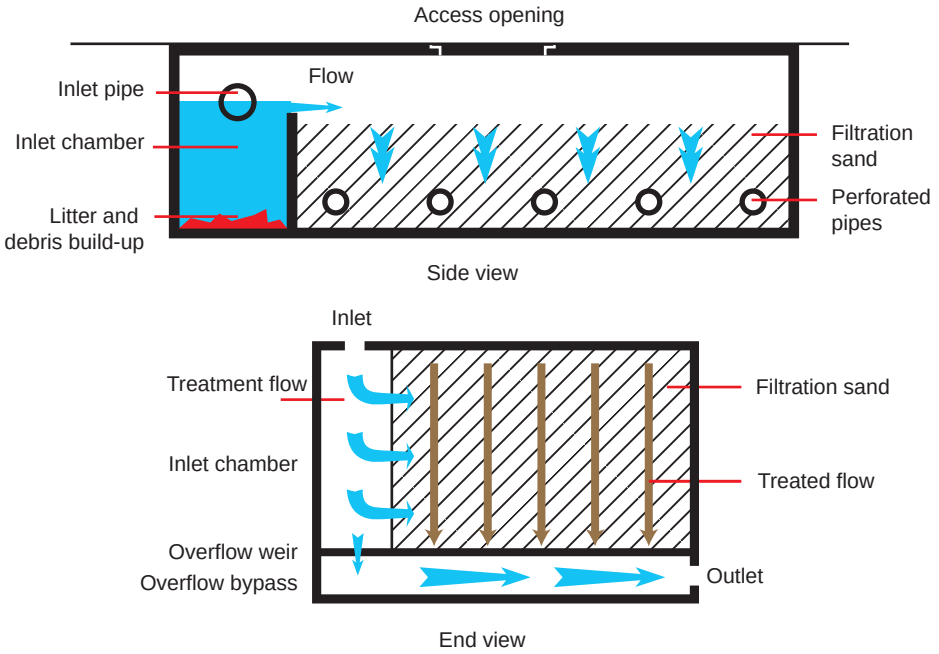
Where other means of preventing industrial pollution in stormwater can be implemented

Where high volume storm event flows cannot be bypassed around the separator (otherwise these flows could cause previously trapped pollution to be flushed downstream)

Interim structural device (pollutant capture device)

Sand and Media Filters

A device that uses sand or other specified media to filter particles and some low solubility pollutants from stormwater.



An example of a sand filter with inlet chamber

Benefits

Assist in removing industrial pollutants from stormwater flow in an existing site where it is unfeasible to introduce structural separation.

Able to be located in an underground chamber and does not restrict work areas.

Suitable conditions

Areas with existing stormwater networks where the installation of structural separation devices is not appropriate.

Good maintenance access.

Where support is provided by non-structual initiatives to reduce the risk of industrial pollutants (eg. work pratices).

Where support is provided by a formal maintenance schedule and procedures.

Unsuitable conditions

Not suited to very high sediment loads.

Can tolerate some oily residues, but should not be used where oils are regularly encountered.

Sand and media filters have a basic configuration that operates in a manner similar to bioretention raingardens, but do not include vegetation. They are appropriate for use in closed and underground chambers. The filter media most frequently used in these devices is sand; however other media such as mulch, gravel or blends that include pollutant absorbing additives are also used.

Particularly when used in a larger scale application, there is a risk that high flow events will re-suspend material that has previously been trapped and stored. An inlet chamber may be incorporated in the design to address this risk. The inlet chamber may be designed to be either normally wet or dry. The risk of mosquito breeding in wet chambers is minimal due to the likely presence of surface oils. A disadvantage of a wet chamber is that maintenance requires the removal and handling of wet materials. The alternative is to allow the sedimentation pond to drain between events by installing weep holes; however it is difficult to ensure that the weep holes do not get blocked as sediment is collected.

As an interim structural device, their role is to try to filter industrial pollutants from stormwater. Bioretention raingardens are designed to be relatively self-sustaining; however sand or media filters should be regarded as sacrificial filter which must be inspected and replaced as part of a scheduled maintenance program in order to stay effective. Good access for inspection and maintenance is therefore important. Maintenance can usually be achieved through the removal of the contaminated top layers of the filter media and by tilling the lower layers. A guide to assessing whether a sand filter needs replacing is as follows: Once stormwater inflow has ceased, if a 100mm water depth over the surface of the sand takes more than an hour or two to seep through, then the sand may need replacing. Other filter media may have different design infiltration rates.

