



HUNTER VALLEY FLOOD MITIGATION SCHEME

Development within the Hunter Valley Flood Mitigation Scheme

Development Control Guidelines

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Acknowledgment of Country

The Department of Planning, Industry and Environment acknowledges the Traditional Owners and Custodians of the land on which we live and work and pays respect to Elders past, present and future.

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Introduction

The Hunter Valley Flood Mitigation Scheme (*HVFMS*) provides protection against flooding in the Hunter River catchment, particularly around the City of Maitland. The Scheme consists of considerable flood mitigation works, including 185 km of levees, 160 km of flood drains and 266 km of protected riverbanks.

The Department of Planning Infrastructure and Environment (*DPIE*) has a role in working with local Councils in the development and implementation of local floodplain risk management plans and policies for sustainable use and development of the floodplain. The *HVFMS* applies to land within the following local government areas:

- City of Newcastle
- Port Stephens
- Maitland City
- Cessnock City
- Singleton Shire
- Muswellbrook Shire, and
- Upper Hunter Shire.

DPIE is responsible for the administration of *HVFMS* and consent from *DPIE* must be obtained prior to the commencement of any development near the *HVFMS*, which may include, for example, construction, excavation or boring, agricultural activities or the planting/removal of vegetation. Failure to comply with these guidelines may result in the structure or vegetation being removed at the owner's expense.

This document sets out the *DPIE* guidelines for development within the *HVFMS* as follows:

- Section 2** defines the land to which this guideline applies.
- Section 3** describes the concept of levee protection zones.
- Section 4** outlines the general criteria or approach to be followed for construction undertaken near *HVFMS* flood mitigation works.
- Section 5** outlines the requirements for vegetation near *HVFMS* flood mitigation works.
- Section 6** outlines the requirements for structures on or adjacent to *HVFMS* levees.
- Section 7** outlines the requirements for excavating or boring in or adjacent to *HVFMS* levees.
- Section 8** outlines the requirements for agricultural activities on or adjacent to *HVFMS* levees.
- Section 9** outlines the requirements for development within a *declared floodplain*.
- Section 10** general definitions used in this guideline.
- Section 11** outlines legislative framework relevant to this guideline.
- Section 12** a list of references.

This guide does not include planning requirements relating to development control for other consenting authorities and it should be read in conjunction with other government authority's requirements. Similarly, consent from local Councils does not infer or imply consent from *DPIE* for development within the *HVFMS*. It is the applicant's responsibility to obtain consent from all relevant consent authorities in relation to their specific development application (DA).

Land to Which This Guide Applies

The guidelines for development within the *HVFMS* apply to any land:

1. On or adjacent to any part of a levee, floodgate, spillway, control bank, drain or bank protection forming part of the *HVFMS*, or
2. Within a *Declared Floodplain*.

Individual owners and occupiers of flood prone property may wish to carry out a development within a *Declared Floodplain* (refer **Section 9**) and/or in proximity to the *HVFMS*.

Assets of the *HVFMS* and *Declared Floodplains* are depicted in the Flood Planning Maps in **Appendix A** to this guide.

Further details including the concept of levee protection zones and general criteria for construction to be undertaken near *DPIE* levees is outlined in **Section 3** and **Section 4**.

Specific requirements for developments on or adjacent to levees is outlined in **Section 5** to **Section 8**.

Concept of the Levee Protection Zone

A review of international best practice (CIRIA, 2013) indicates that many levee maintenance authorities manage their levees through the concept of the levee protection zone. *DPIE* have also adopted this approach for the protection of the *HVFMS* levee systems.

The principle is outlined below on Figure 1, and includes two main zones, namely.

1. **Core Protection Zone** is the zone where any changes or interference could have a direct influence on the potential failure mechanisms of the levee. This zone includes the full width of the levee structure including its crest and embankments down to the toe of the batters on both sides. This zone includes a small additional buffer away from the toe of the levee.
2. **Outer Protection Zones** are zones on either side of the *core protection zone* where restrictions and regulations are applied to protect the hydraulic and geotechnical integrity of the levee. This includes land adjacent on the river side and floodplain side of the levee.

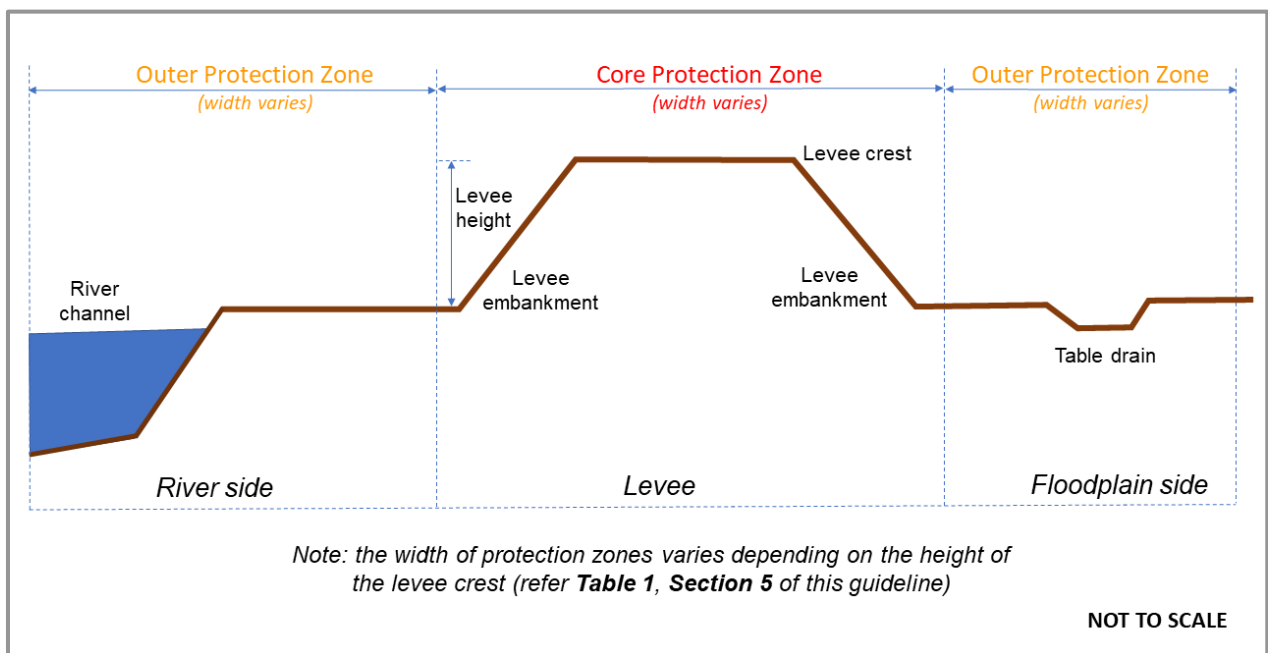


Figure 1: Concept of levee protection zones

DPIE do not own the land on which the levees lie, however, *DPIE* are still responsible for ensuring that the levee structures are maintained and fit for purpose for the life of the flood mitigation scheme. To enable them to do this, they must have control over the *core protection zone* and *outer protection zones* in terms of management of encroachments into these zones, and a right of approval over any proposed development (including buildings/fences/services/vegetation) within these zones of influence of the levee structure.

