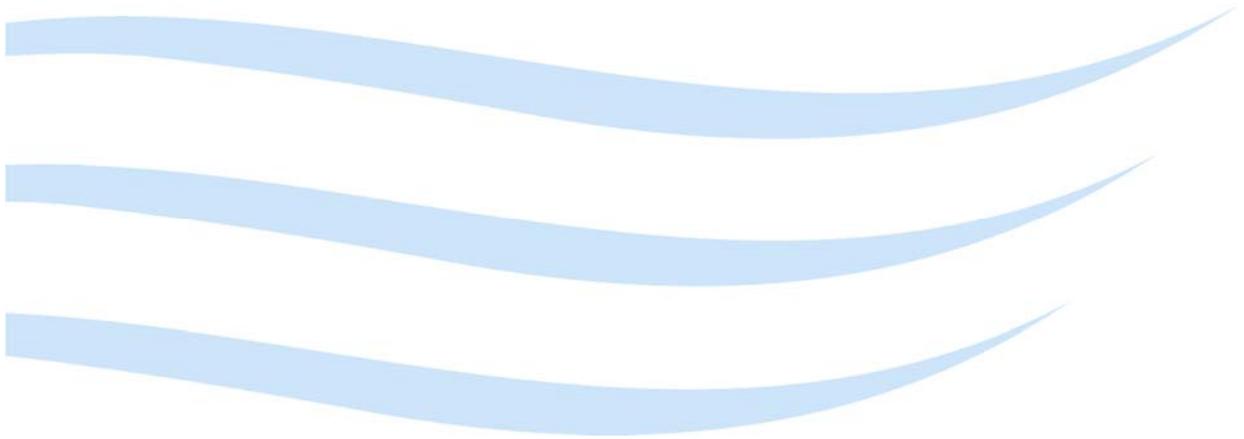


Division 3 Permit Dam Works Code 2015



A Code issued pursuant to section 301 of the *Water Management Act 1999*

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Department of Primary Industries, Parks
Water and Environment



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PART I INTRODUCTION

1.1 Division 3 permit

The *Water Management Act 1999* (the Act) provides for the sustainable management and allocation of Tasmania's water resources. Part 8 of the Act regulates dam works and provides for the issuing of dam works permits which authorise the undertaking of dam works.

Part 8 of the Act provides two pathways to obtaining a dam works permit. The first pathway provides for a Division 3 permit¹, obtained through an application and assessment process. The second pathway provides for a Division 4 permit, which is obtained without the need to make an application. A person is entitled to a Division 4 permit if their dam works meet the criteria specified under section 159 of the Act. The Division 4 permit pathway is not discussed further.

1.2 Legal obligations

A person undertaking dam works authorised by a Division 3 permit is entitled to some permit/approval exemptions under other Acts. For example, a permit or special permit is not required under section 60A of the *Land Use Planning and Approvals Act 1993*.

However, holding a dam works permit does not absolve a permit holder from other legal obligations under the *Water Management Act 1999* or other Acts. For example, a person holding a dam works permit may need to:

- apply for an authority to take water into the dam, under the *Water Management Act 1999*;
- determine whether, under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*, an action will require approval from the Commonwealth Minister for the Environment if it has, will have, or is likely to have a significant impact on a matter of national environmental significance;
- apply for a permit under the *Aboriginal Relics Act 1975*, if the dam works are going to interfere with an Aboriginal relic;
- obtain a certified Forest Practices Plan under the *Forest Practices Act 1985* to harvest more than six tree ferns (*Dicksonia antarctica*);
- undertake action, under the *Weed Management Act 1999*, against declared weed species.

Off-site activities associated with dam works may also require authorisation under other legislation. This may include providing access to the site (e.g. development or upgrading of roads) or operating an off-site quarry (borrow pit). Prior to dam works commencing, dam works permit holders will need to ensure that all the appropriate authorisations for off-site activities have been obtained from the relevant agency or local council.

The limited examples of potential legal obligations set out above should not be taken to be an exhaustive list and provides guidance only. The onus is on dam works permit holders to make themselves aware of all their obligations under the *Water Management Act 1999* or any other Act, prior to commencing dam works.

¹ Section 138 of the Act defines a Division 3 permit issued under section 158.

PART 2 DIVISION 3 PERMIT DAM WORKS CODE 2015 - OVERVIEW

2.1 Purpose of this Code

The purpose of the *Division 3 Permit Dam Works Code 2015* is to prescribe minimum design, construction and environmental standards that apply to dam works authorised under a Division 3 permit.