Water sensitive urban design device

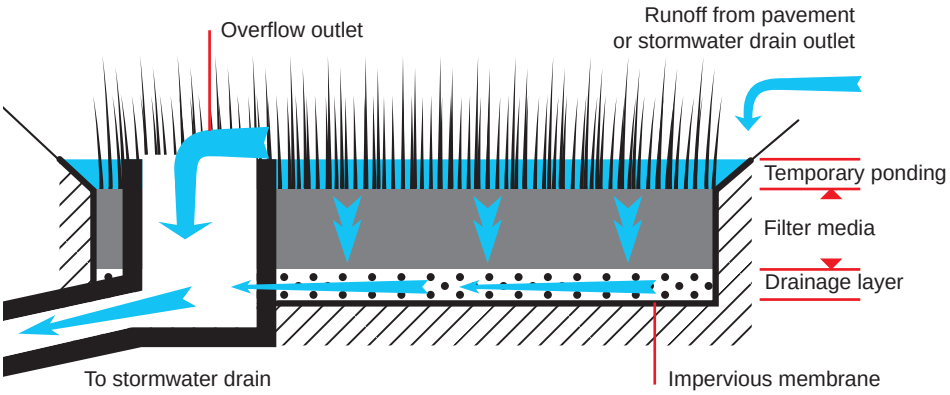
Bioretention raingarden

A bioretention raingarden combines stormwater detention, vegetation and a soil-based filtration system.

Raingarden alongside a carparking area or internal road

Stormwater is filtered through a vegetated soil media layer (eg. sandy loam) draining at 100mm – 200mm per hour and is then collected by an underlying drainage layer with perforated pipes connected to the site's stormwater drain.

Bioretention raingardens can be scaled in size and changed in form to suit a wide range of applications including hard surfaced, highly developed areas. Raingardens need a drainage outlet depth of approximately 800mm below the surrounding surface level. An exception is where an above ground bioretention planter box is used to treat roof areas.



Benefits

Removal of fine and soluble pollutants

A space efficient way of attaining the best practice objectives for runoff from typical urban development

Reduction in peak flow for some storm events

Can be designed as a landscaping feature

Flexibility in location (eg. planter boxes)

Suitable conditions

Flat terrain

Steep terrain (if raingardens are formed from constructed terraces)

Highly impervious areas

Areas with space constraints

Unsuitable conditions

Raingardens cannot be located at ground level unless an underground drainage outlet with depth approx 700-800mm is available

Not suited to treating industrial stormwater pollution from active work areas

Use in smaller sites

(less than 1000 m^2)
Well suited - use as landscape design element such as a garden bed, planter box or small tree

Water sensitive urban design device

Gross pollutant trap (litter trap)

A constructed device used in conventional drainage systems to trap and remove larger solid items or particles.

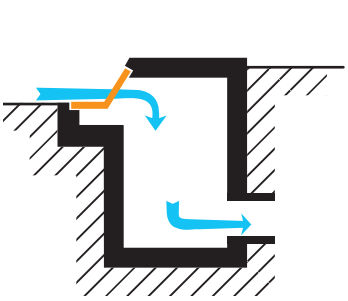
Note: A gross pollutant trap is also used as an interim structural device for existing development, and as a structural isolation device when incorporated into a permitted outdoor work activity area.

Gross pollutant traps (GPTs) come in many forms, but all are designed to trap litter and debris in stormwater while not reducing the drain's flow capacity. They may be categorised according to whether the trapped items are stored dry or stored in a wet sump. Different types of GPTs can be installed in drain entrances, underground pipe systems, at pipe outfalls or on open channels.

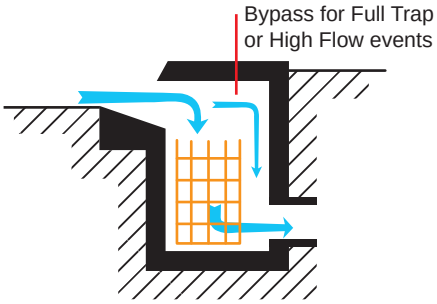
GPTs require a regular maintenance schedule and procedures to remove the accumulated debris.

If the purpose of the trap is only to intercept litter and larger items within individual industrial sites, a dry storage type trap will be well suited and easier to maintain.