Guidance on the activities permitted within the protection zones is summarised in Table 1.

Table 1: Protection zones and permitted activities

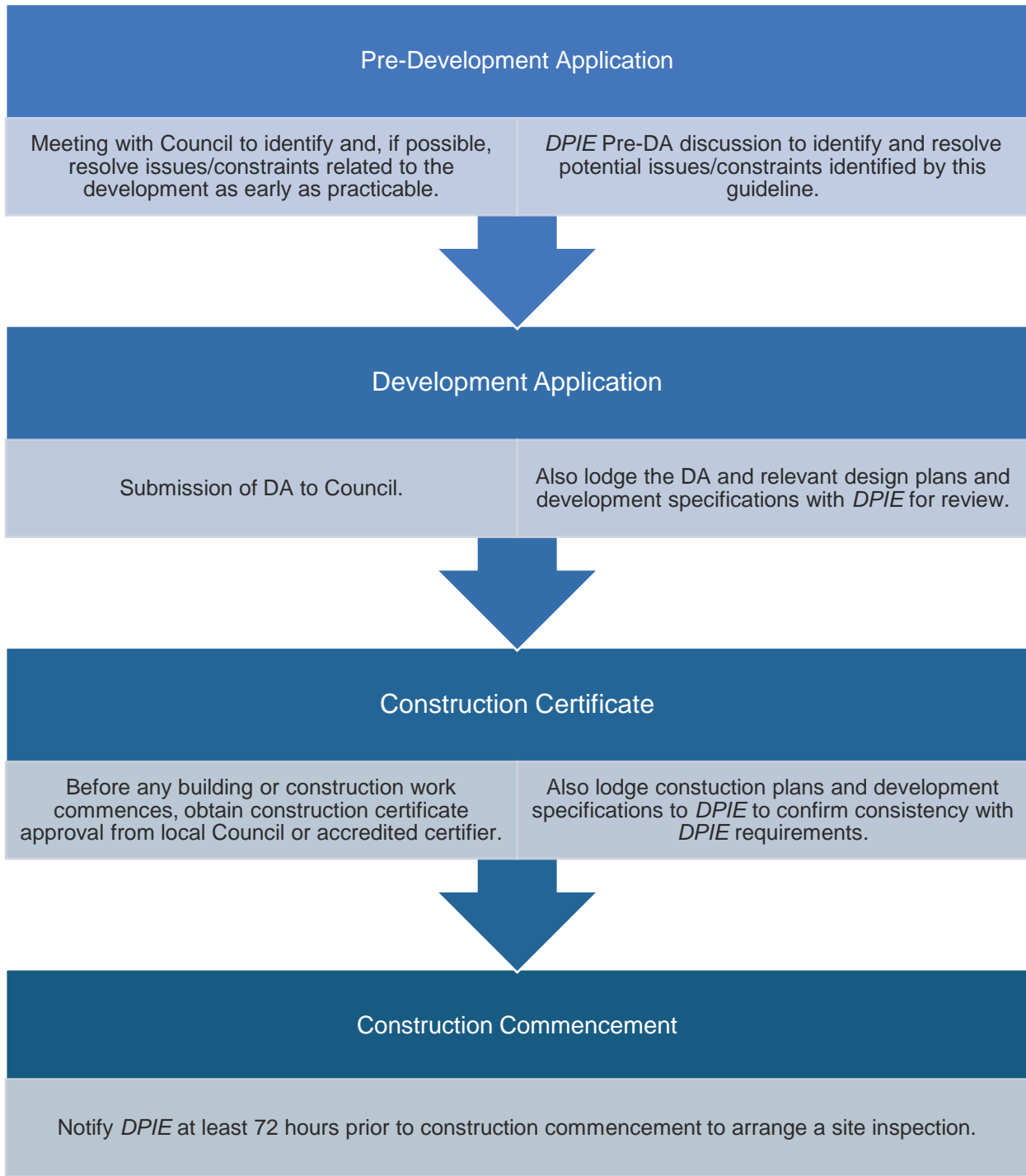
Protection Zone	Activities permitted within
Core	Nil development, excavating/boring or establishment of vegetation other than grass/turf.
Outer	Limited development, excavating/boring or establishment of vegetation subject to these guidelines and <i>HVFMS/DPIE</i> approvals.

General Criteria for Construction near *DPIE* Levees

The following guidance is provided to assist individual owners and occupiers where construction is to be undertaken near *HVFMS* levees:

- As early as possible during the planning process, discuss preliminary proposals with *DPIE* to avoid major revisions or project delay. This may be carried out as a Pre-DA meeting, or as a minimum, a telephone conversation with a *DPIE* project officer.
- Provide a set of Digital (PDF format) design plans and specifications to *DPIE* at least ten (10) days in advance of submission to other consent authorities (e.g. Council) for DA approval and at least thirty (30) days prior to submission of final plans for Construction Certificate approval (i.e. construction commencement).
- Construction may not start until an applicant is in receipt of written consent from *DPIE*.
- Subsequent to *DPIE* approval, *DPIE* must also be notified 72 hours prior to the start of any construction.

The flow chart below further illustrates the equivalent steps of a typical DA/CC process that should be followed by an applicant when planning construction near a *DPIE* levee.



The following outlines the *DPIE* guidelines for the selection and management of vegetation affecting the levees, and for the control of building development adjacent to the levee structures.

Requirements for Vegetation

The primary purpose of managing levee vegetation is to preserve levee integrity, to provide scour protection during times of flooding/levee overtopping and to maintain visibility and access. Woody vegetation is generally not beneficial for levee stability, while healthy grass covers are ideal for levee protection.

