

**GUIDELINES TO PREVENT POLLUTION FROM  
BUILDING SITES**

November 2015

Version 1

## **Acknowledgement**

The Northern Territory Environment Protection Authority wishes to acknowledge information and ideas have been drawn in the development of these guidelines from the South Australian Environment Protection Authority document titled *Handbook for Pollution Avoidance on Commercial and Residential Building Sites Second Edition*.

## **Disclaimer**

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# GUIDELINES TO PREVENT POLLUTION FROM BUILDING SITES

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## 1 WHO SHOULD USE THESE GUIDELINES?

These Northern Territory Environment Protection Authority (NT EPA) guidelines provide practical guidance for:

- builders
- owner builders
- project managers
- site supervisors
- landscape gardeners
- demolition workers
- trades people
- home renovators
- people who supply sand, soil and concrete
- sub-contractors

to minimise pollution from:

- single building sites
- multi lot residential building sites
- high rise building sites
- commercial building sites.

The guidelines provide simple, effective and realistic advice on how to adopt control methods and procedures on building sites to ensure your impact on the environment is minimised.

They are designed to help people involved in the building industry comply with their statutory environmental duties and avoid enforcement action such as fines.

The guidelines have been designed in such a way that users can go directly to specific sections in the guidelines to obtain information on good environmental practice in the area they are interested in.

Although the emphasis of the guidelines is geared for building sites<sup>1</sup> much of the content can be adapted for large land disturbing activities such as:

- subdivision land development
- road projects
- underground utilities and services
- unsealed roads
- channels and flood ways
- ponds and dams

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<sup>1</sup> The terms '**building sites, construction activity or building works**' in this guideline apply to site activities, preparation, demolition, excavation, tunnelling works, building operations, structural alterations, repair and maintenance of buildings, transportation of materials and spoil to and from a site. Although all contractors are expected to adopt the full provisions of the guidelines, it may not be appropriate to apply all the provisions to smaller developments. The NT EPA does, however, expect all parties to comply with the spirit of the guidelines.

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- landfills
- other large land disturbance activities.

A list of helpful information is provided at the end of these guidelines. Additional reference material provided can be used for a number of purposes, including education, reference, regulation and continuing environmental improvement.

***You do not have to do everything that is included in these guidelines, provided you do not pollute the Territory's, stormwater system, lands, waters, or cause noise, odour or dust nuisances from your building site.***

***Be sure that all your employees and contractors understand what they need to do.***

### 1.1 Support

Call the NT EPA on (08) 8924 4218 or email [pollution@nt.gov.au](mailto:pollution@nt.gov.au) if you would like more help in interpreting these guidelines or want advice about applying controls to a particular site.

### 1.2 Feedback on a work in progress

The NT EPA welcomes any feedback on these guidelines and the procedures and practices within it, as well as any additional information that could help develop them further.

Feedback can be provided via email to: [nTEPA@nt.gov.au](mailto:nTEPA@nt.gov.au)

## 2 THE LAW AND YOU

There are laws to help protect the environment in the Northern Territory.

If you break the law, it could be an offence with serious penalties; in most instances, the prosecutor does not have to prove your pollution was deliberate.

***Even accidents can result in prosecution.***

You and others in your business should be aware of these laws and their penalties, and you **must** take all reasonable care not to harm the environment.

The principal legislation addressing pollution in the Northern Territory is the *Waste Management and Pollution Control Act* (the Act).

Section 12 (general environmental duty) of the Act states that:

*A person who:*

- conducts an activity that causes or is likely to cause pollution<sup>2</sup> resulting in environmental harm or that generates or is likely to generate waste; or*
- performs an action that causes or is likely to cause pollution resulting in environmental harm or that generates or is likely to generate waste,*

*must take all measures that are reasonable and practicable to:*

- prevent or minimise the pollution or environmental harm; and*
- reduce the amount of the waste.*

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<sup>2</sup> Under the Act pollution means:

- a contaminant or waste that is emitted, discharged, deposited or disturbed or that escapes; or*
- a contaminant or waste, effect or phenomenon, that is present in the environment as a consequence of an emission, discharge, deposition, escape or disturbance of a contaminant or waste.*

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Furthermore, the Act states that:

A person **must not** cause or permit a contaminant or waste to be stored:

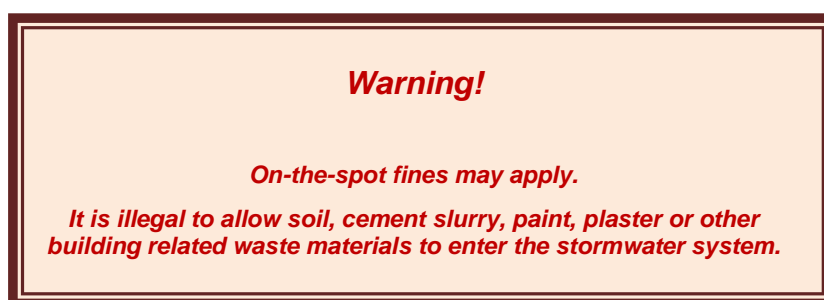
- (a) in a manner or condition in which; or
- (b) at a place from which,  
it is reasonably likely that the contaminant or waste could:
  - (c) leak, spill, or escape from storage into the environment; and
  - (d) in leaking, spilling or escaping from storage, cause environmental harm.

Table 2.1 lists common contaminants and wastes generated at or connected with building sites.

**Table 2.1: Common contaminants and waste**

<b>soil, clay, gravel or sand</b>	<b>wastewater from brick, bitumen or concrete cutting</b>	<b>building construction waste</b>
<b>building wash water</b>	<b>concrete waste</b>	<b>paint waste</b>
<b>plaster waste</b>	<b>rendering waste</b>	<b>left over oils, solvents and greases</b>
<b>litter</b>	<b>illegally dumped waste</b>	<b>sawdust from brick and concrete cutting</b>
<b>excessive noise and vibration</b>	<b>offensive odours</b>	<b>light pollution</b>
<b>contaminated soil</b>	<b>burning off on building sites</b>	<b>hazardous waste</b>
<b>spills of chemicals and oils</b>	<b>general dust due to bad practices</b>	<b>wash down water from vehicles</b>

Section 14 of the Act imposes a duty on persons to notify the NT EPA where incidents cause, or threaten to cause, pollution which results in material or serious environmental harm. Substantial penalties apply where there is a failure to notify such incidents to the NT EPA.



The Act also requires that best practice environmental management<sup>3</sup> is to be employed to prevent adverse effects on the amenity of neighbours or the unreasonable interference with the enjoyment of residential areas by noise, smoke, dust fumes or odours emanating from building sites.

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<sup>3</sup> Means the management of an activity or premises in a cost-effective manner that, having regard to national or international practices for management of activities or premises of the same kind, ensures the continued minimisation of the actual or potential environmental impact of the activity or premises.

## **2.1 Who is responsible?**

Everyone working on a building site has a responsibility to prevent off site impacts to the environment. This includes managers, builders and their sub-contractors. So, everyone must be aware of the requirement to prevent pollution and environmental nuisance from the site they are working on.

All owners, managers and operators should ensure that they know about the Northern Territory's environmental laws and their responsibilities.

Preventing site erosion and waste from impacting the environment will save money for you and your clients and protect you from enforcement action.

## **2.2 NT EPA Compliance and Enforcement Policy**

The NT EPA 'Compliance and Enforcement Policy' drives the targeted and transparent regulatory approach to compliance and enforcement matters that the NT EPA follows when it comes across non-compliances with legislation that it administers. Within this approach there are a number of tools that are available to be used by the NT EPA in its role of protecting the environment. The NT EPA will use the right compliance and enforcement tool when responding to non-compliances, and where there is a need to restore or make good the harm caused by contraventions of its legislation.

A copy of the NT EPA 'Compliance and Enforcement Policy' is available to be viewed at

<http://www.ntepa.nt.gov.au/about-nt-epa/publications/policy-and-procedures>

The statutory<sup>4</sup> and non-statutory tools<sup>5</sup> available to the NT EPA are included in Table 2.2.

The NT EPA may utilise one or more of the regulatory tools to achieve compliance with the Act.

**Table 2.2: Enforcement Tools**

<b>Regulatory level<sup>6</sup></b>	<b>Regulatory tool</b>	<b>Type</b>	<b>Information</b>
<b>One</b>	<b>Compliance advice</b>	<b>Non-statutory</b>	<b>Given verbally or in writing. An example of where advice may be provided is where non-compliances can be remedied in the presence of an NT EPA officer without the need to issue a statutory notice or direction.</b>
<b>Two</b>	<b>Formal warnings</b>	<b>Non-statutory</b>	<b>Can be given verbally but are always confirmed in writing. Failure to comply with a warning will be documented and considered in any further enforcement action.</b>
<b>Two</b>	<b>Corrective requests /directions</b>	<b>Statutory</b>	<b>Can be given orally and require a person to remove, dispose of, destroy, neutralise or treat any pollutant, waste, substance, environmental hazard, noise or thing to prevent environmental damage or harm.  Directions given verbally will be confirmed in writing.  A failure to comply with a direction is considered</b>

<sup>4</sup> Formal legal tools available under Acts of Parliament.

<sup>5</sup> Tools not connected to Acts or Regulations.

<sup>6</sup> The higher the regulatory level number, the greater the escalation of the matter and hence the seriousness.