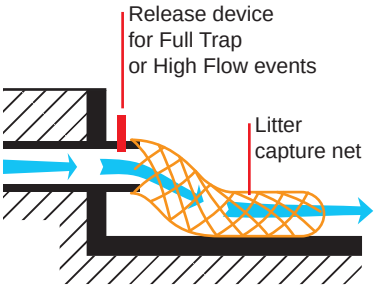
Some examples are:



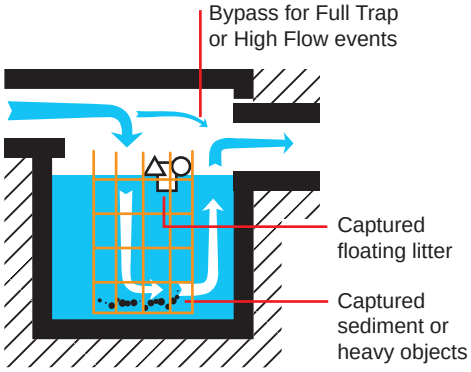
EXAMPLE 1



EXAMPLE 2



EXAMPLE 3



EXAMPLE 4

1. Side entry pit with grill to prevent larger pieces of litter entering the stormwater drain.
2. Steel basket in side entry pit to collect larger pieces of litter. Alternatively a fabric liner bag will collect sediments and store dry for easy maintenance.
3. Bag to collect larger pieces of litter is placed at the end of site drainage before its connection to the municipal drain.

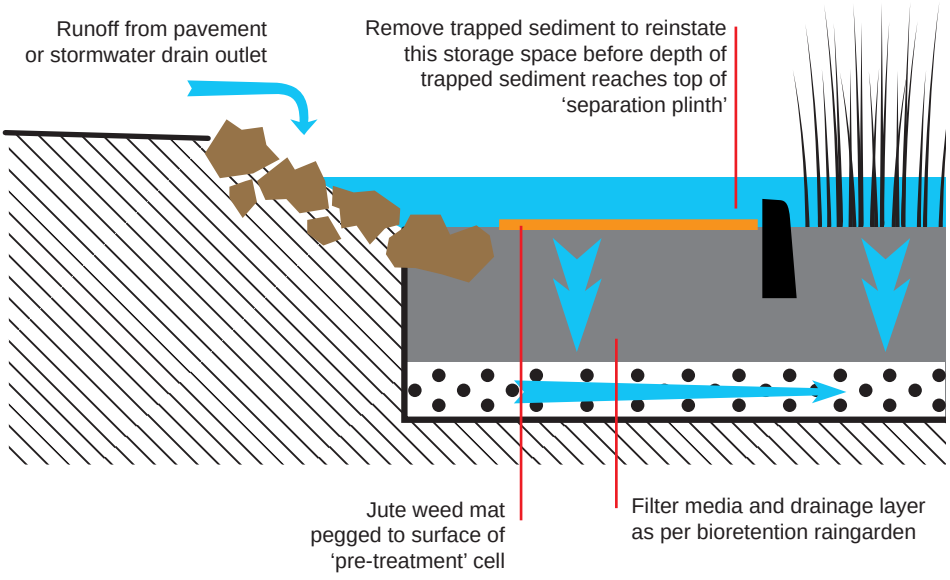
4. Traps sediments in the same way as Example 2 but in a wet condition. These traps can be to effective at trapping finer sediment but maintenance is more complicated.

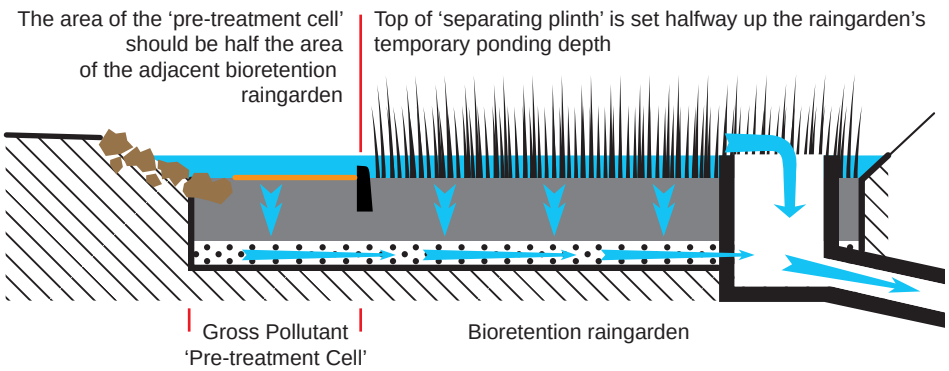
A 'pre-treatment cell' addition to a bioretention raingarden can serve as the sediment trapping facility requirement for a permitted outdoor work activity area.