Grass coverage

Overly long grass cover reduces the level of levee supervision that is possible to ensure that other mechanisms such as burrowing animals and slope stability problems are not compromising the levee integrity. Therefore, regular mowing is required to allow regular inspection and maintenance. Regular mowing also encourages denser grass cover, provided there is sufficient soil moisture and growing conditions. Excessive mowing during drought conditions, can result in valuable topsoil loss and loss of root binding properties of the turf coverage.

Trees and other woody vegetation

Trees and other woody vegetation (e.g. shrubs) cause problems for levees as follows:

- Weaken levees when trees are toppled during a storm event (refer Figure 2)
- When trees eventually die, their roots will rot, leaving holes and penetration pathways for water through the levee, which can lead to internal failure
- Reduce inspection visibility and vehicle access for inspection and maintenance, and
- Creates localised scour points when levees are overtopped causing erosion and possible failure of the levee.

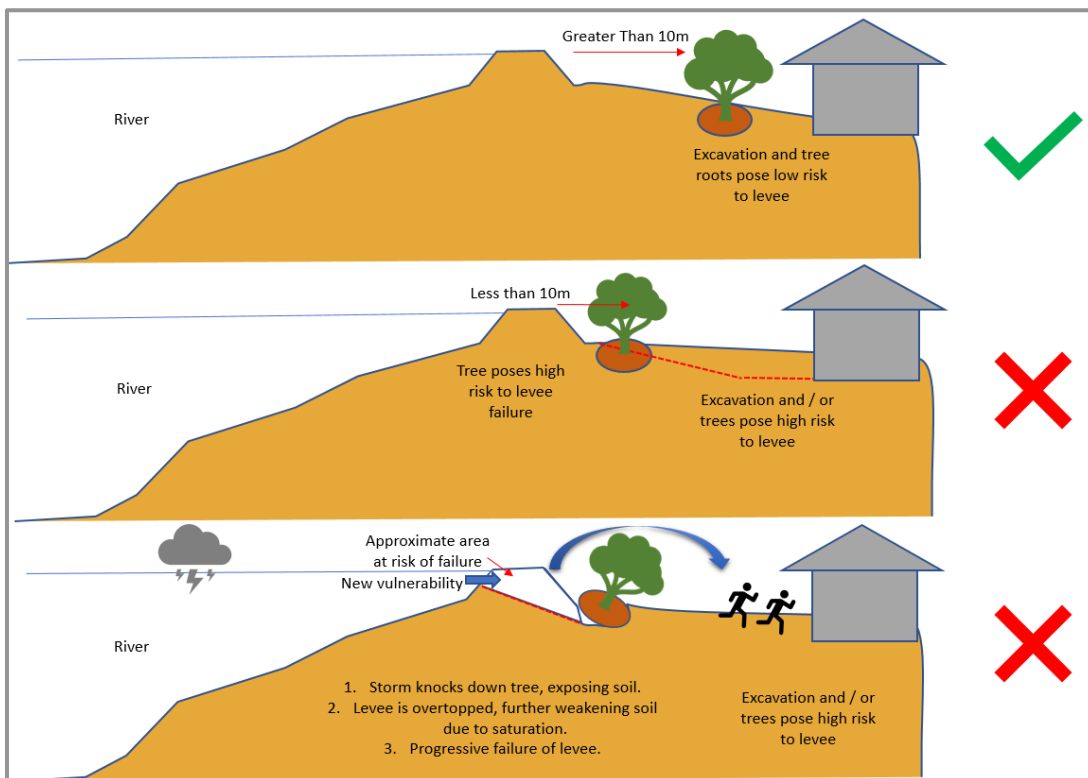


Figure 2: Tree toppling risk within the core and outer protection zones around a levee

Trees and other dense riparian vegetation however are critical for the maintenance of stable riverbanks and for the purposes of providing a habitat for fauna within the riparian zone of the river. However, in areas where dense riparian vegetation is to be maintained, controls on the size of woody vegetation still need to be considered and implemented.

Objectives

The objectives of the controls below are to:

1. provide scour protection to levees during times of flood or levee overtopping (grass cover)
2. maintain adequate vehicle access and visibility for visual inspection of levees and other *HVFMS* flood mitigation assets, and
3. prevent the development of vegetation induced damage or defects.

Controls

The following controls for vegetation apply in all cases:

1. Grass is allowed to be planted within the *core protection zone* and *outer protection zones* or along a levee bank. Native grasses or kikuyu are preferred.
2. Trees, shrubs and other woody plants are not permitted within the *core protection zone* and *outer protection zones*.
3. Ground covers, such as reeds and rushes, may be suitable for planting at some locations, outside the *core protection zone* but within the *outer protection zone* to prevent erosion of stream banks (refer Figure 3). *DPIE* can advise of suitable ground covers and locations for planting.
4. Trees, shrubs and ground covers, such as reeds and rushes, may be suitable for planting at some locations, outside the *outer protection zone* to prevent erosion of stream banks (refer Figure 3). *DPIE* can advise of suitable tree/shrub species and locations for planting.
5. The width in metres (m) of protection zones vary depending on the *HVFMS* asset and the type of vegetation, as per Table 2 below.

Table 2: Width of outer protection zones for vegetation and fences

<i>HVFMS</i> Asset	Width (m) of outer protection zone for vegetation	Width (m) of outer protection zone for fence posts and non-woody vegetation under 1 m height	Width (m) of outer protection zone for large trees
Levee	10	10	10
Spillway	10	10 ^a	25

^a Where permanent fences are designed to collapse automatically under the pressure of floodwaters.

With reference to Table 2, the minimum protection zone width for trees near levees is 10 m. This applies to all levees.

Guidelines for a typical planting regime near a levee are outlined below in Figure 3. A general planting arrangement on a stream bank is shown on Figure 4, which includes shrubs/small trees, rushes and reeds on the riverside of the levee between the normal river level and the top of river bank.

The setback for vegetation and fences adjacent to spillways is shown on Figure 5

As shown in Figure 4, the position of a stock fence (if required) should:

- prevent stock from accessing the river via the levee, and
- maintain levee access for ongoing inspections and maintenance activities undertaken by *DPIE*.

Additionally, suitable watering points (e.g. troughs) should be constructed and maintained on the floodplain side of the levee. Pumps may be used to transfer river water to the watering points to satisfy livestock watering requirements.

