

Bunding and spill management

Updated May 2016¹

EPA 080/16: This guideline applies to facilities that use or store liquids above ground, and provides information on bunds or spill containment systems to minimise the risk of environmental harm from liquid spills and leaks.

Introduction

Bunding should be used for the storage of all liquids except rainwater. All operators working with bunds should know how to carry out preventive maintenance and use standard operating procedures to stop escaping substances from entering the environment.

Legislation

The principal legislation addressing pollution in South Australia is the *Environment Protection Act 1993* (the EP Act). In particular, section 25 imposes the general environmental duty on all persons undertaking an activity that may pollute to take all reasonable and practicable measures to prevent or minimise any resulting environmental harm.

The *Environment Protection (Water Quality) Policy 2015* (Water Quality Policy) offers specific protection for the state's waters. It prohibits the pollution of the stormwater system and our natural waters. The Water Quality Policy has general obligations with which every person, business and industry must comply, as well as specific obligations for particular activities. Failure to comply with any of these obligations may result in the issue of a \$300 fine, environment protection order and/or prosecution.

Clause 10 of the Water Quality Policy states that a person must not discharge a class 1 pollutant into any waters or onto land in a place from which it is reasonably likely to enter any waters (including by processes such as seepage or infiltration or carriage by wind, rain, sea spray or stormwater or by the rising of the water table).

Clause 11 of the Water Quality Policy also states a person must not discharge a class 2 pollutant into any water or a cavity in land. The pollutants include:

- agricultural chemicals
- cleaning agents
- detergents and their byproducts
- engine coolant
- fuel dispensing area washwater

¹ Updated according to *Environment Protection (Water Quality) Policy 2015*.

- oil, grease, lubricants and petroleum products
- photographic chemicals
- rubbish
- solvents.

The full list of class 1 and class 2 pollutants are outlined in Schedule 2 and Schedule 3 of the Water Quality Policy. For more information on the Water Quality Policy, visit the South Australian Environment Protection Authority (EPA) [website](#) or telephone (08) 8204 2004.

Where applicable, the construction of bunds must comply with the requirements of the *Dangerous Substances Act 1979*, and consideration should be given to standards published by [Standards Australia](#) for a number of classes of dangerous substances.

What is a bund?

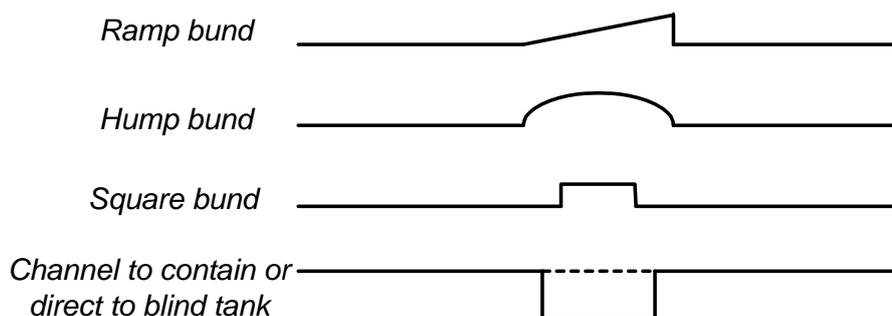
A bund is an embankment or wall of brick, stone, concrete or other impervious material, which forms the perimeter and floor of a compound and provides a barrier to retain liquid. Since the bund is the main part of a spill containment system, the whole system (or banded area) is colloquially referred to as the 'bund'. Bunds should be designed to contain spillages and leaks of liquids used, stored or processed above ground and to facilitate clean-up operations. As well as being used to prevent pollution of the receiving environment, bunds are also used for fire protection, product recovery and process isolation.

Type of facility

The requirement for bunding should be determined on a site-by-site basis. Facilities that should have banded areas include:

- storage facilities for chemicals, pesticides or petroleum
- electrical transformers containing oil and/or PCBs
- facilities used to transfer stored liquids (such as transport facilities)
- drum storage areas, either temporary or permanent
- processing areas
- wineries, breweries and milk processing plants
- any other facilities that store substances other than water or uncontaminated stormwater
- any other locations where spills are common, including transfer points, workshops, factories, service stations, wash bays, and other areas in which a material is transferred from its container.

There are several different types of bunds:



Designing and constructing bunds

Some general rules should be followed when designing and constructing bunds; the following two diagrams illustrate many of the points that should be incorporated into bund design.