Gross pollutant trap with sediment trapping function

Some GPTs can trap litter and also detain sediment that is carried within the stormwater flow. The sediment trapping function specified in the Code of Practice for permitted outdoor work activity areas requires trapping of particles size 125 microns and larger. Few dry storage type traps are capable of attaining this. Manufacturers' specifications should be referred to when selecting and sizing a trap to attain the required performance.

It is likely that for many flat sites, an off-the-shelf unit with sediment trapping function will have an outlet that is too low to be directed to a bioretention raingarden (or other water sensitive urban design device that cannot be installed below ground level). A 'pre-treatment cell' addition to a bioretention raingarden is suggested in these circumstances. The pre-treatment cell filter media will need to be maintained and replaced on a more frequent basis than the raingarden it serves. Its management will be the same as that for a sand and media filter.





Benefits

Reduce litter and debris

Can capture coarse sediment and other granular material

Pre-treatment for other devices

Suitable conditions

Conventional drainage systems

On site drainage networks

A GPT with facility for trapping sediment particles size 125 microns and larger is required to pre-treat a permitted outdoor work activity area

Regular maintenance and cleaning undertaken

Unsuitable conditions

Where adequate physical access is not available for regular maintenance

Use in smaller sites

(less than 1000 m^2)

Requires a regular maintenance schedule and procedures

Alternative is a grated entry to drainage system if litter is the only objective

Water sensitive urban design device

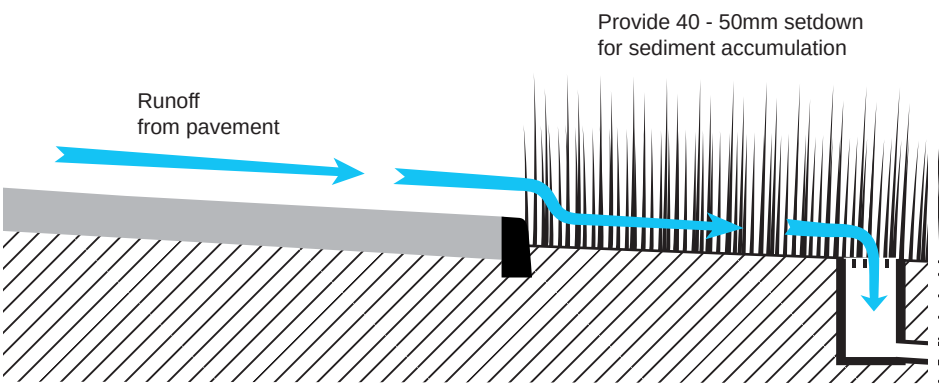
Buffer strip

A wide grassed or vegetated area capable of treating shallow overland flow by filtering it before it enters a stormwater drainage network. It is generally used upstream of another water sensitive urban design device to trap larger sediment particles.

Buffer strip adjacent to paved area

In a buffer strip, coarse pollutants are retained in the vegetation while flows pass downstream. The design of kerbs or paving edge strips can be adapted to allow stormwater to flow from carparking, an internal road or other paved area (but not an active work area) onto grass or vegetation. Well designed paving and lawns can create effective buffer strip systems.

Buffer strips can be included on industrial sites with little change to conventional design. The key difference is surfaces are graded and connected to allow a dispersed flow of water from paving and across the planted areas rather than collecting stormwater for drainage directly from paved surfaces.



Benefits

Removal of coarse pollutants

Flow attenuation

Can be easily integrated with the landscape for an industrial site

Suitable conditions

Flat terrain

Suited to sloping land where the land form can be changed by constructing terraces

Unsuitable conditions

A buffer strip's limited ability to remove soluble pollutants prevents it from being the sole means of treatment where a site needs to attain the best practice stormwater objectives

Steep terrain

Use in smaller sites

(less than 1000 m^2)

Easily integrated, but less space efficient in terms of removing pollution than a bioretention raingarden. It is therefore less suited to small sites where the value of space is at a premium.