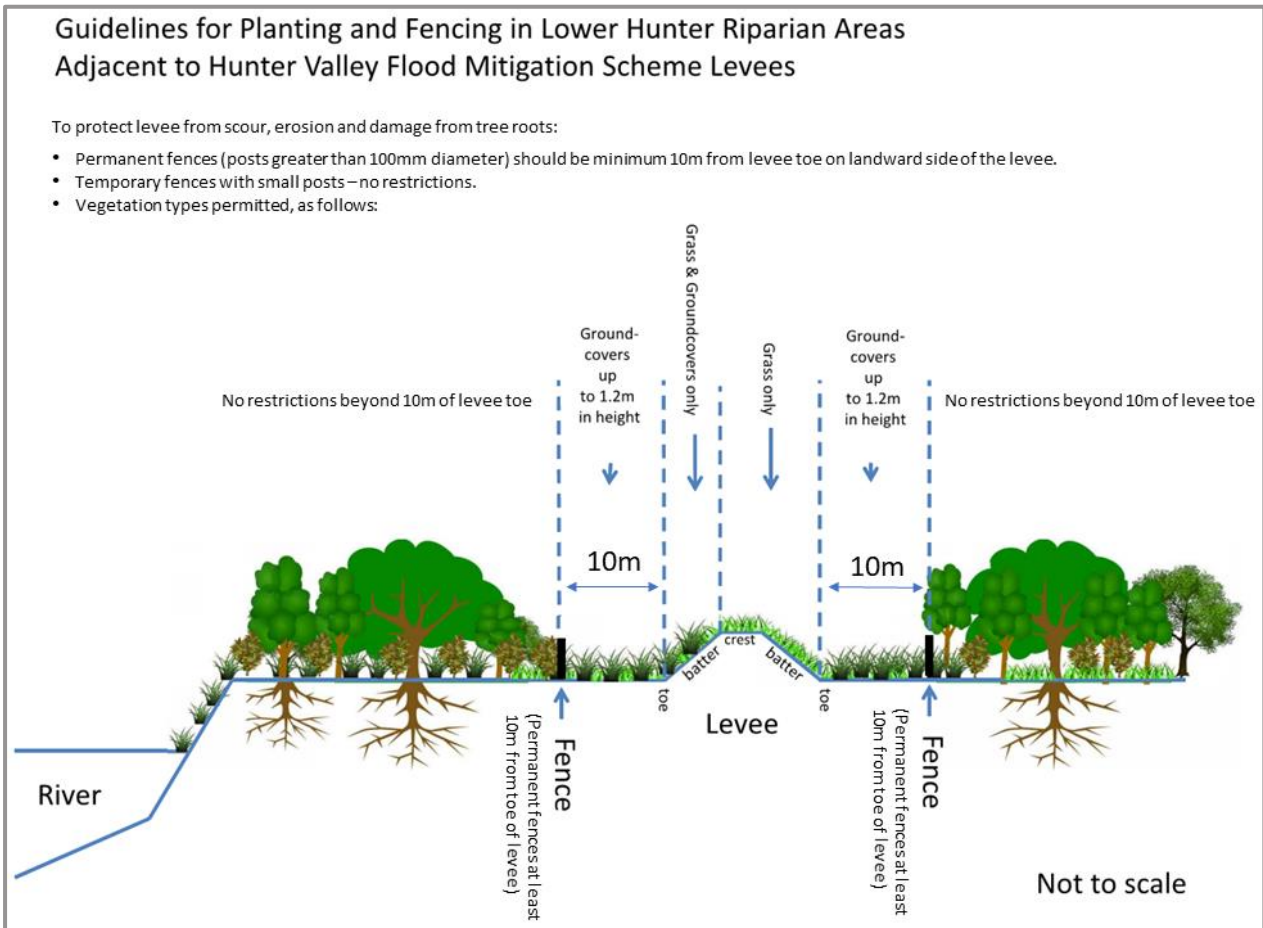


Figure 3: Vegetation guidelines for HVFMS levees

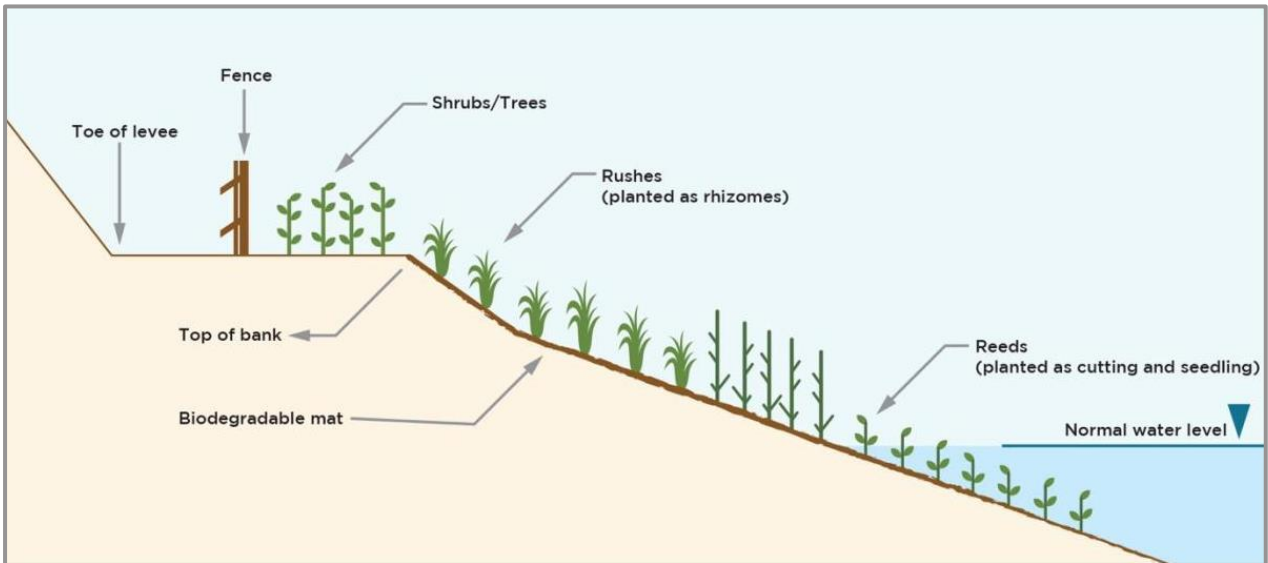


Figure 4: Stream bank section – general planting arrangement

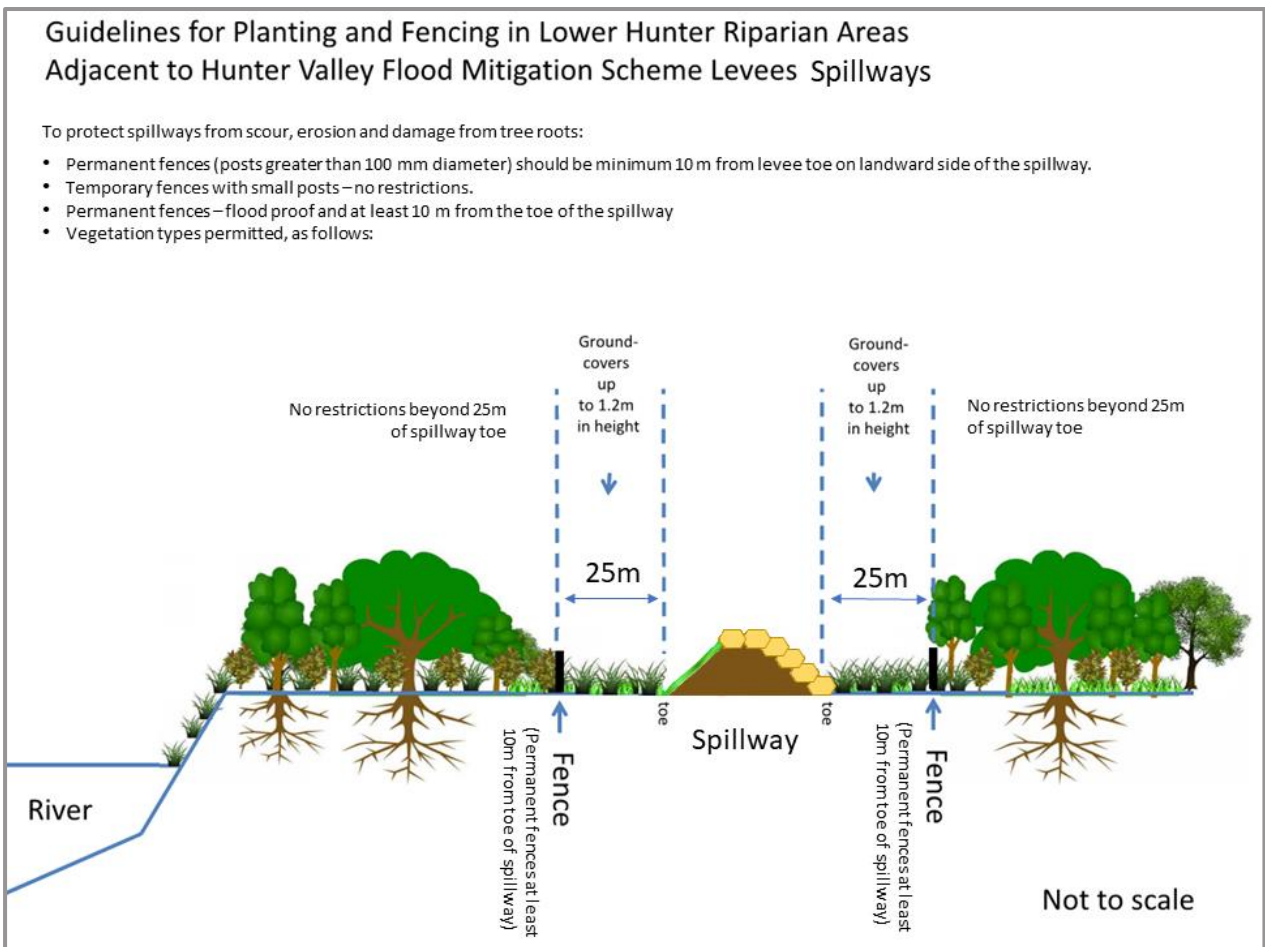


Figure 5: Vegetation guidelines for planting near spillways

Requirements for Structures on or adjacent to Levees

As part of DA within a floodplain, an applicant may apply to their local Council for a new structure to be constructed near a *DPIE* levee. New structures have the potential to impact on a levee directly (i.e. being on or adjacent to the levee), or indirectly, because of the influence of other related works (e.g. raised pad) often required for development in the floodplain.

Structures on or adjacent to levees can impact on the hydraulic performance of the river by restricting overtopping flow area, concentrating flows and causing scour points. Foundations and related earthworks can also impact on the geotechnical integrity of the levee by adding an additional surcharge load that may lead to levee (or riverbank) failure under certain flood (or post-flood) conditions.

Consultation with *DPIE* to discuss the requirements and consent for structures on or adjacent to a levee is therefore important. Examples of structures requiring *DPIE* consent include:

- building structures such as houses, commercial buildings, sheds, garages (or their foundations)
- utility lines or pipes penetrating through a levee embankment, or within the zone of influence of a levee embankment
- boat docks
- stairs
- swimming pools
- power poles
- roads
- irrigation or drainage channels or ditches, and
- fence posts.

Objectives

The objectives of the controls below are to:

1. maintain the hydraulic performance of the levee, and
2. maintain the structural/geotechnical integrity of the levee.

Controls

The following controls apply for any structure on or adjacent to a levee:

1. No building structure can be constructed within the *core protection zone*.
2. A structure may be built upon a **constructed raised pad** adjoining a levee (i.e. within the levee protection zone - refer example on Figure 6). The pad can either be constructed at the levee crest level or (provided it complies with the controls specified in Appendix B and Appendix C of this document), as a raised pad.

3. The width of *core protection zone* is set as 10 m for all *HVFMS* Levees.
4. No development or structure shall be located within 5 m of any flood gate that is part of the *HVFMS*.
5. No development or structure shall be located within 10 m of any drainage channel that is part of the *HVFMS*.
6. No development or structure shall be located within 50 m from the crest level of a formalised (i.e. rock protected or grass) spillway.