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Regulatory level <sup>6</sup>	Regulatory tool	Type	Information
			a serious offence and may result in prosecution.
Three	Notices	Statutory	<p>Statutory notices will be issued where works or actions are required to control risk, prevent further harm or comply with the law and they cannot be completed while the authorised officer is still present.</p> <p>Notices such as pollution abatement notices and environmental audits are legal instruments issued to carry out works, stop activities or carry out investigations.</p> <p>These notices ensure there is a formal record that the NT EPA has required action to remedy a risk or prevent further harm and that people are treated consistently. They will often hold recipients to a given timeframe to comply with the requirements.</p> <p>Authorised officers will advise recipients of a proposed notice prior to its issue. Where the situation allows, an officer will consult on its draft contents, including the timeframe for compliance.</p> <p>The Act includes provisions to require builders to remove and dispose of contaminants and waste and to require owners or occupiers to clean up building sites.</p> <p>Notices may be accompanied by other enforcement measures, such as infringement notices or prosecution.</p> <p>Contravention or failure to comply with the requirement of a notice is an offence under the Act and will lead to further enforcement.</p>
Three	Penalty infringement notices (PIN)	Statutory	<p>On-the-spot fines may be imposed on offenders who contravene the provisions of the Act.</p> <p>PINs can be issued for example where an inspection discovers a breach of the Act that should have been prevented by normal operations procedures or where there is non-compliance after a number of inspections.</p>
Four	Suspension of a licence/approval /consent	Statutory	<p>Suspending a licence or approval may temporarily remove the ability for that person or entity to operate and may have serious commercial impacts. Suspension may occur where the holder of a licence has a history of repeated breaches of licence conditions or where there has been a failure to demonstrate to the NT EPA that continued operation would not result in unacceptable risk or harm to the environment.</p>
Four	Injunctions	Statutory	<p>NT EPA can apply for an injunction from the Supreme Court to stop a person contravening legislation or a condition of a licence or approval.</p>

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Regulatory level <sup>6</sup>	Regulatory tool	Type	Information
			<b>Injunctions can also be sought where other enforcement measures have not been effective.</b>
<b>Five</b>	<b>Prosecution</b>	<b>Statutory</b>	<p><b>Depending on the seriousness of the offence, the NT EPA may choose to prosecute offenders through the court system.</b></p> <p><b>In all its dealings with the court system, the NT EPA is guided by the Northern Territory Government's Model Litigant Policy.</b></p>
<b>Five</b>	<b>Cancellation/revocation of a licence/approval/consent</b>	<b>Statutory</b>	<p><b>This action permanently removes the ability for a licence holder to operate until a new licence is issued.</b></p> <p><b>It is undertaken in situations for example where the holder has a history of breaches of licences conditions or an Act or where NT EPA cannot be assured that the actions of the holder will not damage the environment.</b></p>

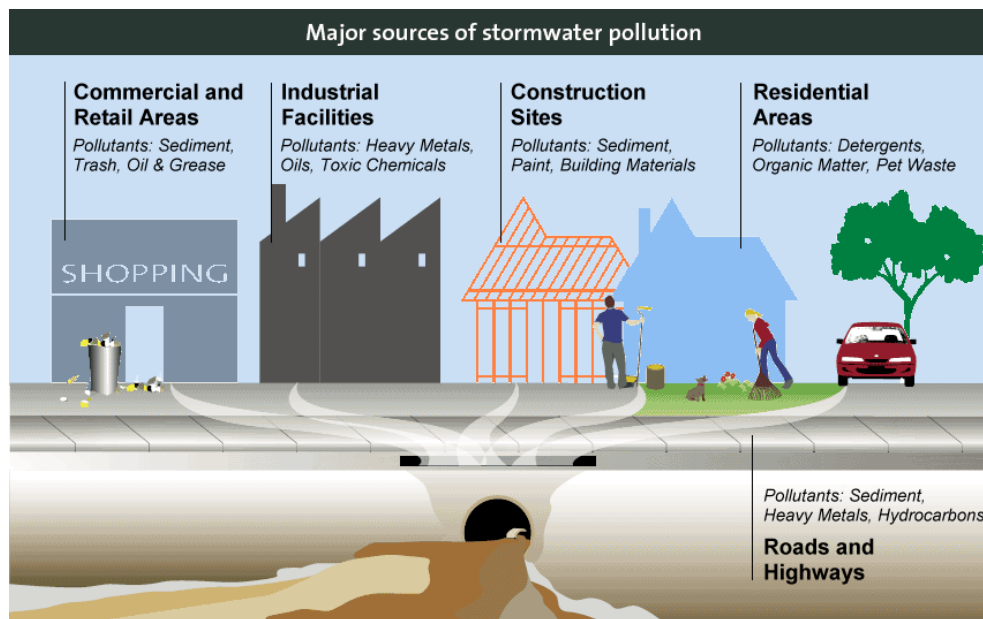
### 3 WHAT ARE THE IMPACTS OF POOR BUILDING SITE PRACTICES?

There are a number of environmental problems directly associated with pollution from building sites.

#### 3.1 Waterway impacts

##### 3.1.1 Sources and nature of stormwater pollution

As can be seen in Figure 3.1 in addition to other sources, construction/building sites can be a major source of stormwater pollution.



**Figure 3-1: Major Sources of Stormwater Pollution (from Georgia stormwater management manual - modified from [www.melbournwater.com.au](http://www.melbournwater.com.au))**

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Table 3.1 provides typical figures of pollutants entering the stormwater system. These pollutants ultimately end up in natural waterways, such as Darwin Harbour.

**Table 3.1: Typical Stormwater Pollutants**

Pollutant	Typical Concentration
Total Nitrogen	17 (kg/ha)
Total Phosphorus	2.3 (kg/ha)
Aluminium	50,000 (g/ha)
Arsenic	15 (g/ha)
Cadmium	2.9 (g/ha)
Chromium	81 (g/ha)
Copper	830 (g/ha)
Nickel	25 (g/ha)
Lead	360 (g/ha)
Zinc	1900 (g/ha)
Total suspended solids	960 (kg/ha)

**From: The Impact of Urban Land-use on Total Pollutant Loads Entering Darwin Harbour NT Department of Natural Resources, Environment, the Arts and Sport. Aquatic Health Unit. 2009.**

Run-off containing sediment (e.g. soils, sands and clays), as well as other waste, can have a significant effect on water quality. Water from building sites can contain pollutants that can contravene receiving water quality standards.

Building site practices that fail to control pollution can cause damage to waterways and wetlands, kill fish, upset aquatic ecological systems and wildlife communities and result in contamination of land and groundwater. The risk to the environment is particularly high when work is done near natural waterways, such as streams, creeks, river or coastal areas.

Sediment also chokes local creeks and waterways affecting plant and animal life. Studies have shown that one building site can lose up to four truckloads of soil in a single storm.

It is important to keep soil and your waste on your site.

### 3.1.2 Turbidity

*What is turbidity?*

Turbidity is a measure of the cloudiness, clarity, or degree of transparency of water caused by suspended or dissolved substances. It is an indicator of how muddy a waterway is and consequently the risk of impact to a waterway. Turbidity values are generally reported in nephelometric turbidity units (NTU). High turbidity levels are caused by mud and sediment entering our waterways. The turbidity of waterways in the Northern Territory can be as high as 150 NTU during the Wet season.

Turbid water restricts sunlight penetration through the water column and reduces the amount of light available to aquatic plants for photosynthesis and hence the productivity of the aquatic ecosystem suffers.

Figure 3-2: Turbidity provides an example of water samples that contain different amounts of sediment. The amount of sediment in the sample affects the turbidity (i.e. cloudiness) of the water.

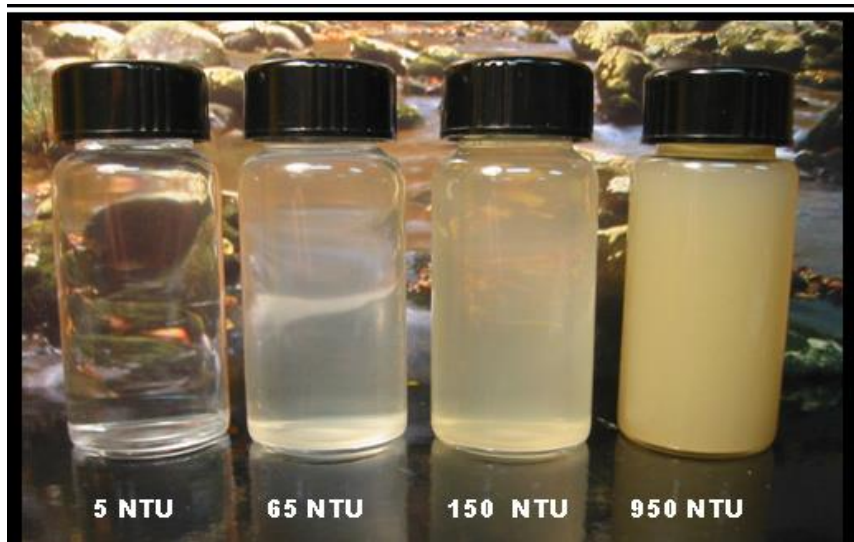


Figure 3-2: Turbidity (City of Abbotsford, Canada)

Figure 3-3 shows the impact on fish of high turbidity levels over time. During and after rain events, increased turbidity may be associated with higher water temperatures, lower dissolved oxygen levels, decreased ability for light to reach photosynthetic aquatic plants, and affect the gills of fish and *macroinvertebrates* (organisms that are large enough to be seen with the naked eye and lack a backbone).

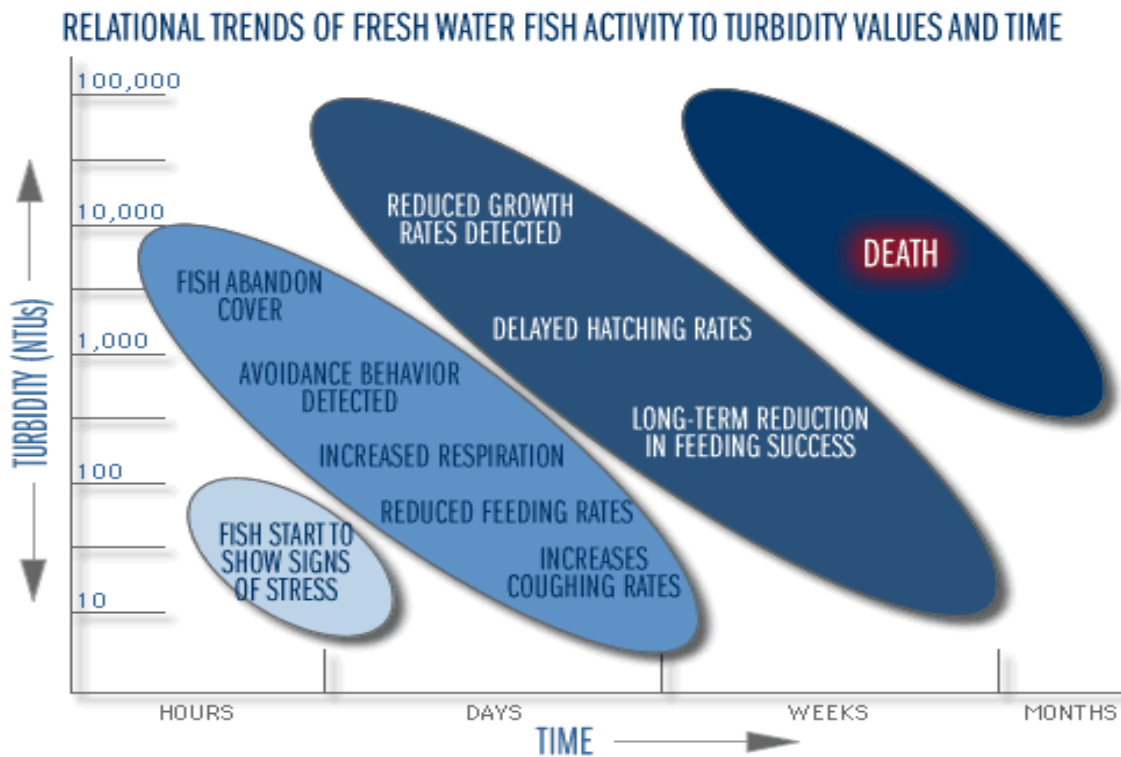


Figure 3-3: Effects of Turbidity on Fish (The Wallerstein Collaborative for Urban Environmental Education New York University Steinhardt School of Culture, Education, and Human Development)

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**Figure 3-4: Creek being impacted by highly turbid water releases (Environment Canterbury Regional Council)**



**Figure 3-5: Turbid water entering stormwater drain (NT EPA 2014)**



Figure 3-6: Turbid water discharging from a stormwater drain (NT EPA 2014)

### 3.1.3 Algal blooms

Natural watercourses can become polluted by runoff from building sites, which can carry pollutants such as soil (with associated nutrients), concrete, and paint and plaster residues. Nutrient-rich water often develops algal blooms on our surface and marine waters.