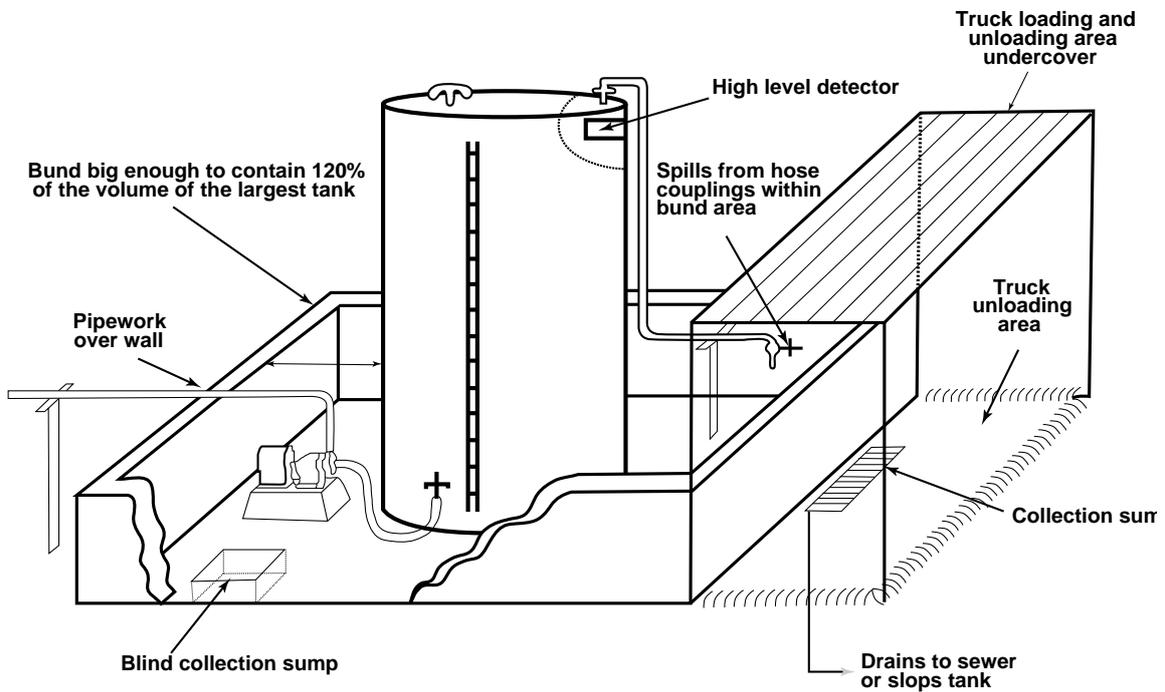


Figure 1 Example of bunding for bulk liquid storage tanks (adapted from Victorian and NSW EPA)

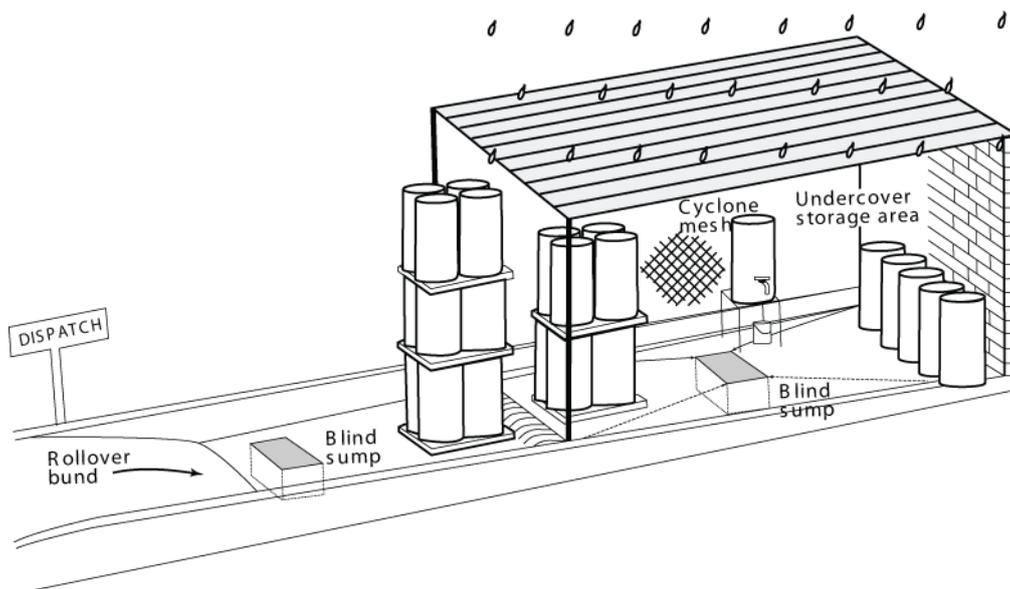


Figure 2 Example of bunding for drums and containers (adapted from Victorian and NSW EPA)

Approvals

Before any work starts on the construction of bunds, consider whether the local planning authority should be consulted for any necessary approvals.