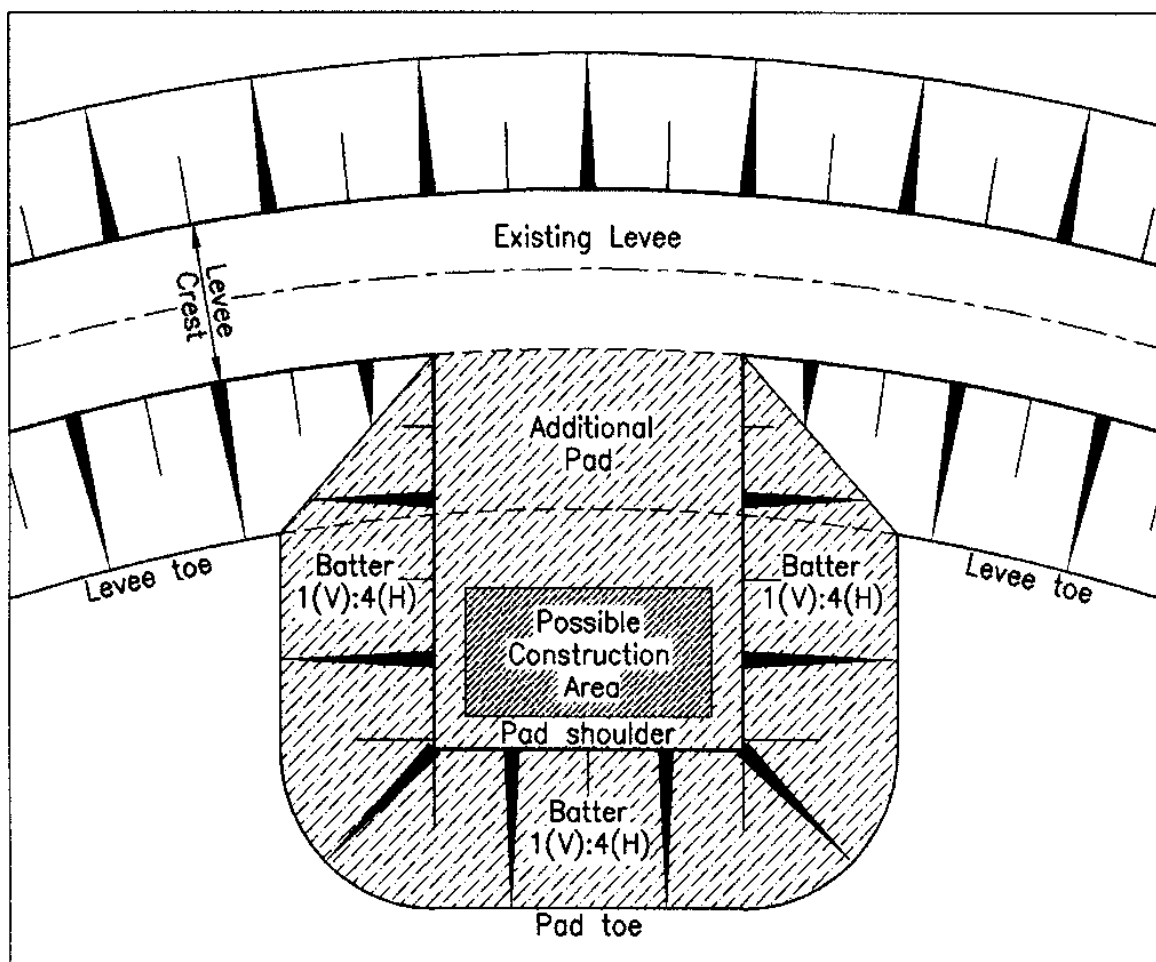


Figure 6: Typical plan view of a newly constructed pad adjacent to HVFMS levee

1. Constructed pads must meet the following conditions:
 - The toe of a raised pad must comply with the minimum distance from the levee toe. Refer to Figure 7 and Figure 8.
 - If the raised pad is the same height as the levee crest or less, then the minimum clear distance from the toe of the existing levee is 10 m (refer Figure 7).
 - If the raised pad height is above the levee crest, then the minimum distance from the toe of the existing levee to the toe of the raised pad is 10 m (refer Figure 8).
 - The Proposed Structure is to be located at least 2 m from the pad shoulder in any direction. Refer to Figure 7 and Figure 8.
 - The structure shall not impede maintenance access along the crest of the levee.
 - Figure 8 shows the requirements where the pad is constructed at a level higher than the crest of the levee.

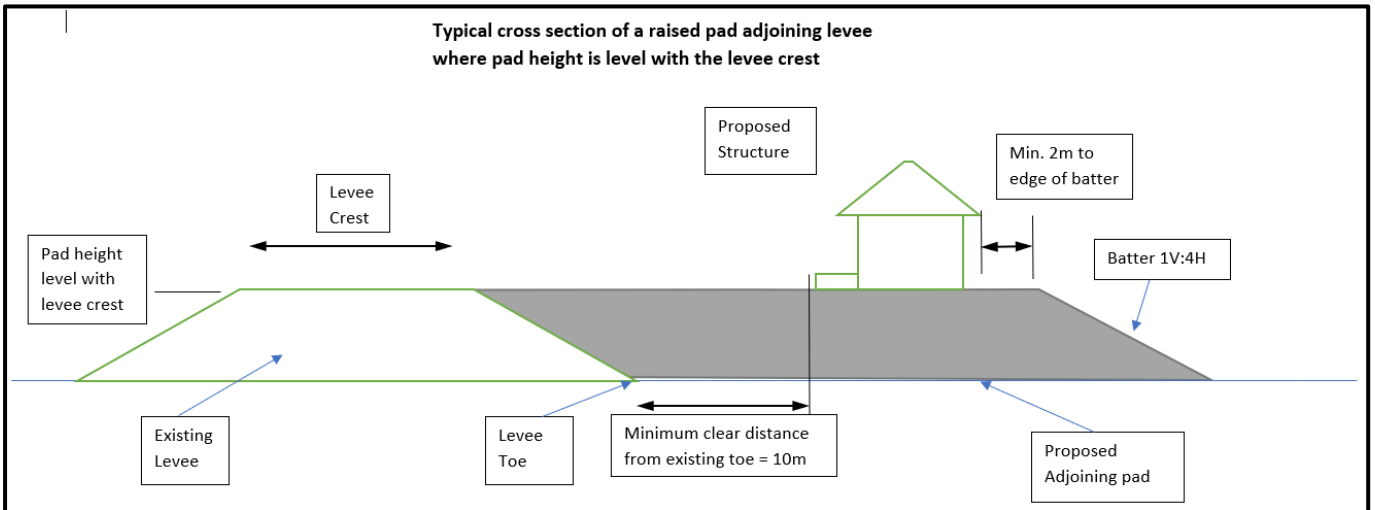


Figure 7: Typical cross section of newly constructed pad (same level) adjacent to HVFM levee