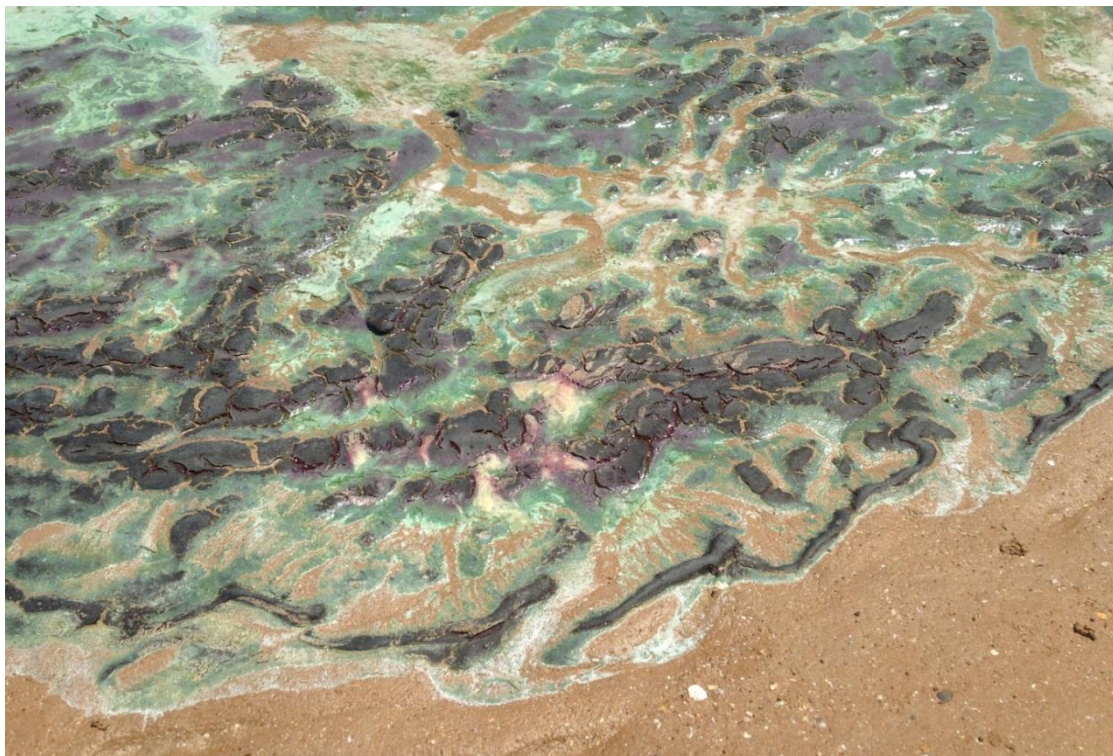


Figure 3-7: Algal bloom washing up on a Darwin beach (NT EPA 2014)



Figure 3-8: Blue Green Algae warning sign (NT EPA 2014)

### 3.2 Impacts on public and private infrastructure

Building site run-off can block reticulated stormwater systems and other purpose built systems designed to control flows. This may lead to localised floods and cause property damage. There is also the cost associated with the maintenance and clean-up of these systems from the impacts of uncontrolled run off. These costs are borne by rate payers and the general public and can add to the cost of living.

Sediment on roads and highways also poses safety risks for road users by increasing the likelihood of accidents. They can also pose slip and fall hazards on footpaths.



Figure 3-9: Mud from building site posing traffic hazard on public road (NT EPA 2014)

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Figure 3-10: Mud from unprotected building sites impacting a public road (NT EPA 2014)



Figure 3-11: Footpath covered by mud posing slip risk to pedestrians (NT EPA 2014)

### 3.3 Noise and vibration impacts

Building site noise is one of the major environmental noise issues in the Northern Territory – not only from building works but also from demolition, remediation, renewal and maintenance works. Construction can generate high noise levels that can adversely affect sleep, concentration, and thus learning performance and mental and physical health.

Construction on building sites can occur close to residences or other sensitive land uses, and is variable in times of occurrence. These aspects of construction can exacerbate noise levels and their effects. Construction noise by its nature is temporary, may not be amenable to purpose-

built noise control measures applied to industrial processes, and may move as construction progresses.



Figure 3-12: Building noise can be disruptive particularly in the early hours of the morning (NT EPA 2014)

### 3.4 Dust and odour impacts

The Act regulates air pollution emitted by industrial processes and other activities. In addition to minimising pollution from industrial processes, the Act requires goods or materials to be handled, moved and stored in a manner that avoids air pollution.

Emissions to the atmosphere from building sites include **particulate matter** (that is, dust, motor vehicle emissions and smoke) and **odour**. Poor practices may result in air pollution that can have adverse off-site impacts, cause annoyance and impact on the health of adjoining neighbours.

Particulate matter (PM) comes in a wide range of sizes and the types of particles will vary in composition from place to place and time to time. Particulate matter is measured in micrometres (or microns). One micrometre is one millionth of a metre. To put this in context the width of cotton fibre is about 10 micrometres and human hair width can range from 17 to 180 micrometres.

Most particulate matter is too big to be inhaled but can cause eye, nose and throat irritation and lead to deposition on cars, windows and property.  $PM_{10}$ <sup>7</sup> is of more concern to human health as the particles can enter the lungs, and is associated with a range of effects on health including respiratory and cardiovascular systems (i.e. asthma) and mortality (deaths brought forward). Particles can also carry adhered carcinogenic compounds into the lungs. The most vulnerable people are the elderly, the very young and those with existing heart and lung conditions.

These particles travel further than coarser dust, land on surrounding areas and damage the amenity of neighbouring properties. They also have the potential to block drains and sediment retaining systems. This can lead to the discharge of pollutants outside of retention areas and cause subsequent environmental harm.

The impacts of poor air quality can also be seen on flora and fauna.

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<sup>7</sup> A mass fraction of airborne particles with an aerodynamic diameter of 10 microns or less. It is comprised of *coarse* particles (2.5-10  $\mu\text{m}$  in diameter), which are primarily from non-combustion sources and *fine* particles (less than 2.5  $\mu\text{m}$ ), which includes combustion processes or are formed in the atmosphere through the chemical reaction of primary emissions of gases.

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Dust can have chemical and physical impacts on plants. Dust may have physical effects on plants such as blockage and damage to stomata, shading, abrasion of leaf surface or cuticle, and cumulative effects (e.g. drought stress on already stressed species). The chemical effects of dust, either directly on the plant surface or on the soil, are likely to be more important than any physical effects. Dust deposited on the ground may produce changes in soil chemistry, which may in the longer-term result in changes in plant chemistry, species composition and community structure.

Fauna can be impacted by dust, particularly those animals that use plants either as a source of food or habitat. Dust on the leaves and fruit may decrease palatability to animals and decreased health of trees and changed community structure can result in a reduction in the amount of available habitat.



Figure 3-13: No dust control measures in place (NT EPA 2014)



Figure 3-14: Mud from construction site as source of dust from vehicle movement (NT EPA 2014)

### 3.5 Health risks

Water that has pooled and become stagnant on a building site as a result of poor practices poses a significant health risk through mosquito borne viruses.



**Figure 3-15: Vacant site adjoining building site impacted by accumulation of stagnant water and has also attracted illegal dumping from other sites (NT Department of Health 2014)**

## **4 SAVE MONEY, TIME AND ENERGY – REASONS TO DO THE RIGHT THING**

Some of the benefits to owners, builders and the building industry in general of doing the right thing are included in Table 4.1.

**Table 4.1: Benefits of doing the right thing**

<b>all weather site access</b>	<b>improved wet weather working conditions</b>	<b>sites do not get boggy</b>
<b>less mud and dust problems</b>	<b>reduced stockpile losses</b>	<b>reduced clean-up costs</b>
<b>a better public image</b>	<b>more marketable sites</b>	<b>earlier sales</b>
<b>fewer public complaints</b>	<b>reduced risk of fines</b>	<b>reduced risk of loss of bond</b>
<b>reduced loss of valuable top soil</b>	<b>reduced costs of potable water treatment</b>	<b>better neighbour relationships</b>
<b>fewer site hazards</b>	<b>reduced downtime</b>	<b>decreased algal blooms as a result of reduced nutrients in our waterways</b>
<b>healthier waterways</b>	<b>better fishing for everyone</b>	

National and international experience shows that the cost of effective pollution management on building sites is greatly reduced within the first few years as builders become experienced with the various techniques.

## 5 SITE PLANNING – ALWAYS THE FIRST STEP IN DOING THE RIGHT THING

### 5.1 Plan before you start work on your building site.

The main objectives are to stop sediment, waste, litter and other pollutants from leaving your site, as well as preventing noise and dust from your building site annoying your neighbours. This requires careful planning and forethought. The way you run your building site impacts on the amount of pollution in stormwater run-off from your site, as well as the number of complaints made by your neighbours about noise and dust impacts.

When planning the site layout, building location, earthworks and operational activities at your building site you should take into account the following:

1. a soil erosion and sediment control plan (ESCP) (see below)
2. the location of stockpiles and storage materials
3. the location of waste management facilities including litter and recycling material storage areas
4. the location of ablution blocks and Portaloos
5. a secondary containment area for the storage of chemicals, oils and paint
6. an area for brick cutting and concrete works
7. a contained area for paint and plastering waste
8. a contained wash down area for vehicles and equipment
9. the placement of noisy equipment so as to avoid annoying your neighbours
10. dust control measures
11. a spill response kit and procedure
12. a reporting procedure to the NT EPA for environmental incidents.