Section Three

Water sensitive urban design device

Rainwater tank (for roof water)

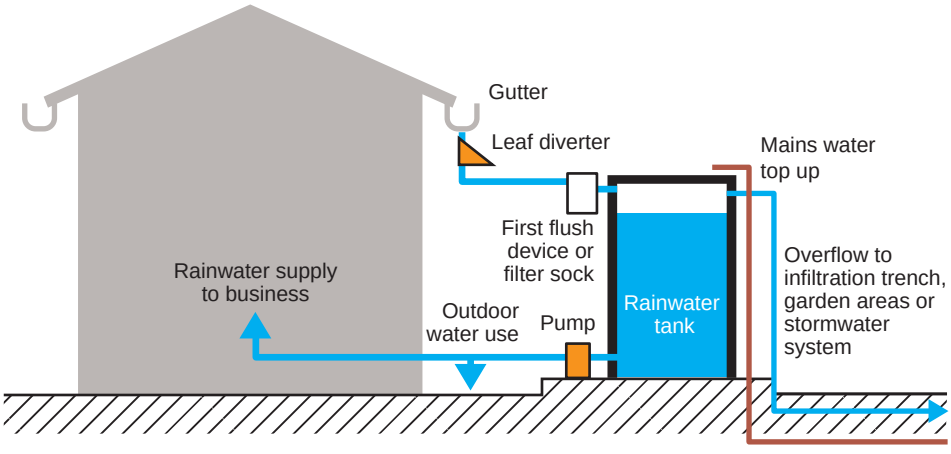
A sealed tank capable of collecting stormwater directly from a roof.

Rainwater tanks are manufactured in many shapes and sizes

Rainwater tanks are designed to allow use of the collected stormwater for non-health sensitive uses such as toilet flushing and landscape irrigation. The size of the tank depends on your area's rainfall, the roof area and the amount and consistency of use. A well-designed system can provide a self-sustaining water supply for toilet flushing in an industrial business.

There is pollution in roof water that can harm water environments. This includes nitrogen that is absorbed from the air and would be filtered out if the rain fell on vegetation and soil. Using the roof water also removes the pollution from the stormwater system.

By collecting stormwater, the tank can also reduce peak flow from the roof for the smaller, more frequent storm events. Tanks also provide some treatment of the water that overflows from them by settling sediments.



Benefits

Replaces mains water supply (for toilet flushing, etc.)

May incorporate a storm flow retarding function into the design of the tank to meet a site's peak flow requirements

Reduces overall runoff volumes for the benefit of natural flow patterns in local waterways

Suitable conditions

Needs to be incorporated with site and building design

Above or below ground

Unsuitable conditions

Where areas connected to tank are accessible and used for purposes other than roofing

Areas where contaminated water may run off into rainwater tanks (eg. plant or equipment located on roof)

Use in smaller sites

(less than 1000 m^2)

Particularly suited to use in smaller sites

Benefits increase if harvested water is used for regular consumptive use, eg. toilet flushing

Water sensitive urban design device

Infiltration bed

A shallow, excavated trench filled with porous material or leaky well capable of draining stormwater into surrounding soils.

Infiltration bed with overflow grate and pipe

In an infiltration bed, stormwater is directed onto and through a bed of porous material. The stormwater is trapped and held in this bed and then allowed to seep into the underlying ground, while pollution is retained in the bed.

Infiltration beds are typically made from sand or sandy loam. Variations include gravel beds and porous pavements.

These systems need to be regularly maintained by removing the accumulated sediment that makes the filter less permeable than at the time of original construction. They should not be relied on for industrial sites unless the business has a regular maintenance schedule and procedures. If built like a bioretention raingarden – with selected soils and plants – then maintenance requirements may be less frequent.

Some filter materials are less effective in removing soluble pollutants. The underlying ground can assist in removing soluble pollutants, but must not be relied on if groundwater is shallow. If a minimum of 600mm of sandy loam, or a minimum of 2000mm of sand, exists as either the constructed filter or the underlying soil above groundwater, then effective treatment can be assumed.