Net capacity of the bund

The net capacity of a bunded compound in a storage facility should be at least 120% of the net capacity of the largest tank. Take into consideration the capacity displaced by other tanks within the same bunded area and any foundations. Treat interconnected tanks as a single tank of equivalent total volume for the purposes of the bund design criteria.

For flammable liquids, bund capacity should be at least 133% of the net capacity of the largest tank. If an automatic fire sprinkler system is installed in or over any bunded tank or drum storage compound, the capacity of the bund should be increased either by a volume equal to the output from the sprinkler system for a period of at least 20 minutes, or to 133% of the capacity of the largest tank, whichever is greater.

Further guidance on the storage of flammable liquids can be obtained from Australian Standard *AS1940–2004 The storage and handling of flammable and combustible liquids*, and the *Dangerous Substances Act 1979*.

Packaged storage

If the material to be bunded is contained in drums (or other small containers), the bunded area should be able to contain at least 25% of the total volume of the stored products. In addition, provide for the containment of firewater onsite by designing and constructing adequate drainage controls, and formulating emergency response plans.

Materials used for bunding

The bund floor and walls should be built of materials impervious to the contents of any tank or container within the bund. It should be of sufficient strength and structural integrity to ensure that it is unlikely to burst or leak in ordinary use, and should not have a damp course. The use of un-reinforced materials is not recommended for bund wall construction.

The bunded area should be capable of preventing the migration of any spillage or leakage to the surrounding environment. Earthen bunds are not recommended, except where there is no other viable alternative.

Bund heights and tank distance from the wall

Wall-type bunds at tank storage facilities should be from 0.5 m to 1.5 m high, depending on the required containment capacity and the distance to the tank—the closer the wall to the tank, the higher the wall should be. The distance between tanks and bund walls should be at least 1 m. If the bund walls are more than 1 m above the compound floor, consider providing steps or ladders for quick escape. For bund walls close to tanks or higher than 1.5 m, the rules applicable for confined spaces may apply.

If vehicles will need access to the bunded area, consider using ramps, a change in grade, or speed humps to maintain an effective bund height.

Designers should consult AS 1940–2004 to ensure that wall heights between bund walls and tanks are adequate where inventories are elevated.

Storage of liquid classed as a dangerous substance

If the liquid to be stored is classed as a dangerous substance, consider making allowance for the trajectory of a liquid leak, assuming a full tank with an elevated point of leakage. You might need to install a splatter shield, or have a generous distance between the tank and the bund wall; half the height of the tank would normally be appropriate.

Drainage

A collection sump should be provided in the bund floor to make it easy to remove accumulated liquids, and the floor should be graded in such a way that liquids collect in the sump. The sump should not be connected to stormwater or sewer drainage systems—it is only a collection point from which to pump out the liquid; there should not be any access to the stormwater system within the bund. Bund drain valves should not be installed, and pump controls should be located

outside the banded area. Accumulated liquids resulting from spills or vessel ruptures may be able to be collected and reused on site. However where this is not possible or appropriate, the liquid should be collected and disposed of by an authorised liquid waste contractor

Rainwater will often evaporate from within an open bund, however if there is no rainwater in the bund after heavy rainfall it may indicate that the bund may not be properly sealed and therefore should be inspected and repaired as appropriate. Accumulated rainwater may be contaminated and should not be disposed of to the stormwater drainage system. Options for the treatment and disposal of this water are:

- reuse on site
- off-site disposal by an authorised liquid waste contractor, or irrigation in certain circumstances with approval
- disposal to a sewer (with SA Water Trade Waste approval), or to a septic tank effluent disposal scheme (STEDS).

Piping and pumping facilities

Piping and pumping facilities should be arranged so that no leaks can escape the confines of the bund, and the pumps will still operate when the bund is full of liquid. All pipework should go over the bund walls, not through them. All valves, filters, sight gauges, vent pipes and other ancillary equipment should be situated within the bund and arranged so that discharges are contained.