### 5.2 Erosion and Sediment Control Plans

An Erosion and Sediment Control Plan (ESCP) is an electronic or hard copy document that **must** be prepared where it is required by the Consent Authorities or the NT EPA. ESCPs **should** be prepared where there is a high risk of pollution to adjoining land, roads, stormwater drains or receiving waters.

An ESCP is not usually required if the risk of the development activities affecting stormwater quality are low—for example, if a site is developed at a depth significantly below street level, such as for multi-storey buildings.

If a formal ESCP is not required there is still an expectation that building site managers implement appropriate erosion and sediment control measures in accordance with the requirements in this guideline.

**Steps for preparing** an effective ESCP are to:

1. investigate the site characteristics
2. conduct an assessment of the risks associated with the timing of the proposed works
3. develop effective site water management
4. integrate all clearing and grading works with the site layout design – aim to limit exposure of the least area of land to the risk of erosion, for the shortest period of time

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5. determine the existing and proposed drainage patterns – to effectively control surface run-off entering and leaving the site
6. select the appropriate erosion control practices
7. select the appropriate sediment collection devices
8. identify the locations of stockpiles
9. select an appropriate entry and exit point
10. identify the locations of site waste receptacles (mini-skip, bins, wind-proof litter containers)
11. develop a daily clean up schedule
12. develop an inspection and maintenance schedule of the erosion control and sediment collection devices
13. outline the site rehabilitation program – for example, rehabilitate all disturbed areas as soon as possible.

The ESCP product must be readily understood and applied on-site and should as a minimum contain the information listed in Table 5.1 where applicable.

**Table 5.1: ESCP information requirements**

<b>North point and plan scale</b>
<b>Site and easement boundaries</b>
<b>Proposed building works and limits of disturbance</b>
<b>Site access points</b>
<b>Location of stockpiles</b>
<b>Retained vegetation including protected trees</b>
<b>Existing and final site contours</b>
<b>Location of all drainage, erosion and sediment control measures</b>
<b>Site revegetation requirements</b>
<b>Technical notes on ESC measures, installation sequence and maintenance requirements</b>
<b>Inclusion of standard drawing of all nominated erosion and sediment controls and labels and legend to clearly identify the controls of the ESCP</b>

For assistance on the preparation of an ESCP please refer to:

- ***Developing an Erosion and Sediment Control Plan for a Residential Building Site 10 September 2014*** which can be found at the NT Department of Land Resource Management web site at: <http://www.lrm.nt.gov.au/soil/management/factsheets>
- ***Erosion and Sediment Control Field Guide for Builders by Catchments and Creeks Pty Ltd V3, January 2013*** and available at: <http://www.catchmentsandcreeks.com.au/docs/Erosion-&-Sediment-Control-Field-Guide-for-Builders-screen.pdf>
- Fact sheets produced by *Catchments and Creeks Pty Ltd* are available at: [http://www.catchmentsandcreeks.com.au/M-fact\\_sheets-ESC.html](http://www.catchmentsandcreeks.com.au/M-fact_sheets-ESC.html)

## 6 EROSION AND SEDIMENT CONTROL MANAGEMENT

This section covers in detail the key aspects of erosion and sediment control that you must consider for your building site, and for inclusion in your ESCP referred to in section 5.

### 6.1 Site excavation

Avoid stripping and excavating the site until you are ready to build. Look to limit disturbance at your site when cutting, filling and excavating the building platform. Fill needs to be well compacted.

Preserving as much grassed area as possible will help to filter sediment from stormwater run-off before it reaches the drainage system. Dust at your site should be controlled to limit nuisance to nearby residents and pollution of stormwater systems.

Vehicles should enter and leave the site only by a stabilised construction access driveway to limit the tracking of mud and/or soil onto roads. It is recommended that geofabric lining be incorporated under rock for stabilised construction access. In addition, it is recommended that all top soil is removed prior to placing the geofabric lining and rock material.

Where the risk is high, ensure that loads are covered to eliminate materials or litter blowing off site. Excavator drivers for example, should remove any sediment left on the road by their vehicles.

### 6.2 Stabilised entry/exit point

Where possible, the entry/exit point of the site should be managed so vehicles do not track sand, soil and clay (i.e. sediment) off the site. This access point should be restricted to one stabilised location (note that it may not be the location of the permanent driveway).

It is recommended that large gravel or aggregate be used to establish the entry/exit point. Make sure that you clearly mark the access point and provide a map for delivery drivers.

Stabilised access points only require periodic maintenance by topping up the rock, although street sweeping on adjacent roads may still be required.

*Advantages of stabilising the access point:*

- it restricts vehicle movement, therefore allowing the entire site to be more stable and durable in wet weather
- after wet weather, work can begin more quickly
- vehicles are less likely to become bogged
- sediment flowing into waterways will be reduced.

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**Figure 6-1: Entry point not stabilised - mud accumulating around stormwater entry (NT EPA 2014)**



**Figure 6-2: No defined entry point causing mud and dirt leaving the site (NT EPA 2014)**



**Figure 6-3: Properly stabilised entry point with nearby silt fence (Brisbane City Council)**



**Figure 6-4: Another example of proper stabilised entry point (Environment Canterbury Regional Council)**

### **6.3 Sediment Fencing**

The most efficient and widely accepted way to control sediment from construction sites is a specially manufactured geotextile sediment fence.

Sediment fences act like dams – trapping the sediment while allowing water to leave the site. They are effective in retaining suspended solids coarser than 0.02 mm. Sediment fences are simple to construct, relatively inexpensive and easily moved as the development/building works proceed.

When using a sediment fence, keep in mind that it will be effective within the following parameters:

- a sediment fence is generally not designed to filter heavy flows, and therefore needs to be placed following the contours whenever possible
- it needs to be trenched-in, at least 150 mm, and buried with the soil compacted so the water flows through, and not underneath
- the performance of a sediment fence diminishes considerably when crushed – it must remain vertical and keyed into the soil

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- incorrect installation will allow water to flow through the point of least resistance
- it should last for up to six months, but requires regular maintenance and weekly checks
- damaged fences must be repaired promptly.

On a typical residential building block (approximately 700 m<sup>2</sup>) a sediment fence should work well providing it is placed on the low side of the block. If there needs to be a break in the fence for any reason (for instance, an access point) a contour bank/diversion bank or bund will be needed to direct water back to the fence. The sediment fence must have uphill returns at either end to prevent sediment flowing around it.

*Advantages of sediment fences:*

- it is a simple strategy that is easily installed, shifted or removed
- they work well and, if maintained, should last for the duration of the building construction stage.



**Figure 6-5: Badly managed building site with no controls with nearby unprotected stormwater entry pit (Department of Environment and Conservation NSW)**



**Figure 6-6: Exposed site with no controls (NT EPA 2014)**

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**Figure 6-7: Soil being washed away due to no sediment controls on a building site (NT EPA 2014)**



**Figure 6-8: Overland discharge of muddy water onto road– no controls (NT EPA 2014)**

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Figure 6-9: Example of best practice erosion and sediment control at a building site (Mackay Regional Council).



Figure 6-10: Properly constructed silt fence (Environment Canterbury Regional Council)

### 6.4 Hay Bale Filter

Hay bale filters are suitable for low flows of water. These are recommended for only limited applications, such as to reduce the speed of the flow.

The return of hay bales every 20 metres, held firmly in place with star pickets, is recommended to ensure stability.

The minimum number of bales to be used is four. If only two bales are used during a storm, the water will simply hit the bales and flow around, increasing erosion. The bales must dam the runoff and allow the sediment to settle behind the bales.

Please note that hay bales do not filter sediment-laden waters. They will only hold water back if installed correctly.



**Figure 6-11: Failed hay bale structure bales not staked; catchment is far too big and the barriers are located in a high volume flow path (Environment Canterbury Regional Council)**

Other options, such as mulch banks and coir logs, can be explored as an alternative hay bales.



**Figure 6-12: Correct placement of bale structure – note appropriate number of angle irons (Environment Canterbury Regional Council)**

## **6.5 Inlet Protection**

Protection must be provided for stormwater inlets located within or adjacent to your building site, particularly where inlets drain areas of bare and unprotected soil. Protection may consist of geotextile fabric covered timber frames. During storms, ponding should be allowed to occur around the stormwater inlet to assist in the settling-out of sediments. A structurally sound support frame is needed to withstand the weight of sediment-laden water (i.e. placed either directly over the grated inlet or around the inlet supported).

### *Advantages:*

- reduce the amount of sediment leaving the site
- inexpensive
- easy to construct.

### *Disadvantages:*

- require frequent maintenance to prevent clogging

## GUIDELINES TO PREVENT POLLUTION FROM BUILDING SITES

- ineffective for small particles and during large storm events
- may cause flooding
- ineffective for large areas.

Kerb inlet protection can be used (with the road owner's consent) where the drainage area to an inlet is disturbed and it is not possible to temporarily divert the stormwater drain outfall into a sediment trapping device. Watertight blocking of inlets is not to occur. Also, it is not to be used in place of sediment trapping devices. Stormwater inlets must be maintained and checked regularly and roads should be cleaned at the end of every day and particularly before and after rain events.



**Figure 6-13: Kerb inlet protection measures (Environment Canterbury Regional Council)**

Figure 6.13 shows examples of kerb inlet protection measures. The image to the left indicates the use of a sediment sock/tube which traps sediment but allows water to flow through to prevent flooding. The image to the right shows the installation of a specially designed bag filter inside the drain sump to catch any dirty or silty runoff which also allows water to flow through



**Figure 6-14: Inlet protection treatments must not completely block off the stormwater system; always include a bypass arrangement (Environment Canterbury Regional Council)**



Figure 6-15: Sediment control device not maintained and thus not protecting the inlet (NT EPA 2014)



Figure 6-16: Example of proper inlet protection - height of sediment control devices around inlet must be kept to less than 300mm so that runoff does not cause local flooding and/or is not inadvertently directed into adjacent catchments (Environment Canterbury Regional Council)

The following links provide comprehensive advice and information on best practice stormwater inlet protection:

- **Catchments and Creeks Pty Ltd Fact Sheets**  
[http://www.catchmentsandcreeks.com.au/fact-sheets/fs\\_sedcontrol\\_storminlet.html](http://www.catchmentsandcreeks.com.au/fact-sheets/fs_sedcontrol_storminlet.html)
- **Erosion and Sediment Control Field Guide for Builders**  
<http://www.austieca.com.au/documents/item/355>

## 6.6 Diversion of Up-Slope Water

Where practical, or where stormwater run-off is from more than 0.5 ha, upslope water should be diverted around the building site. Stormwater can be diverted by small turf or geotextile-lined catch drains, or by the use of diversion banks.