2.2 Authority of this Code

Pursuant to section 301 of the *Water Management Act 1999*, a code of practice may be issued in respect of dam works and related matters. This Code has been issued under section 301(1)(b) for the purposes of dam works authorised under a Division 3 permit.

This Code is administered by the Department for Primary Industries, Parks, Water and Environment on behalf of the Minister for Primary Industries and Water.

2.3 Application of this Code

This Code applies to all dam works, including constructing a new dam and repairing, modifying or removing an existing dam, that are authorised under a Division 3 permit.

2.4 Format

Part 3 of this Code, *Planning*, prescribes requirements for site investigations and planning that must be undertaken in relation to all dam works authorised under a Division 3 permit.

Part 4 of this Code, *Design Standards*, prescribes minimum design standards that apply to all dam works, with the exception of removal of an existing dam, authorised under a Division 3 permit.

Part 5 of this Code, *Minimum Construction Standards*, prescribes minimum construction standards that apply to all dam works, with the exceptions of (1) removal of an existing dam, authorised under a Division 3 permit and (2) dam works subject to a Department approved Preconstruction Report.

Part 6 of this Code, *Repair or Modification of an Existing Dam*, prescribes additional requirements that apply when repairing or modifying an existing dam authorised under a Division 3 permit.

Part 7 of this Code, *Removal of an Existing Dam*, prescribes additional requirements that apply when removing an existing dam authorised under a Division 3 permit.

Part 8 of this Code, *Other Obligations of Dam Works Permit Holders*, provides advice in regard to other legal obligations including dam safety and notice of completion of dam works.

2.5 Compliance requirements

Compliance with this Code is a condition of a Division 3 permit. Under the Act, non-compliance with dam works permit conditions is a breach of the permit and the holder is liable to enforcement action.

Dam works permit holders should ensure that staff, contractors and their employees are familiar with, and observe, those aspects of this Code applicable to dam works undertaken.

PART 3 PLANNING

3.1 Site investigations

Before undertaking dam works the permit holder must make a thorough investigation of the site to establish the nature of the foundation and to locate sufficient suitable clay material to use in the embankment.

3.2 Site planning

Before commencing dam works, permit holders must prepare a dam works site plan that accurately shows the:

- location of the dam wall, or proposed dam wall; and
- siting of the proposed dam works construction footprint²; and
- inundation area at full supply level (FSL) and maximum flood level (MFL)³; and
- contours of the land; and
- mapped⁴, or otherwise known, significant features⁵.

Note: the basis of a site plan may be produced on LISTMAP by:

1. entering the following URL into your web browser -
<http://maps.thelist.tas.gov.au/listmap/app/list/map?bookmarkId=99801#.Vkqd8bQWVjl.email> ;
2. selecting 'Tools' > 'Drawing Tools' > 'Add an Area on the Map' (at the top left of LISTmap), then using the selected tool to draw the proposed inundation and dam works footprint on the map; or alternatively
 - a. importing a shape file of the dam/inundation footprint; or
 - b. simply drawing the dam/inundation footprint on a hard copy of a printed map.
3. Identifying any known significant features not available on the LISTmap dam layer.

3.3 Notice of Intention

A *Notice of Intention to Commence Dam Works under a Division 3 Permit* must be submitted to the Department before dam works commence. Dam works must not commence prior to the nominated start date on this notice, unless otherwise authorised by the Department.

² **dam works footprint** means the total area of land on which dam works are to be undertaken under a Division 3 permit including the dam wall, spillway, the land to be inundated and any land on which clearance of vegetation is to be undertaken under a permit.

³ not required for removal of an existing dam;

⁴ **mapped** means as mapped on LISTmap, Natural Values Atlas, CFEV and salinity mapping available at: <http://dpiwwe.tas.gov.au/Documents/salinity-mapA0-web.pdf>