All pipework should be sited above ground and properly supported to make inspection and repair easier. Fill pipes, draw-off pipes and vent pipes should be positioned away from vehicle traffic to avoid collision damage.

Roof design

If possible, provide a roof to stop rainwater entering the bund. Make sure that the roof will not cause a build-up of dangerous or poisonous gases, or restrict the application of water in an emergency.

Consider incorporating an overhang, 12 degrees from vertical, to help stop rain entering the bund from the side. Professional risk assessment and planning processes should be done on a case-by-case basis; they should explore the options of roofing or of safely disposing of rainwater that might collect in an open bund.

Temporary storage

It is sometimes acceptable to store drums temporarily on spill containment pallets. Each pallet should be capable of capturing the contents of at least one of the drums if there is a leak. If these pallets are to be used, the drums should be stored in a level area (to ensure full spill storage capacity), and they should be covered so that the pallets do not fill with rainwater.

Temporary bunding arrangements should ensure that there is only potential for localised contamination in the event of a spill. An example of where temporary bunding may be appropriate is for storage of fuel during forestry or mining operations where regular relocation of activities may be necessary

General maintenance

All bunds should be routinely inspected to ensure maintenance of their integrity. A routine inspection and maintenance program should be tailored to suit the specific installation.

Common problems that have been observed by the EPA:

- Chemical resistant linings on bunds have been damaged.
- Stormwater has been allowed to accumulate in bunds thereby reducing the effective volume.
- Spills of material stored within the bund have been allowed to accumulate thus reducing the effective volume.

- Spills of acidic material stored in concrete bunds have been allowed to accumulate resulting in chemical attack leading to loss of bund integrity.
- The flexible joints between concreted sections have shrunk resulting in gaps in the bund.
- Concreted sections have been poured without any jointing material between them resulting in gaps in the bund.
- Concrete bunds have cracked due to movement or damage from mobile plant.
- Besser blocks have been used to build a bund (the porosity of besser blocks and the large number of mortar joints result in a low integrity bund).
- Pipework has been installed through bund walls or floors without any specific design provision to isolate the bund from pipework movement.
- The bund has been installed with stormwater drainage holes (or valves) in the walls.
- An earthing system has been installed through the bund walls.
- Material such as pallets or drums has been stored in the bund.
- Bunds have been used as a rubbish storage.
- Bunds have been used as process vessels.
- Pipes, pipe fittings such as valves or flanges, or hoses have been installed on top of or outside bund walls.

Further reading

The following standards are available from [Standards Australia](#):

- AS 1940–2004 *The storage and handling of flammable and combustible liquids*
- AS 4326–2008 *The storage and handling of oxidising agents*
- AS/NZS 4081–2001 *The storage, handling and transport of liquid and liquefied polyfunctional isocyanates*
- AS 2714–2008 *The storage and handling of organic peroxides*
- AS 3780–2008 *The storage and handling of corrosive substances*
- AS 2507–1998 *The storage and handling of agricultural and veterinary chemicals*
- AS 2865–2009 *Confined spaces*
- AS/NZS 4452–1997 *The storage and handling of toxic substances*
- AS/NZS 5667.1–1998 *Water quality-sampling-guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*

Relevant legislation and policies that should be consulted include:

- *Environment Protection Act 1993*
- *Environment Protection (Water Quality) Policy 2015*
- *Natural Resources Management Act 2004*
- *Dangerous Substances Act 1979*
- *Bunding and Blind Tanks Trade Waste Guideline (SA Water)*

Acknowledgements

The EPA wishes to acknowledge the NSW EPA and Victorian EPA for material and diagrams used in this guideline.

Disclaimer

This publication is a guide only and does not necessarily provide adequate information in relation to every situation. This publication seeks to explain your possible obligations in a helpful and accessible way. In doing so, however, some detail may not be captured. It is important, therefore, that you seek information from the EPA itself regarding your possible obligations and, where appropriate, that you seek your own legal advice.

Further information

Legislation

[Online legislation](#) is freely available. Copies of legislation are available for purchase from:

Service SA Government Legislation Outlet
Adelaide Service SA Centre
108 North Terrace
Adelaide SA 5000

Telephone: 13 23 24
Facsimile: (08) 8204 1909
Website: shop.service.sa.gov.au
Email: ServiceSAcustomerservice@sa.gov.au

General information

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