Benefits

Reduces overall runoff volumes for the benefit of natural flow patterns in local waterways

These systems can be used to passively irrigate trees

Allows a large range of uses of the surface area above the filter bed

Suitable conditions

Underlying ground is sandy to sandy-clay soils (as permeability of ground will be greater than 36 mm/hr)

Flat terrain (less than 2% slope)

Suitably deep groundwater – 600mm to 2000mm depending on soil type

Unsuitable conditions

Underlying ground is silty-clay to clay soils (as permeability of ground will be less than 36 mm/hr)

Steep terrain, greater than 2% is more difficult and expensive

Shallow groundwater table – less than 600mm to 2000mm depending on soil type

Saline groundwater

Not suited to treating industrial stormwater pollution from active work areas

Use in smaller sites

(less than 1000 m^2)

Use as a landscape element and integrate with landscape design

Requires a regular maintenance schedule and procedures

Need to ensure that base of filter bed is below any footings in the vicinity

GLOSSARY

Active work area
Areas where the following activities take place:

- any process of manufacture
- dismantling or breaking up of any article
- treating waste materials
- winning clay, gravel, rock, sand, soil, stone, or other materials (other than Mineral, stone, or soil extraction)
- laundering, repairing, servicing or washing any article, machinery, or vehicle,
- onsite work on a building, works, or land
- any process of testing or analysis
- storing goods used in the operation or resulting from it
- storing goods for service or sale

Groundwater
Below ground waters that travel through rock and are stored in aquifers.

Industrial stormwater pollution
Dangerous and hazardous chemicals, oils and residues, and materials that can leach into water. These are difficult to remove from stormwater, waterways, wetlands and marine waters and should be kept away from the stormwater drain.

Inert solid materials
Solid materials that do not leach or otherwise release oily or soluble substances or fine particles into water. Particles carried in runoff must be capable of being captured in gross pollutant traps that include a sediment trapping function that is capable of trapping particles of size 125 microns or larger.

Interim stormwater treatment
Temporary or non-permanent devices such as triple interceptors, sand filters, isolation valves, temporary bunding and the like which are used when structural isolation is not available.

MUSIC
A software package that predicts both the generation of stormwater pollution and the performance of stormwater treatment devices such as water sensitive urban design devices. MUSIC is available at www.toolkit.net.au

Permitted outdoor work activity area
A designated and treated area in which activities involving inert solid materials are permitted without the need for structural isolation.

Sewage
Waste generated by human activity that is carried by pipes to a centralised waste treatment/ recycling plant operated by a water authority. It includes wastewater from toilet, bathroom and kitchen, and industrial processes if there is a trade waste agreement

STORM
A simplified online assessment rating system that predicts whether the stormwater quality performance objectives will be met using proposed water sensitive urban design devices. The online STORM rating tool covers all areas of Victoria and is available at www.storm.

melbournewater.com.au.

Stormwater
Water from rainfall that falls on roofs and land that is carried by pipes or other conveyance to the site's stormwater drainage system.

Stormwater quality performance objectives
Performance objectives for stormwater quality including pollution removal and flow management. The objectives are published in the Urban Stormwater Best Practice Environmental Management Guidelines (Victorian Stormwater Committee, CSIRO Publishing, 1999) and on-line at www.publish.csiro.au/nid/197/issue/3822.htm Chapter 2. Current objectives are:

suspended solids: 80% retention of the typical urban annual load

- total phosphorus: 45% retention of the typical urban annual load
- total nitrogen: 45% retention of the typical urban annual load
- litter: 70% reduction of the typical urban annual load
- flows: maintain discharges for the 1.5 ARI at pre-development (natural) level

Stormwater reuse
Collection, treatment as necessary, and reuse of stormwater for non-potable use as a substitute of reticulated drinking (potable) water.

Structural isolation
Permanent, physical separation of active work areas on a site from stormwater and stormwater runoff. Examples of structural isolation include enclosing or roofing active work areas, sealing floors and ground surfaces, and installing cut out drains, bunds, sumps, waste enclosures and similar devices.

Urban stormwater pollution
Pollution from the air, roofs and land in urban areas that is carried in stormwater.

Water sensitive urban design
Integration of site layout and building design with sustainable urban water management practices. In the context of this Code of Practice it is primarily related to the use of constructed devices to treat stormwater and enable its use. Onsite collection for treatment and use occurs before stormwater is released to the stormwater drain. Water sensitive urban design devices most commonly used on individual sites include rainwater tanks for collection and reuse, gross pollutant (litter) traps and bioretention (raingardens). Other devices are also available.