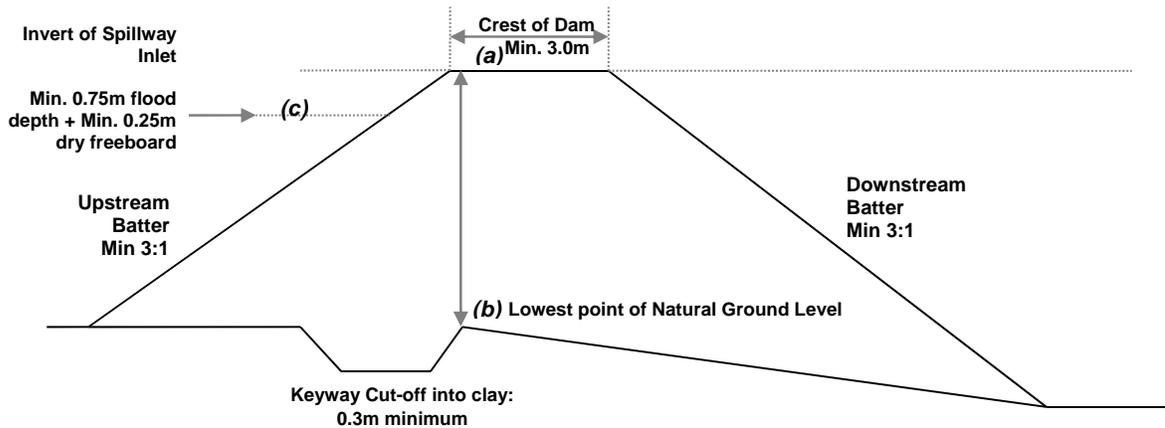
⁵ **significant features** include water resources, contour lines, public and private assets, reserves, recorded threatened species, mapped or known threatened native vegetation communities, nests of a threatened species, significant habitat for a threatened species, mapped or known biosecurity risks including weeds, pests and diseases, landslide hazard areas, any trees to be cleared or harvested, potential/known acid sulfate soil areas, high conservation value freshwater-dependant ecosystems, potential/known saline soil areas, potential/known contaminated land, road or rail infrastructure or easements, electricity or gas infrastructure or easements, conservation covenants, heritage listed property, known aboriginal relics, caves, listed geoconservation sites.

3.4 Supervision

Dam works must be supervised by a person with the appropriate level of competence. The permit holder must ensure that supervision of the following activities is undertaken in accordance with the competencies set out in the *Water Management (Safety of Dams) Regulations 2015*:

- (i) selection of a suitable construction contractor;
- (ii) compliance with all approved specifications;
- (iii) selection of materials;
- (iv) foundation preparation;
- (v) excavation of the cut off trench;
- (vi) placement and backfilling of the outlet pipe;
- (vii) placement and compacting of embankment material and internal drains;
- (viii) construction of a flood spillway;
- (ix) provision of flood spillway erosion prevention;
- (x) installation of infrastructure for seepage collection and flow rate and turbidity monitoring at the downstream toe;
- (xi) provision of effective wave erosion protection to the upstream batter;
- (xii) provision of effective erosion protection to the downstream toe of the embankment;
- (xiii) any other aspect of undertaking dam works that the site engineer considers supervision necessary to ensure that a safe dam is built at the permitted location and is required in certifying the Work-as-Executed Report.

PART 4 DESIGN STANDARDS



Note: The cut-off trench is required to be taken down a minimum of 300 mm into impervious soil and backed filled with good quality clay that is thoroughly compacted.

Figure 1. Dam Cross Section

1. The **maximum height of the proposed dam wall** (i.e. height from Point (a) to Point (b) on Figure 1) must not exceed the height specified on the dam works permit.
2. The **minimum width of the crest of the proposed dam wall** must be 3.0 m for dams with a wall height, at or greater than, 1.0 m (location of crest is noted on Figure 1).
3. The **minimum upstream batter slope** must be 3:1 for dams with a wall height at, or greater than, 1.0 m (location of batter is noted on Figure 1).
4. The **minimum downstream stream batter slope** must be 3:1 for dams with a wall height at, or greater than, 1.0 m (location of batter is noted on Figure 1).
5. The **minimum spillway width** must be 3.0 m for dams on a watercourse or with a catchment area of up to 40 ha.
6. The **minimum spillway flood depth** must be 0.75 m for dams on a watercourse or with a catchment area of up to 40 ha.
7. The **minimum dry freeboard depth** must be 0.25 m for dams with a fetch distance* up to 300 m (*the distance from the dam wall to the upper most extent of the backup water).
8. The **minimum outlet pipe size** must be a nominal diameter of 150 mm for all dams on a watercourse or with a storage capacity at or greater than 10 ML, with a valve to suit.

PART 5 MINIMUM CONSTRUCTION STANDARDS



Part 5 does not apply to dam works subject to a Department approved Preconstruction Report. Where a Departmental approved Preconstruction Report exists, refer to the approved Preconstruction Report for construction standards.