Diverted stormwater should be discharged onto stable areas and should not be diverted into neighbouring properties unless written permission is obtained from adjoining landowner(s). Avoid directing stormwater towards the site's entry/exit point.

*Advantages:*

- there is less water that must be treated
- the site is kept drier during wet periods.

## GUIDELINES TO PREVENT POLLUTION FROM BUILDING SITES

*Remember* – on steep sites, depending on the duration of works and the expected water flows, it may be necessary to line the earth drain with turf or a geotextile fabric to avoid unnecessary soil erosion.

### 6.7 Grass Filter Strips

Strips of vegetation down-slope from earthworks are a simple method of trapping coarse sediment. The flatter and wider the filter strips, the more effective they are. Grass filter strips have little effect in a storm, but can stabilise a disturbed site quickly and form an important part of a sediment control program.

A 400 mm-wide grass strip can be installed next to a kerb to stabilise the area between the kerb and footpath, and trap sediment in very small storms. For best results, it is advised that the whole footpath is planted.

*Advantages of grass filter strips:*

- they are very effective in removing coarse sediment upstream from detention basins or infiltration structures
- they limit sediment travelling from bare soil areas to the drain.



Figure 6-17: Example of an appropriately constructed grass filter strip (NT EPA 2014)

### 6.8 Service Trenches

Where possible, coordinate the various service connections so that a single trench can be used. Avoid trenching in areas where water flow is likely to concentrate. Alternatively, try to schedule work when rainfall is low.

*Notes:*

- limit the time trenches are open to less than three days, and avoid opening them whenever the risk of storms is high
- remove and store vegetated topsoil (sod) so that it can be used to provide immediate erosion protection after backfilling
- place the soil on the uphill side of trenches to divert water flow away from the trench line, or use temporary bunds for similar effect
- backfill subsoil and compact to 95% Standard Proctor<sup>8</sup>, then replace topsoil and any sod to match surrounding ground levels

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<sup>8</sup> This is a laboratory geotechnical testing method used to determine the soil compaction properties – specifically the optimal moisture content at which a given soil type will become most dense and achieve its maximum dry density.

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- re-vegetate using original sod or other vegetation where possible.

### 6.9 Early Roof Downpipe Connection

Temporary or permanent downpipes should be installed at the same time as the roof is installed. The early connection of downpipes to the stormwater system will reduce site drainage problems on your, as well as downtime following storms.

Connecting roof downpipes is a vital process to keep water off the site and **'keep the soil on the site'**.



Figure 6-18: Flexible downpipes directed to stormwater entry points (Environment Canterbury Regional Council)

### 6.10 Stockpiles and Storage of Materials

The incorrect storage of stockpiles is a major source of stormwater pollution. Uncovered stockpiles can also cause dust impacts to the surrounding environment.

Stockpiles and building materials should **not** be stored on the footpath or within a road reserve. To avoid damage to the stockpile and pollution of the waterways, limit the amount of material on-site and remove all materials when work is completed.

*Stockpiles and building materials should be:*

- covered where necessary to minimise losses
- located behind the sediment controls
- protected from run-on water by placing diversion banks up-slope, and with sediment control structures placed immediately down-slope
- located at least 2 metres (preferably 5 metres) from hazard areas, especially likely areas of concentrated or high velocity flows, such as waterways, kerb inlet pits, paved areas and driveways
- less than 2 metres in height.

All site workers, subcontractors and delivery drivers need to be advised of their responsibilities to minimise soil erosion and pollution. Delivery drivers must be given a designated location to deliver materials on site. This practice will keep stockpiles away from site access and help keep sediment from being discharged into the stormwater system.

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**Figure 6-19: Unprotected stockpile fanning out onto the footpath – incurring loss of money and time (NT EPA 2014)**



**Figure 6-20: Stockpile unprotected and too close to stormwater entry point (NT EPA 2014)**



**Figure 6-21: Stockpile too close to road as well as being unprotected (NT EPA 2014)**



Figure 6-22: Appropriately protected stockpile (Environment Canterbury Regional Council)

### 6.11 Maintenance of Control Measures

The proper maintenance of erosion, sediment and other controls is vital to their success. The site manager should check the operation of these each day and organise repair or maintenance as required. The effectiveness of the established controls can be assessed after a storm.

An effective maintenance program should include on-going modification to plans as the building works progress. Plans are usually based on a specific landform, but as work proceeds changes occur in slope gradients and drainage paths.

Best practice includes anticipating potential risks as well as being prepared for abnormal circumstances and emergencies. This could include storing extra sediment fence fabric and posts on-site for emergency repairs, or ensuring that the sediment control contractor's phone number is readily available on-site.

*Maintain control measures by:*

- reapplying aggregate to the entry/exit point if excessive sediment build-up occurs
- cleaning any catch drains
- repairing erosion in drainage channels with rock, turf or erosion control matting
- replacing sediment fences if the fabric is ripped or otherwise damaged (retrenching may also be needed) – sediment fences work well if they are maintained on a weekly basis and/or after each storm
- keeping an eye on the weather.

### 6.12 Site Clean-Up and Rehabilitation

Accidental spills of soil or other materials such as cement or paint onto the road or drains must be cleaned up immediately if there is an imminent threat to the environment.

Materials should be physically removed from the roads and drains, minimising dust in the process and not washed down the drains. The roadway and sediment controls should be inspected and all excessive sediment residues removed following storms.

All areas disturbed by construction should be promptly stabilised (e.g. re-vegetated) so they can no longer act as a sediment source.

If the site has not been rehabilitated, and is handed over to the homeowner, the homeowner needs to understand their legal obligation concerning erosion and sediment control, especially if a sub-contractor is employed to complete landscaping works.

Builders should provide advice to homeowners on practical ways to reduce erosion from building sites until re-vegetation cover has been established or other measures installed in accordance with a local council or consent authority requirements.

## **7 WATER MANAGEMENT**

### **7.1 Dewatering of Building Sites**

Dewatering, for the purposes of these guidelines, is any activity that involves the removal of ponded stormwater or infiltrated groundwater from any location on site, and the subsequent reuse or discharge of that water.

Onsite reuse of stormwater or detained groundwater should be considered as a priority for all dewatering activities. Onsite reuse may include applications such as dust suppression, earthworks compaction, vegetation establishment/rehabilitation and plant/vehicle wash-down.

Reuse of water on site may reduce the need for imported or extracted water and provide a lower risk to the environment than direct discharge to the environment. Common minimum requirements for any reuse activity are that the reuse should not cause the ponding or runoff of water, which may then cause concentrated runoff and unauthorised discharge.

Discharges must comply with on-site discharge release criteria in accordance with Table 7.1 prior to releasing any water from a building site. It is your responsibility to test the water and ensure compliance with the criteria in Table 7.1.

**Table 7.1: On-site Dewatering Water Quality Release Criteria**

<b>Indicators</b>	<b>Criteria</b>
<b>Turbidity (NTU)</b>	<b>&lt; 20</b>
<b>Total suspended solids</b>	<b>&lt; 50mg/L</b>
<b>pH</b>	<b>6.5 – 8.5</b>
<b>Dissolved Oxygen</b>	<b>90<sup>th</sup> % ile &gt; 80% saturation or 6 mg/L</b>
<b>Litter</b>	<b>No visible litter washed from site</b>
<b>Oil and grease</b>	<b>No visible oil or grease</b>

Options to treat sediment during dewatering operations to achieve the above criteria include: desilting basins, desilting traps, wier tank, dewatering tank, gravity bag filters, sand media filters, pressurized bag filters and cartridge filters.

Examples of other common treatments for turbid water may include:

- **Flocculation** to minimise the settling duration of suspended particles, as well as to facilitate the clearing of waters exposed to dispersive soils that are prevalent throughout the NT. Flocculation enables water quality standards to be achieved within an accepted time period. A suitable flocculent should be chosen for sites based on an impact assessment of the receiving environment. Flocculant use must be subject to consultation with relevant stakeholders, including the NT EPA prior to use.
- **pH adjustment** using a base such as hydrated lime (for acidic waters), or inversely an acid such as hydrochloric acid (for alkaline waters). Low volume trials for each location will need to be carried out to determine dosage rates. Special care must be taken when adjusting pH to understand the buffer capacity of the waters, ensuring the neutral point is not over-shot. Any personnel involved in the adjustment of pH must be suitably trained and competent in the use of any additives.

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- **Absorption of oils and grease** to remove traces of hydrocarbons that may have been mobilised by rainfall. Sources of oil and grease on a project may include spills and leaks from machinery, runoff from pre-coat aggregate stockpiles, and runoff from adjacent travel lanes. Generally oils and grease can be removed from the surface of water detention structure by the use of floating booms, pads and socks.

Alternatively, turbid or sediment laden water can be pumped directly (with prior permission from the relevant land owner if not on your site) to a grassy area or field that does not flow into a waterway, or it can be taken away by tanker and disposed of appropriately.

It is important to ensure that dewatering activities do not cause subsequent erosion at the discharge location or in receiving environments. Consideration must be given to the potential for erosion at discharge locations when designing dewatering outlets. Preference should be given to locations with established stable drainage.

Energy dissipation must be provided at all dewatering discharge points. This may include the use of surface protection such as concrete aprons, woven geotextile fabric, composite sediment fence fabric, gabions or form ply – depending on the condition of the receiving environment.

**Seek advice from the NT EPA if you intend to dewater.**



Figure 7-1: Sediment laden water being discharged from building site (NT EPA)

### 7.2 Wash down Areas

Vehicles and other equipment on building sites may need to be washed frequently. The wash-down water from this equipment contains sediment (soil, clay, gravel and sand), detergents and automotive fluids, all of which can pollute our creeks, rivers and beaches.

Allowing these pollutants to enter the stormwater system and our natural waterways is also an offence under the Act. Building site supervisors should therefore ensure that an appropriate vehicle and equipment cleaning area is available on site. The following is a guide for the design and operation of a bunded<sup>9</sup> wash area for a building site.

Slope the wash area for wash water collection into a sedimentation basin. This will allow the sediment to settle to the bottom of the basin and the wastewater to evaporate. The basin can be made using sandbags or hay bales. Alternatively, if there is a large volume of wastewater to be collected, a blind sump (no outlet) should be installed.

Use phosphate-free, biodegradable soaps in small amounts. Avoid using solvents to clean vehicles.

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<sup>9</sup> A bund is an embankment or other impervious material, which forms the perimeter and floor of a compound and provides a barrier to retain liquids and waste.

## GUIDELINES TO PREVENT POLLUTION FROM BUILDING SITES

Use as little water as possible by initially spraying the vehicle with a trigger hose and then scrubbing it with cloth rags and squeegees.