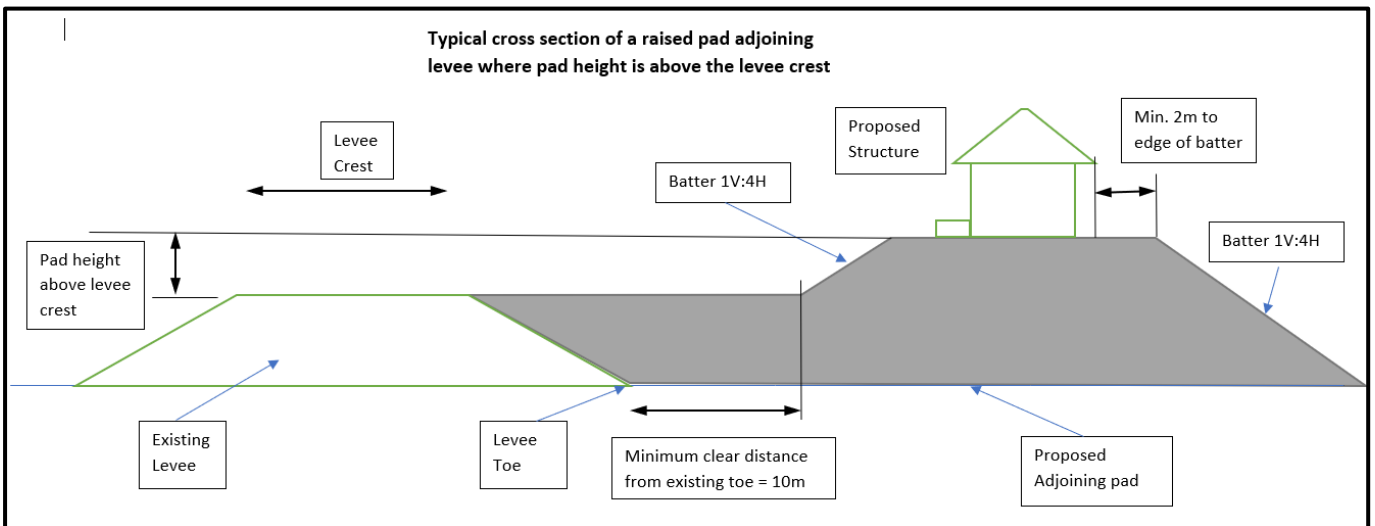


Figure 8: Typical cross section of newly constructed pad above levee crest height, for proposed buildings adjacent to HVFMS levee

The “Proposed Structure” refers to any part of the structure and including:

- Fill pad above the level of the levee crest;
- Sheds / Garages;
- Roof line;
- Poles / Piers;
- Steps;
- Concrete slabs;
- Clothes lines.

A cantilevered structure may protrude beyond the setback lines nominated, provided it is at a height of at least 4 m above the surrounding ground level.

Details of the pad construction that will need to be addressed by the applicant include:

- plan dimensions and cross sections of the pad including height of the pad to metres above Australian Height Datum (m AHD)
- pad location in relation to the levee and any other nearby structures pad material specification
- method of compaction and moisture conditioning
- pad cross sectional view relative to the levee showing “actual” and “true” toe
- pad side slopes
- pad access ramps
- grassing of the pad and the side slopes location and dimensions of the Proposed Structure on the pad.

Requirements for Excavating or Boring in or adjacent to Levees

Excavating and boring for the installation of pipes and cables, can severely weaken the structural integrity and slope stability of levees and create zones of turbulence during a flood event. Turbulent flow around such features may displace rock, pull bedding material out under bank protection or cause erosion of the levee to the point that a failure could occur.

Objectives

The objectives of the controls below are to:

1. maintain the structural integrity of the levee.

Controls

The following controls apply for excavating or boring on or adjacent to a levee:

1. Excavating within the *core protection zone* of a levee is prohibited without consent. Where consent is given by *DPIE*, development conditions may include:
 - No pits are to be left on a levee
 - No granular material is allowed as backfill within the excavated trench, pit or notch. Backfill material shall be either:
 - High clay content soil
 - Existing material treated with Water\$ave PL Plug Range or similar product. This can be purchased from Polymer Innovations Polymer Innovations Pty Ltd, 2/129 Maison Dieu Rd, Singleton, Phone: 02 6571 5177.
 - The fill soil is to be compacted with a trench roller. If the depth of the trench exceeds 150 mm, the material shall be compacted in two or more layers; the minimum thickness of each layer shall be 150 mm.
 - Trenches shall be compacted to obtain a relative compaction of at least 98% of maximum dry density throughout.
 - Moisture content of the fill material shall not be less than 2%.
 - After works are complete, all exposed earth is to be turfed with a suitable grass such as kikuyu.
2. Boring within the *outer protection zone* of a levee is prohibited without consent. Where consent is given, development conditions may include:
 - The annular space between the bore and sleeve shall be pressure grouted with bentonite or other suitable cementitious flowable grout approved by *DPIE*.
 - Density of bentonite solution should be checked during boring operation to ensure that the density is about 1.05 g/cc to 1.10 g/cc, marsh cone viscosity of 30 to 40 and pH value 9.5 to 12.
3. The applicant must provide detailed designs, calculations, geotechnical analysis and construction procedures for all excavation or boring works to be undertaken.

Requirements for Agricultural Activities on or adjacent to Levees

Agricultural activities such as farming, and stock access can impact on levees. Cattle may cause surface damage by creating depressions and surface rutting. This can accelerate the erosion of levees and riverbanks.

Objectives

The objectives of the controls below are to:

1. Encourage good agricultural practices around levees and riverbanks.

Controls

The following controls apply for agricultural activities on or adjacent to a levee:

1. Farming equipment shall not be stored on levees without *DPIE* approval.
2. Limit stock access to small portions of stream banks as shown on Figure 9, so that minimal damage will occur to riverbanks. This can be achieved by constructing “laneways” to restrict stock access onto eroded banks.