5.1 Reference bench mark

For dams with a capacity greater than 10 ML, before commencing dam works, permit holders must:

- (i) install a reference benchmark; and
- (ii) keep a record of the Reduced Level (metres) and the coordinates of the height datum reference until dam works are completed.

The reference bench mark must not be removed, damaged or tampered with for the life of the dam.

Note: The reference bench mark must be reported in the *Notice of Completion of Dam Works Under a Division 3 Permit*⁶.

5.2 Clearing of the dam site

The area to be covered by the embankment must be pegged out prior to commencement of works and this, and the area to be excavated, must be cleared and grubbed.

Topsoil must be heaped in areas outside the area to be covered by the embankment and all trees, scrub and roots removed. Topsoil must be placed in layers not exceeding 200 mm in depth and planted with grass if it is to be left for more than 6 months before being placed back onto the completed dam. This will conserve the integrity of the topsoil.

All saturated material in the embankment area must be pushed well clear of the site and not used in the embankment in its saturated state.

5.3 Foundation

The base of the embankment must be stripped of all topsoil, silt, loose material, vegetable matter and then scarified over its whole area.

5.4 Keyway

A keyway at least 2.5 m wide must be excavated under the centre section of the embankment. The keyway must be at least 0.3 m in depth into impervious soil, or solid rock, and backfilled with the appropriate quality clay, then thoroughly compacted. The keyway must extend for the entire length of the embankment including the hillside flanks, and must continue to the height of the embankment.

5.5 Rock

If rock is encountered under the embankment, appropriate measures must be taken to cut off seepage through the rock/soil interface and to prevent seepage in the rock joints coming into contact with the embankment soil. Such measures might involve the use of bentonite and a mortar or shotcrete blanket over the rock.

⁶ Required under section 164ZA of the *Water Management Act 1999*.

5.6 Outlet pipe materials and installation

The preferred outlet pipe material is High Density Polyethylene (HDPE) with a nominal pressure rating of at least PN 6.3. When selecting an appropriate pressuring rating, consideration should be given to the height of the dam and the head of water in the dam. For example, a pipe with a PN of 6.3 has a nominal pressure or head of 63 m or 630 kPa and would suit a dam with a height of up to 63 m. This is the lowest nominal pressure head that can be purchased commercially for HDPE pipe.

When installing outlet pipes, the following procedures must be followed:

- (i) a separate trench must be dug at natural ground level, not through any formed embankment, for the pipe to lay in;
- (ii) HDPE pipe lengths are to be joined by either fusion welding or, if they need to be disassembled, the pipe can be joined by Vitaulic joints (or depending on the application, a mixture of both);
- (iii) after joining of pipes, pressure testing will need to be undertaken to ensure that there are no leaks;
- (iv) the installation of baffle plates affixed to HDPE pipe must be constructed from HDPE material and each baffle plate must be at least 600 mm x 600 mm in dimension and 20 mm thick;
- (v) baffle plates must be placed over the length of the pipe at regular intervals, with a minimum of two baffle plates installed;
- (vi) clay must be hand-tamped with an appropriate hand held tamping machine such as a Wacker Packer, up to slightly above the top of the installed pipe so as not to damage or crush the pipe during embankment construction;
- (vii) the intake end of the outlet pipe must be fitted with a screen and encased in a concrete anchor block;
- (viii) the discharge end of the outlet pipe must be fitted with a valve to suit the diameter of the pipe.

5.7 Borrow pits

When rock is exposed in the excavation area, no attempt should be made to excavate into the rock. All exposed areas of gravel, jointed rock or other porous material in the storage area and under the embankment must be covered with at least 300 mm of compacted clay to ensure water tightness.

5.8 Embankment compaction

For dams with a wall height at, or greater than, 3.0 m, compaction must be undertaken with a tamper foot roller (sheeps foot roller) as follows:

- (i) all fill material for the embankment is to be placed in layers (or lifts) no greater than 150 mm thick;
- (ii) the largest size particle should not be greater than one third the height of the lift, that is, 50 mm;
- (iii) each layer should be thoroughly compacted before the next layer is placed, with a minimum of 6 passes per layer required;
- (iv) the minimum compaction effort is to be at 95% standard maximum dry density (MDD), with an average of 98% MDD being achieved; or standard Proctor (non-structural fill) as

in context to modified Proctor (structural fill) as per Australian Standard: AS1289 *Methods of Testing Soil for Engineering Purposes*;

- (v) the material forming the embankment should be placed with sufficient moisture content to ensure proper compaction; the moisture content is to be within the range of -1% to +3% of optimum moisture content (OMC). If the material is too dry, water should be added to achieve the OMC. If the material is too wet, it should be spread and mixed;
- (vi) before each additional 150 mm lift is added to the embankment, the preceding lift should be scarified to ensure that the two lifts are properly joined so that no natural paths for seepage are present;
- (vii) a wheeled scraper or truck may be used for placing the clay on the dam site and spread with the blade of a bulldozer and then compacted using a tamper foot roller. Machinery with crawler tracks or tyres are not suitable and are not to be used for compaction.