If the wash bay requires a sump, arrange for a licensed liquid waste contractor to collect the wastewater from the sump and dispose of it appropriately.

### 7.3 Brick and Tile Works

Without adequate care, **waste** from brick and tile works can easily find its way into the stormwater system and harm our rivers and oceans.

For this reason, all wastewater from brick cutting activities **must** be prevented from entering the stormwater system.

#### Notes

- mortar must not be mixed in gutters or any other location that will drain into the stormwater system
- brick cutting activities that generate surplus wastewater should not be carried out on public roads, footpaths or reserves
- surplus wastewater from brick cutting activities should be recycled or discharged into a contained area for drying by soakage.



Figure 7-2: Washing of tile waste water discharging off site and into the stormwater  
(Source unknown)

### 7.4 Concrete Works Including Pours

All residues and wastes generated by concrete works **must** be prevented from entering the stormwater system.

On-site concrete mixing, either by hand or by mechanical means, should be carried out in an area that is capable of containing all excess water, residues and waste.

Where site conditions require the use of concrete pumps from public roadways, temporary bunds **must** be provided across all down-slope gutters to trap any spilt material. All spilt material **must** be removed from roadways and gutters prior to the removal of temporary bunds.

Concrete mix trucks, pumps and equipment **must not** be washed down on roadways, footpaths or reserves. Vehicles and equipment should be washed down either on the designated contained area within the site or at a suitably designed and operated wash down facility.

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Waste concrete slurry should be allowed to dry and either be disposed of on-site or taken to a licensed waste disposal or recycling facility.

### 7.5 Painting and Plastering

Paint waste and wash waters **must not** be discharged into the stormwater system. Unused paint should be kept in the tin or other sealed container and disposed of to a waste facility licensed to receive this waste.

Water-based paint clean up material should be disposed via a NT EPA licenced facility, or diverted into a contained area lined with newspaper on-site. When it is dry, place the newspaper with paint residue in a solid waste bin.

Oil-based clean up material should be filtered for reuse of the solvent, or taken to a waste facility that is licensed to accept these wastes. After filtering, place the paint residue in a solid waste bin.

Plastering waste and wash waters **must not** be discharged into the stormwater system. All residues and wastes from plastering activities should also be allowed to dry within the designated contained area of the site. Solid waste should either be put into an on-site bin or taken to a licensed waste facility. Solid plastering wastes, such as calcium sulfate may also be used as a clay modifier in gardens.

## 8 WASTE MANAGEMENT

### 8.1 Litter and Building Waste

Waste recovery and disposal must be considered when planning contracts for a site. Organise waste management facilities such as waste bins to match the resource recovery contracts – for example, separate the different wastes to maximise resource recovery and minimise the cost of waste disposal.

Waste that is produced **must** be kept on-site and managed in an appropriate manner. Litter and waste should not be a visible nuisance. Bins can be covered to minimise any wind-generated litter and dust escaping from the site. Covered bins minimise rain entry, and locked bins discourage illegal use by unauthorised people. Any liquid from the bins (leachate) **must** be kept on-site, and not be allowed to enter the stormwater drains.

#### 8.1.1 The Waste Hierarchy

Waste should be managed in accordance with the **waste hierarchy** as shown below:

- **Avoid** producing waste
- **Reduce** the amount produced
- **Reuse** materials
- **Recycle** waste
- **Recover** (including energy recovery)
- **Treat** waste before disposal
- **Dispose** of waste.

We must reduce waste volumes going to landfill and remove toxic content from materials before disposal.

Australians generate approximately one tonne of waste per person per year, which goes to landfill. Around 45-50% of this is building material.

## GUIDELINES TO PREVENT POLLUTION FROM BUILDING SITES

Avoiding waste production makes economic sense. Where possible, order items, such as timber and plasterboard, pre-cut to your required length and size. Order only what is required. If items are left over – for example, bricks and tiles – return the unused quantity to the supplier, or to a second-hand dealer for resale.

Where possible, consider using materials with recycled content and/or plantation grown timber. This reduces the demand on our natural resources, and encourages the recycling and reuse of waste products.

Use suppliers who will accept back their packaging – for example, return pallets.

### 8.1.2 Recycling

Most materials from building and construction sites can be recycled.

The following list demonstrates some reuse options.

- **STEEL** - electric arc furnaces produce reinforcing bar, mesh and sections from 100% steel scrap
- **ALUMINIUM** - 100% recyclable
- **GYPSUM PLASTERBOARD** - CSR for example, recycles plasterboard. If disposed to landfill, it produces poisonous hydrogen sulfide and has a foul odour
- **TIMBER** - (excluding treated timber) can be reprocessed into horticultural mulch or reused
- **CONCRETE** - unset concrete can be 'washed out' at the plant to remove cement. The sand and stone can be reused. Set concrete can be crushed and recycled as aggregate for new concrete or road base and fill
- **BRICKS & TILES** - can be reused where appropriate or crushed on-site for backfill, aggregate and gravel, using portable crushing plants
- **PLASTICS** - many plastics can be granulated and reused to make new plastic products for use within the building industry
- **MOST GLASS** - can be recycled. Construction glass must be separated from other glass such as drink bottles. Glass may be cut and reused or recycled as aggregate for concrete
- **CARPET** - in good condition can be sold and reused. It can also be recycled into secondary carpets. Some carpet can be recycled as weed barriers or as a covering and food for worm farms.

A list of waste recyclers can be found in the NT Yellow pages under the description of "waste recyclers".

## 9 CHEMICAL STORAGE AND SPILLS

Employees and subcontractors must be educated on pollution prevention measures and the importance of protecting the stormwater system from pollution.

Store paints, stains, oils and other chemicals in a lock-up that has an impervious floor with appropriate bunding so that it will hold at least 110% of the contents of the largest container stored in the area. These pollution prevention measures must be incorporated to prevent leakage and contain spills of fuels, oils, lubricants and other stored chemical products.

Clean up spills immediately to prevent contamination of the ground and stormwater. If a spill occurs that threatens the environment, you must contact the NT EPA **Pollution Hotline on**

## GUIDELINES TO PREVENT POLLUTION FROM BUILDING SITES

**1800 064 567** or email [pollution@nt.gov.au](mailto:pollution@nt.gov.au) as soon as you can after you have become aware of it. Make all staff aware of emergency telephone numbers in the case of spills.

Develop and practise a spill response and clean-up procedure. For example, if there was a large spill from a cement pour on your site, what would you do?

In addition to a spill response and clean up procedure you must have a spill kit on site. Make sure everyone on site knows where they are and how to use them.



Figure 9-1: A typical spill station (Bay of Plenty Regional Council)

## 10 NOISE AND VIBRATION MANAGEMENT

Building work can be noisy. Contractors and building site managers must control and limit noise and vibration levels as far as is reasonably practicable, with the aim that occupiers of dwellings and other sensitive buildings are protected from both.

Construction noise should be considered and assessed before a planning application is submitted so that potentially noisy processes can be identified and addressed. These can then be controlled once the building work begins.

The general environmental duty under the Act requires all reasonable and practicable measures to be taken to prevent, or minimise, any unreasonable impacts from your site.

This duty relates not only to activities associated directly with construction, but extends to secondary activities such as concrete trucks parked on roadways, concrete mixers located on footpaths and excessive noise from radios and mobile phones.

The types of measures that satisfy the general environmental duty will be specific to each site, but the following limits must be observed:

- regular construction activity should be restricted to between 7 a.m. and 7 p.m. Monday to Saturday, and between 9 a.m. and 6 p.m. on Sundays and public holidays; and
- noise levels in residential use areas should not exceed ambient noise levels by 5 dB(A) at any time.

## GUIDELINES TO PREVENT POLLUTION FROM BUILDING SITES

The NT EPA provides guidance on noise<sup>10</sup> levels that may be deemed excessive under the Act. Supervisors for example need to take reasonable and practical steps to ensure that workers under their control on building sites (e.g. sub-contractors) do not breach the Act and comply with NT EPA requirements.

### 10.1 Noise Management Plans

A Noise Management Plan (NMP) will be required when noise resulting from a building or construction activity is to be emitted from a site:

- outside the times 7am to 7pm Monday to Saturday; or
- outside the times 9am to 6pm on a Sunday or public holiday; or
- is likely to exceed the construction noise levels defined in the NT EPA noise guidelines (see below); and
- the construction work is proposed or taking place on, land within or directly adjacent to land zoned Commercial or Residential.

The NMP is a document that demonstrates how environmental noise pollution will be managed for a particular site and any developments on the site. A NMP details how a proposal will comply with the Act and other applicable standards and outlines measures to prevent, minimise or control noise impacts.

NMPs must be prepared by a person suitably qualified in the assessment of environmental noise. For example, the NT EPA considers full members of the Australian Acoustical Society to be suitably qualified.

*What should a NMP contain?*

For what should be included in a Noise Management Plan see the NT EPA document titled:

**Noise guidelines for development sites In the Northern Territory January 2013** which is available at <http://www.ntepa.nt.gov.au/waste-pollution/guidelines/guidelines>

### 10.2 Control measures for specific types of noise generating activities

#### 10.2.1 Piling

Piling works are one of the most intrusive and most annoying activities that can impact neighbouring occupiers and residents. The noise sensitivity of the area should always be considered when determining the method of piling to be used.

The use of conventional impact hammers for driven steel piling should be avoided wherever possible. Where practicable, jacked or auger piles should be used in preference to piles driven using other methods. Any pile driving shall be carried out by plant equipped with a recognised noise reducing system.

Purpose-made dollies or blocks of plywood can also be used to reduce noise from the contact of the hammer with the pile helmet by using. The design of the equipment and the pile helmet should ensure that damping can be utilised in this way. It is also possible to add shrouds to help contain noise at the hammer or enclose the entire pile and hammer. Planned breaks may be necessary to fit in with the business or activities happening in neighbouring properties.

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<sup>10</sup> Noise guidelines for development sites in the Northern Territory January 2013 – NT EPA:  
<http://www.ntepa.nt.gov.au/waste-pollution/guidelines/guidelines>

### 10.2.2 Sand Blasting

The main sources of noise generated during abrasive blasting operations which cause community noise complaints are:

- discharges of compressed air from blast nozzles – 112 to 119 dB(A)
- blast cabinets – 90 to 101 dB(A)
- air compressors – 85 to 88 dB(A).