Information web sites and contact numbers

EPA Victoria
www.epa.vic.gov.au

Advice (03) 9695 2722

EPA Pollution Watch Line (03) 9695 2777

Victorian Department of Sustainability and Environment – water policy & water issues
www.dse.vic.gov.au - Water

Melbourne Water's Water Sensitive Urban Design web site
www.wsud.melbournewater.com.au

Clearwater program
(supported by Melbourne Water, EPA Victoria, Municipal Association of Victoria & Stormwater Industry Association of Victoria)
www.clearwater.asn.au

Water Sensitive Urban Design in the Sydney Region
www.wsud.org

Stormwater Industry Association of Victoria (SIAV)
www.stormwater.asn.au/vic

Delivering Water Sensitive Urban Design: Final report of Clean Stormwater – a planning framework. Association of Bayside Municipalities, 2004.
www.abmonline.asn.au

Sustainability Victoria
www.sustainability.vic.gov.au

Planet Ark
www.recyclingnearyou.com.au

Victorian WorkCover Authority
www.workcover.vic.gov.au
Advice (03) 9641 1444 or 1 800 136 089

Victorian policies

State environment protection policy (SEPP) (*Waters of Victoria*)

www.epa.vic.gov.au/water/epa/wov

Securing Our Water Future Together (Victorian water policy)
www.dse.vic.gov.au – Water – The White Paper

Melbourne 2030 (metropolitan strategy)
www.dse.vic.gov.au/melbourne2030online

Stormwater technical publications

Australian Runoff Quality.
Institution of Engineers Australia, 2005.

www.arq.org.au

Urban Stormwater Best Practice Environmental Management Guidelines.
Victorian Stormwater Committee, CSIRO publishing, 1999.

www.publish.csiro.au and on-line at www.publish.csiro.au/nid/197/issue/3822.htm

WSUD Engineering Procedures: Stormwater.
Melbourne Water, CSIRO publishing, 2005.

www.publish.csiro.au

Pollution control and safety publications

EPA Victoria Publication 347, Bunding Guidelines

EPA Victoria Publication 899, Good Practice for Cleaner Production in Small & Medium Sized Enterprises

EPA Victoria Publication 976, What is Stormwater Pollution?

EPA Victoria Publication978, Reducing Stormwater Pollution: A Guide for Industry

EPA Victoria Publication 980, Reducing Stormwater Pollution: A Guide for Auto Repairers

EPA Victoria Publication 982, Stormwater Pollution Fom Concreting Operations

EPA Victoria Publication 983, Reducing Stormwater Pollution: A Guide for Painters

EPA Victoria Publication 984, Reducing Stormwater Pollution: A Guide for Home Maintenance Teams and Tradespeople

EPA Victoria Publication 985, Reducing Stormwater Pollution: A Guide for Mobile Home Gardeners and Landscapers

EPA Victoria Publication 986, Reducing Stormwater Pollution: A Guide for Mobile Pet Grooming Businesses

EPA Victoria Publication 987, Reducing Stormwater Pollution: A Guide for Mobile Carpet Cleaners

EPA Victoria Publication 988, Reducing Stormwater Pollution: A Guide for Auto Repairers and Detailers

EPA Victoria Publication 989, Water Sensitive Urban Design

EPA Victoria Publication 996, Guidelines for Hazard Classification of Solid Prescribed Industrial Wastes

EPA Victoria Publication 997, Guidelines for Hazard Classification of Solid Prescribed Industrial Wastes: Frequently Asked Questions

www.epa.vic.gov.au – Publications or EPA Victoria (03) 9695 2722

EPA New South Wales Bunding and Spill Management: Information Manual for Authorised Officers

Safe Handling of Industrial Waste - A Practical Guide for Workplaces

WorkSafe Victoria (03) 9641 1444

Dangerous Goods Act, Regulations and Code of Practice

www.workcover.vic.gov.au or Workcover1800 136 089 (Freecall)

Australian Standards

HB 203:2006: Environmental risk management - Principles and process
HB 205-2004: OHS Risk Management Handbook

www.standards.org.au – various website options

Smart Paint Disposal
www.melbournewater.com.au

Australian Paint Manufacturers Federation 1800 807 568 (Freecall)

Services and suppliers (yellow pages)

Handling and spills:
Environmental and/or Pollution Consultants

Oil & Chemical Spill Recovery or Dispersal

Safety Equipment & Accessories

Safety Consultants

Waste disposal and recycling including trade waste:
Effluent Treatment Equipment

Environment & Pollution Consultants

Waste Reduction & Disposal Services

Recycling Services

Scrap Metal Merchants

Sewage & Wastewater Treatment

Software

MUSIC
www.toolkit.net.au

STORM
www.storm.melbournewater.com.au