5.9 Settlement of the embankment

An allowance of 5% of the height of the embankment is provided to allow settlement of the embankment over time. For example, if the permitted height of the dam is 5.0 m, the embankment may be built to 5.25 m (+5%) to allow for settlement.

5.10 Vegetation

Topsoil is to be spread over the exposed surfaces of the completed embankment to a depth of at least 150 mm and sown with pasture grass to establish a good cover as soon as possible.

5.11 Spillway

The spillway should be cut in solid material (preferably rock) that will resist erosion. The spillway discharge must be channelled away from the embankment.

5.12 Initial filling

Most dams that fail, do so on first filling and as such, a cautious approach should be taken in filling a dam for the first time.

Often these failures are due to dispersive soils, where salts leach out of the soil into the freshwater filling the dam, potentially leading to the erosion of a “pipe” through the embankment. If waterways are showing signs of significant erosion, this could be an indication of dispersive soils and that even more care may be required.

Where practical, a dam should be filled at a rate of not more than 0.3 metres depth per day and be subject to close monitoring. If there is a sudden increase in flows downstream of the dam due to seepage, indicated by discoloured or muddy water, filling of the dam should cease or the water level should be lowered and carefully watched.

Where concerns arise in regard to filling a dam for the first time, you're local Regional Water Management Officer should be contacted immediately.

PART 6 REPAIR OR MODIFICATION OF AN EXISTING DAM

In addition to the requirements of Parts 3, 4 and 5 of this Code, where dam works consist of repair or modification of a dam, and a Departmental approved Preconstruction Report does not exist, the following requirements must be complied with:

- (i) all new material used in the repair or modification must be similar to that of the existing dam;
- (ii) all top soil in and around the site of the repair or modification must be removed prior to commencing dam works;
- (iii) the surface areas of the existing dam where works will be undertaken must be scarified and prepared so that the new and existing materials are laid down and joined without forming any laminations;
- (iv) the laying down and compaction effect of the new material is to be undertaken as per embankment compaction requirements of Part 5.8 of this Code.

PART 7 REMOVAL OF AN EXISTING DAM

In addition to the requirements of Part 3 of this Code, where dam works consist of the removal of a dam, and a Departmental approved Preconstruction Report does not exist, the following requirements must be complied with:

- (i) the dam must be dewatered prior to embankment removal;
- (ii) the inundation area is to be dry and able to take machinery traffic before dam works commence;
- (iii) all silt and fine materials laying on the bottom of the inundation area must be removed or stripped away and stockpiled;
- (iv) top soil must be stripped away from the surface of the embankment and stockpiled;
- (v) embankment material must be placed back within the inundation area and treated as per embankment compaction requirements of Part 5.8 of this Code;
- (vi) topsoil must be spread over the final compacted material to a depth of at least 150 mm and sown with pasture grass to establish a good cover as soon as possible.

PART 8 OTHER OBLIGATIONS OF DAM WORKS PERMIT HOLDERS

In undertaking any dam works, Division 3 permit holders must also be aware of their obligations under the:

- *Water Management (Safety of Dams) Regulations 2015*; and
- *Water Management Act 1999*.

8.1 Dam safety

The *Water Management (Safety of Dams) Regulations 2015* prescribe levels of competency in relation to the safety of dams that must be fulfilled for dam works undertaken under a Division 3 permit.

8.2 Notice of completion

In accordance with the requirements in section 164ZA of the Act, before the expiration of a dam works permit, and as soon as practicable after the dam works to which a permit relates have been completed, the holder of a Division 3 permit must submit to the Department a completed *Notice of Completion of Dam Works under a Division 3 Permit*^{7,8}.

⁷ An approved form is available at: <http://dpiwwe.tas.gov.au/Documents/Division3NoCForm.pdf>

⁸ Ideally, notice of completion should be submitted after the first filling.