Measures to control noise from abrasive blasting operations include the following:

- using blast chambers
- relocating or enclosing noisy equipment – blast cabinets, air compressors, and grit pots can be located in sound proof enclosures or separate rooms away from work areas. In the open air, mobile enclosures lined internally with sound absorbent material can be used at locations where noisy work has to be carried out and other people may be affected
- reducing the amount of pressure used to abrade the substrate
- improving mufflers on blast pots
- silencers on intake and exhaust systems
- baffles and muffling materials in air supply hoses for blast helmets
- sound attenuating material on walls and ceilings
- sound transmission barriers around compressors.

The work area should be close sheeted to also reduce dust nuisance from grit. Routine checking should be undertaken to ensure that the sheeting remains functional, intact and sealed during the operation. Attention should also be given to the working platform to ensure that it is properly sheeted or sealed to contain dust.

Non-siliceous grit must be used to avoid the long-term irreversible lung damage caused from silica dust. For further advice, read the guidance on sand blasting available on the NT WorkSafe website at <http://www.worksafe.nt.gov.au/home.aspx>.

Proper protection should be provided for any structure painted with lead based paint in order to prevent the exposure of workers or the general public to the dust produced.

In cases where water is used for large scale cleaning and blasting the requirements of the NT EPA must be followed. Waste water from sand blasting activities must not enter any stormwater system.

### 10.2.3 Concrete Breaking, Rock Hammering and Rock Breaking

Use of traditional rock breakers attached to excavators is one of the most common causes of noise complaints, especially if it takes place on or near to a common or shared wall of an occupied building. Always consult the occupants of adjoining properties before work starts. Where possible, use equipment that breaks concrete or rock by crushing it rather than drilling through it.

Examine and implement feasible and reasonable alternative work methods such as hydraulic splitters for rock and concrete, hydraulic jaw crushers and chemical rock and concrete splitters. These hydraulic and chemical expansion methods are less noisy methods and are worth considering.

Even explosive methods such as penetrating cone fracture can be tailor-made for the job and may be appropriate. Again, check with **NT WorkSafe** for any blasting requirements.

**10.2.4 Concrete Pouring**

Concrete pouring starting before 7.00 a.m. is not normally permitted unless there are good reasons. The noise from concrete pumps is likely to cause complaints from nearby residential sites when the neighbourhood is otherwise very quiet, even in the central city area. It pays to place concrete orders early so that suppliers can offer a choice of delivery times after 7.00 a.m. Concrete pumping should be located away from sensitive boundaries.

**10.3 Other general control measures to reduce noise impacts from your site**

When operating within the prescribed hours, all reasonable and practicable measures **must** be taken to minimise the noise impacts. These may include, but are not limited to the measures contained in Table 10.1.

**Table 10.1: Noise Control Measures**

<b>Notifying potentially affected nearby neighbours before works start</b>
<b>Extremely noisy activities such as brick cutting, jack hammering or the like, in close proximity to residential areas, must not occur before 9 a.m.</b>
<b>Noisy plant or equipment shall be situated as far as possible from noise sensitive buildings. Barriers (e.g. site huts, acoustic sheds or partitions) to reduce noise reaching noise sensitive buildings shall be employed where practicable. Old buildings around the site perimeter waiting to be demolished can provide effective noise screening</b>
<b>Vehicles and mechanical plant used for the purpose of the works shall be fitted with effective exhaust silencers, maintained in good and efficient working order and operated in such a manner as to minimise noise emissions. Contractors on site shall ensure that all plant complies with the relevant statutory requirements. Mufflers need to be appropriately maintained as well as other proprietary noise reduction devices on equipment, and ensuring these devices are installed and operated effectively</b>
<b>During breaks in work activity, wind down equipment such as generators, bobcats, cranes and the like to the minimum possible</b>
<b>Ensure mobile phones, radios and the like are used close to personnel and the workforce rather than operated to service a large proportion of the site</b>
<b>Use alternative, quieter processes where these processes provide the same result and are used on other similar sites</b>
<b>Ensure that equipment is not operated if maintenance or repairs would eliminate or significantly reduce noise from that equipment</b>
<b>Compressors should be fitted with properly lined and sealed acoustic covers which should be kept closed whenever in use. Pneumatic percussive tools should be fitted with mufflers or silencers of the type recommended by the manufacturers</b>
<b>Equipment which breaks concrete, brickwork or masonry by bending or bursting or “nibbling” shall be used in preference to percussive tools where practicable. Avoid the use of impact tools where the site is close to occupied premises</b>
<b>Where practicable, rotary drills and bursters activated by hydraulic, chemical or electrical power shall be used for excavating hard or extrusive material. Where practicable, equipment powered by mains electricity shall be used in preference to equipment powered by internal</b>

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### combustion engine or locally generated electricity

Neither any part of the works, nor any maintenance of plant shall be carried out in such a manner as to cause unnecessary noise or vibration except in the case of an emergency when the work is absolutely necessary for the saving of life or property or the safety of the works

Plant shall be maintained in good working order so that extraneous noise from mechanical vibration, creaking and squeaking is kept to a minimum

Noise emitting machinery which is required to run continuously shall be housed in a suitable acoustic lined enclosure wherever practicable

Care should be taken to reduce noise when loading or unloading vehicles or moving materials etc.

Look out for engines left idling when not in use, noisy mufflers on plant and noisy site radios. Machines in intermittent use should be shut down or throttled down to a minimum when not in use

Make sure that unnecessary metallic impact noise is avoided from dropping scaffolding poles, placement of roading plates, moving metal fencing and the clanking of chains on crane hoists

Materials such as plywood or chipboard panels can be lined with sound-absorbing material such as mineral wool to create noise containing screens or enclosures. The length of the barrier should be greater than its height. If possible, the noise source should not be visible and the barrier located as close as possible to either the source or the receiver

Simple portable screens, located very close together, can effectively reduce the effects of noisy work in small areas, including jack hammering or plate compaction

Design details of acoustic screens, enclosures and sheds can be found in NZS 6803:1999. Screening may be essential when any noisy work is proposed outside of the prescribed hours

## 11 DUST MANAGEMENT

The most likely sources of dust on your site can be caused by the activities listed in Table 11.1.

**Table 11.1: Sources of dust**

Demolition, including the use of concrete crushers	Grit/sand blasting	Asbestos removal
Handling loose powders, e.g. cement, gypsum	Cutting and sanding wood and wood products	Handling and spraying man made mineral fibres
Scabbling concrete	Disturbing dust concentrations in existing structures	Sweeping up the workplace
Cleaning out ducts and trunking during commissioning	Carrying out maintenance	Lead paint removal

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Stone, brick and tile cutting, e.g. sandstone, concrete blocks and paving slabs	Other sawing and grinding	Diamond drilling and sawing
Vehicle movements on bare soil	Stockpiles not being covered	Large bare soil areas
	Brick cleaning	

### 11.1 Controlling dust

Dust can be controlled by measures included in Table 11.2 below.

**Table 11.2: Dust Control Measures**

<b>Ensuring you have method statements to minimise dust generating activities</b>
<b>Informing adjoining neighbours of your intended activities</b>
<b>Considering wind direction and speed before you undertake dusty generating activities</b>
<b>Erecting protective screens</b>
<b>Appointing professionals to remove asbestos</b>
<b>Vacuuming areas in preference to sweeping where practicable</b>
<b>Carefully handling cement bags including bag disposal - where practicable use ready mixed concrete and mortar</b>
<b>Fitting dust bags to power saws and grinders</b>
<b>Where possible for concrete cutting and drilling, use concrete and drilling equipment that is fitted with extraction devices or misting devices to eliminate dust production at the source</b>
<b>Removing slurry as soon as possible to prevent the dried material from generating dust that can be spread to other areas of the site</b>
<b>Fully enclosing dusty processes</b>
<b>Considering using slower cutting and drilling equipment which produces less dust</b>
<b>Regularly and lightly water dust-prone areas - however, prevent excess watering as it can cause damage and erosion</b>
<b>During windy periods, limit the movement of soil, construction work such as earth moving and the use of high-speed abrasive disc saws and sanders</b>
<b>Minimising the lifting height of the loader bucket when transferring soil or rubble from front-end loaders to trucks and controlling its unloading speed to reduce wind-borne dust</b>
<b>Controlling the speed of dumping from tip trucks</b>

Using mist guns during demolition
Using water coil attachments to suppress dust on jackpicks and scabbing picks and water sprays fitted to rock breakers
Covering or stabilising materials during transport into and within the construction site
Lightly watering access tracks and roads regularly and compacting (where possible) to minimise dust levels and provide a hard-wearing surface
Removal of topsoil and the importing or storing of soil and other materials must be done with due care to avoid dust
Limiting vehicle traffic to essential vehicles only and applying speed limits—slower speeds produce less dust and road wear: speeds in excess of 10 km/h are not recommended on sites next to residential premises because of dust impact and on large sites, speed limit signs should be posted.

**NT WorkSafe** deals with all issues connected with work health and safety, dangerous goods, electrical safety, and workers compensation and rehabilitation in the Northern Territory. Please contact **NT WorkSafe** for advice on specific on-site controls at:

<http://www.worksafe.nt.gov.au/ContactUs/Pages/default.aspx>

## 12 BURNING AND ODOURS

Burning of materials can generate odours and smoke that may cause environmental harm. Burning of materials on site must not be permitted. It is against the law to burn off at a building site. For example, waste timbers may contain chemical treatments and may be toxic, either in their original form or as partial products of combustion.

Building materials which are not contaminated should be reused or reclaimed wherever possible. Place all rubbish that cannot be re-used or recycled in your waste disposal bin.

Contractors should take all necessary precautions to prevent smoke emissions or fumes from plant or stored fuels/oils from drifting into residential areas. Plant and equipment should be operated away from residential areas or sensitive receptors near to the site. In particular, measures should be taken to ensure that all plant is well maintained and not left running for long periods when not in use. Vehicle exhausts should be directed away from the ground and other surfaces and positioned at a sufficient height to ensure dispersal of emissions.

## 13 HAZARDOUS MATERIALS

Beware of potentially hazardous materials, including lead, asbestos, polychlorinated biphenyls (PCBs) and glass fibre. Hazardous materials must be labelled, packaged and handled correctly in accordance with NT legislation. Call in a specialised contractor to remove these.

### 13.1 Asbestos

In Australia, asbestos cement materials were first manufactured in the 1920s and were commonly used in the manufacture of residential building materials from the mid-1940s until the late 1980s.

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Friable<sup>11</sup> asbestos products have also been commonly used in commercial and industrial settings for fireproofing, soundproofing and insulation. Some friable products were also used in houses and may still be found in these houses.

During the 1980s asbestos cement materials were phased out in favour of asbestos-free products. From 31 December 2003, the total ban on manufacture, use, reuse, import, transport, storage or sale of all forms of asbestos came into force.

Many houses built before 1990 therefore contain asbestos cement materials, especially in the eaves, internal and external wall cladding, ceilings (particularly in wet areas such as bathrooms and laundries) and fences.

Everyone who is involved in the handling, disturbing, removing, transporting and/or disposing of materials containing asbestos must:

- take all reasonable steps to minimise the risks resulting from handling disturbing, removing, transporting and/or disposing of the materials
- ensure they are licensed in accordance with the requirements of NT WorkSafe and the NT EPA.

For further information on asbestos at demolition sites you can visit **NT WorkSafe** at <http://www.worksafe.nt.gov.au/home.aspx> and can contact them on **1800 019 115** or email: [ntworksafe@nt.gov.au](mailto:ntworksafe@nt.gov.au)

The NT EPA regulates the licensing of the transportation, storage and disposal of asbestos after it has been safely removed by licensed asbestos removalists.

The following link provides a full list of licensed asbestos transporters and disposal facilities: <http://www.ntepa.nt.gov.au/waste-pollution/approvals-licences/ep-licences>

## 14 ILLEGAL DUMPING AND CLEAN FILL

### 14.1 Fly Tipping (Illegal Dumping)

Fly-tipping is illegally dumped waste and it is very expensive to the government and to private land holders to clean the waste up.

Why is illegal dumping a problem?

- dumped rubbish looks unsightly and affects the appearance and value of your site
- it costs thousands of dollars to investigate and clean up illegally dumped waste
- you may not be able to start building on your site until such time as your site has been cleared of any dumped waste
- dumped material can be hazardous and may be dangerous to humans, wildlife and the natural environment and can contain hazardous waste such as asbestos, toxic chemicals, syringes and contaminated soil
- rising costs - to you! Continuous clearing of litter and illegally dumped waste creates significant costs for you

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<sup>11</sup> **Friable asbestos** is material containing asbestos that when dry, is in powder form or may be crushed or pulverised into powder form by hand pressure. This material poses a higher risk of exposing people to airborne asbestos fibres. It is different to **non-friable asbestos** which is all forms of asbestos other than friable asbestos and includes asbestos cement sheeting and other materials where asbestos fibres are bonded into a matrix. If non-friable asbestos is damaged or degraded it may become friable and will then pose a higher risk of fibre release.

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- environmental damage – dumped materials can harm the local environment through damaging vegetation and leaching of hazardous materials into soil, groundwater and waterways
- illegally dumped waste pose missile risks during the cyclone season
- decreasing value – illegal dump sites serve as magnets for additional dumping and other criminal activities that ultimately decrease property and community value.

The NT EPA treats this problem very seriously and will prosecute anyone caught illegally dumping waste. If you see someone illegally dumping on your site, please report it to us via the Pollution Hotline on: **1800 064 567** or email: [pollution@nt.gov.au](mailto:pollution@nt.gov.au).

If a dumper cannot be found, the onus for clean-up of the illegally dumped waste will be placed on the owner or occupier of the land that it has been dumped on. So, it pays to be vigilant and to secure your site to prevent illegal dumping.

It is also illegal to bury construction and demolition waste that has been generated on your site. You may incur expensive clean-up costs associated with waste removal if it is found that waste has been buried on your site.



Figure 14-1: Example of the type of waste illegally dumped on construction site (NT EPA 2014)



Figure 14-2: Dumped tyres on a construction site (NT EPA 2015)

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Figure 14-3: Dumped building waste (NT EPA 2014)



Figure 14-4: Dumped asbestos waste (NT EPA 2015)

### 14.2 Accepting “clean fill” on your building site – The risks

Building site managers may require clean soil for many reasons, including for landscaping, levelling of blocks, renovations, land rehabilitation and land reclamation works.

If you're accepting fill onto your site **beware**: you may permanently devalue your site and face substantial fines and clean-up costs if the fill is contaminated. Landowners and occupiers of

## GUIDELINES TO PREVENT POLLUTION FROM BUILDING SITES

land can be ordered to remove contaminated fill and pay the costs of taking it to a lawful waste facility.

Incidents have occurred where unscrupulous operators have offered site managers and land owners “clean fill” but have delivered fill that was contaminated with building and demolition waste, harmful chemicals or asbestos.

If anyone approaches you about taking fill onto your property – either for free or for payment – ask them for proof of identity (such as a drivers licence) and/or business details (such as an ABN or ACN). If you have any doubts, contact the NT EPA.

Always ask the supplier where the fill is coming from and what activities were conducted at the site. Check whether any activity may have caused contamination.

***If you don't know where the fill is from, don't take it!***

The NT EPA has produced two fact sheets which are aimed at informing the NT community about illegal dumping and the dangers of accepting contaminated “clean fill” onto your property. These fact sheets are titled:

- ***Illegal dumping – what you need to know*** and
- ***How to avoid the dangers of accepting illegal fill onto your land.***

These fact sheets are available on the NT EPA web site at the following location:

<http://www.ntepa.nt.gov.au/waste-pollution/guidelines/factsheets>



Figure 14-5: No Dumping Sign (Source: NT EPA 2012)

## 15 CONTAMINATED SITES

Site contamination is an important environmental issue. It can result from a range of activities including: refuse disposal – such as solid waste and hazardous waste; timber preservation plants; service stations; petroleum storage areas; old mine sites; chemical manufacturing industries; and gas works.

Contamination commonly becomes a problem when a contaminated site is rezoned, redeveloped, or the contamination extends off site or impacts on groundwater. A typical example is the rezoning of a contaminated site from an industrial/commercial use to a residential zone land use.

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If present, contamination can present a risk to human health via direct contact, inhalation or ingestion, or damage the wider environment (for example surface water, groundwater or ecosystems). Dealing with contamination can be a complex matter which needs specialist scientific expertise. A number of consultancies specialise in advising on this type of work and will be needed to carry out site investigation work and remediation (including that carried out on-site or if necessary the removal of contaminated material to licensed disposal sites) before any work begins.

Before starting work on your site, make sure you know what contaminants (if any) are present on your site. If there is a risk of soils on site from current or historical potentially contaminating activities to have elevated levels of contaminants, then a desk top study identifying the former land uses and a site investigation report should be completed. If contamination at the site is confirmed, then a remediation strategy should then be prepared which will set out any risks present and the steps that must be taken to mitigate the risks. If you discover anything unexpected, call the NT EPA for advice straight away. Also, if you want to make changes to the remediation strategy, seek advice from the NT EPA in advance.

The NT EPA may require you to conduct an environmental audit program of your site if it is determined that there is pre-existing contamination which is required to be cleaned up.

Contact the NT EPA for advice on the NT requirements for contaminated sites.

The NT EPA has developed a flow chart to assist developers and owners of contaminated land of their requirements when contaminated land is to be turned into more sensitive uses. It is available at: <http://www.ntepa.nt.gov.au/waste-pollution/guidelines/factsheets>

## 16 SEWAGE MANAGEMENT

There is a requirement to provide portable toilets or ablutions connected to sewer. Management of waste associated with any portable toilet on your site must be in accordance with the NT Department of Health guidance note titled, ***Trade Waste Disposal from Portable Toilets, Septic Tanks and Grease Traps*** available at [http://www.health.nt.gov.au/Environmental\\_Health/index.aspx](http://www.health.nt.gov.au/Environmental_Health/index.aspx)

The NT EPA licenses the transport, storage, treatment and disposal of sewerage sludge and residues, including high soil and septic tank sludge.

## 17 FURTHER HELP

### 17.1 Northern Territory Contacts

#### Northern Territory Environment Protection Authority

Website: <http://www.ntepa.nt.gov.au/>  
email: [pollution@nt.gov.au](mailto:pollution@nt.gov.au)  
Pollution Hotline: 1800 064 567  
General queries: (08) 8924 4218  
Guidelines webpage: <http://www.ntepa.nt.gov.au/waste-pollution/guidelines/guidelines>

#### NT Department of Land Resource Management

##### Fact sheets

<http://www.lrm.nt.gov.au/soil/management/factsheets>

##### Technical notes

<http://www.lrm.nt.gov.au/soil/management/technotes>

#### NT Department of Local Government and Regions

[http://www.localgovernment.nt.gov.au/home/council\\_information](http://www.localgovernment.nt.gov.au/home/council_information)

#### NT Department of Lands Planning and the Environment

<http://www.lands.nt.gov.au/>

### 17.2 Reference material

#### Bay of Plenty Regional Council

<http://www.boprc.govt.nz/media/29555/Guideline-100624-ErosionandSedimentControl.pdf>

#### Catchments & Creeks

[http://www.catchmentsandcreeks.com.au/M-fact\\_sheets-ESC.html](http://www.catchmentsandcreeks.com.au/M-fact_sheets-ESC.html)

#### Department of Water (Western Australia)

##### Stormwater Management Manual

<http://www.water.wa.gov.au/PublicationStore/44217.pdf>

#### Environment Canterbury Regional Council

<http://ecan.govt.nz/advice/your-land/earthworks-soil-eroison/pages/default.aspx>

##### Builders Pocket Guide

<http://www.bpg.co.nz/>

#### Environment Institute of Australia and new Zealand

<http://www.eianz.org/>

#### Environmental Protection Authorities:

##### ACT EPA

[http://www.environment.act.gov.au/environment/environment\\_protection\\_authority/business\\_and\\_industry/environment\\_protection\\_guidelines](http://www.environment.act.gov.au/environment/environment_protection_authority/business_and_industry/environment_protection_guidelines)

##### NSW EPA

## GUIDELINES TO PREVENT POLLUTION FROM BUILDING SITES

<http://www.environment.nsw.gov.au/stormwater/publications.htm>

### **EPA South Australia**

[http://www.epa.sa.gov.au/environmental\\_info/water\\_quality/programs/stormwater](http://www.epa.sa.gov.au/environmental_info/water_quality/programs/stormwater)

### **EPA Tasmania**

[http://epa.tas.gov.au/epa/soil\\_and\\_water-management\\_on\\_building\\_sites](http://epa.tas.gov.au/epa/soil_and_water-management_on_building_sites)

### **EPA Victoria**

<http://www.epa.vic.gov.au/search?q=construction%20sites>

### **Gold Coast City Council**

<http://www.goldcoast.qld.gov.au/planning-and-building/sediment-control-3825.html>

### **Healthy Waterways**

<http://healthywaterways.org/resources/documents/>

### **International Erosion Control Association**

<http://www.austieca.com.au/>

### **Nelson City Council**

[http://nelson.govt.nz/home/SearchForm?Search=erosion+and+sediment+control+&action\\_doSearch=arch=search](http://nelson.govt.nz/home/SearchForm?Search=erosion+and+sediment+control+&action_doSearch=arch=search)