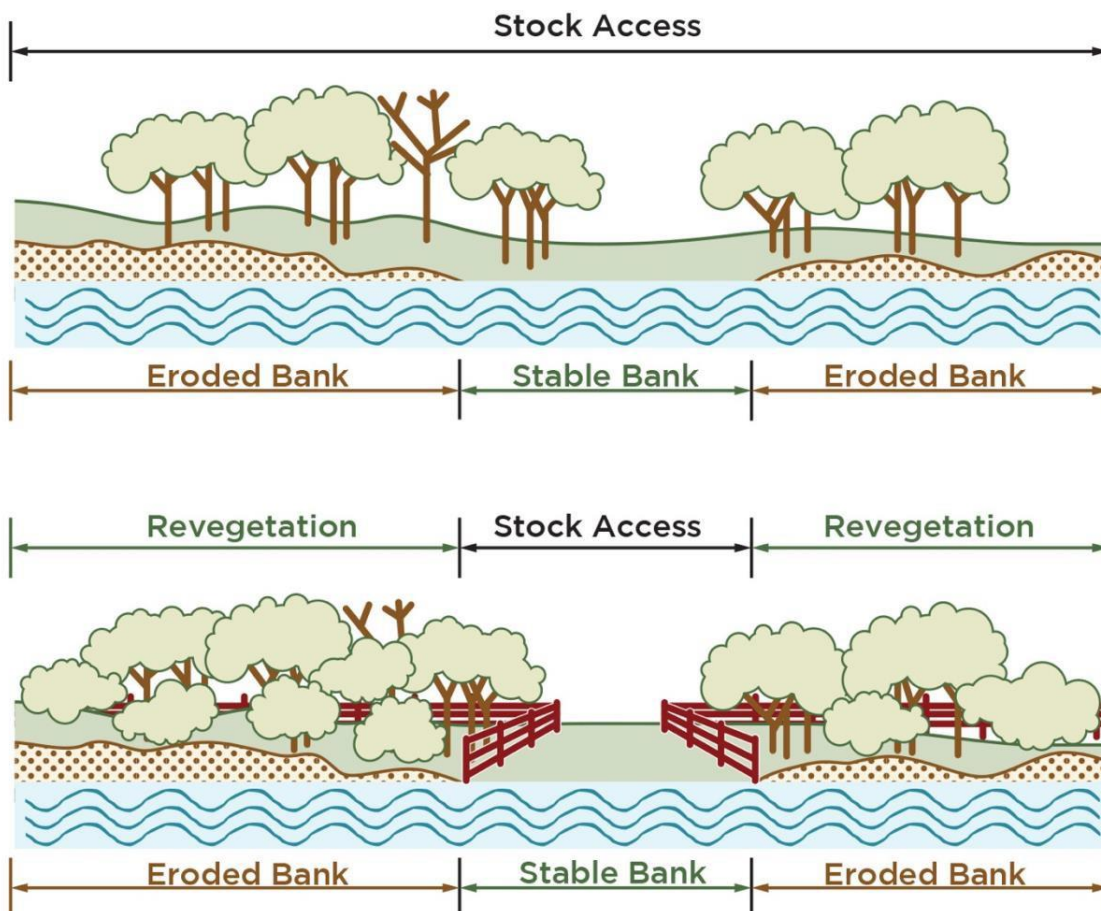


Figure 9: Example of managed stock access to the riverbank

Requirements for Development within a Declared Floodplain

Floodway areas are those areas of the floodplain where a significant discharge of water occurs during floods. They are often aligned with naturally defined channels but sometimes may be artificial. Floodways are areas that, even if only partially blocked, would cause a significant redistribution of flood flow, or a significant increase in flood levels.

Declared Floodplains within the *HVFMS* are *floodways* where unrestricted flows are required during times of flooding. Obstructions cause the redistribution and concentration of flood flows, which can redirect flood waters into urban and rural areas resulting in deeper and faster flows, significantly increasing the danger to people in those areas. This is what happened to Maitland during the 1955 flood.

Development within a *Declared Floodplain* must therefore complement the role and function existing flood mitigation works which serve to protect urban and rural areas.

Objectives

The objectives of the controls below are to:

1. Retain *floodways* in a condition capable for the conveyance of essential flood flow.
2. To prevent the obstruction of the *floodways*.
3. To prevent redistribution of the flood flows away from *floodways* and into other rural and urban areas.

Controls

The following controls apply for development within a *Declared Floodplain*:

1. No building or structure is to be erected, and no land filled by way of the deposition of any material, within any area identified as a *Declared Floodplains* except for minor alterations to ground levels which do not significantly alter the fundamental flow patterns during a flood.
2. No development or structure shall be located within 50 m of the crest level of a levee spillway or control bank.
3. Where dividing fences across *floodways* are unavoidable, they are to be only of an open type fencing (i.e. 4 strand post and wire) that does not restrict the flow of flood waters and are less prone to blockage. New development shall be designed to avoid fences in *Declared Floodplains*.

Definitions

A word or expression used in this guide has the same meaning as it has in the 'Floodplain Development Manual 2005' (DIPNR, 2005), unless it is otherwise defined in this document.

- **Proposed Structure** – refers to the extremities of the building or its foundations (includes verandahs and other non-habitable areas such as sheds, garages, steps etc).
- **Core Protection Zone (Levee)** – the area where any changes or interference could have a direct influence on the potential failure mechanisms of the levee. This zone includes the full width of the levee structure including its crest and embankments down to the toe of the batters on both sides.
- **Outer Protection Zone (Levee)** – an area around a levee where any development or vegetation could have an adverse impact on the performance of the levee. It is defined as a minimum distance of 10 m from the toe of the existing levee as shown on Figure 3, Figure 7 or Figure 8.
- **Declared Floodplains** – these are areas proclaimed as “Floodplains” under the provisions of the *Hunter Valley Flood Mitigation Act 1956* that have been carried over into the *Water Management Act 2000*.
- **DPIE** – Department of Planning Infrastructure and Environment.
- **Floodway** – those areas of the floodplain where a significant discharge of water flows during floods; often aligned with obvious naturally defined channels. Floodways are areas which, even if only partially blocked, would cause a significant redistribution of flood flow or increase in flood levels, which may in turn adversely affect other areas.
- **HVFMS** – Hunter Valley Flood Mitigation Scheme.

Legislative Framework

The *HVFMS* is protected by Section 256 of the Water Management Act 2000.

Water Management Act 2000

On January 2001, the *Water Management Act 2000* repealed the *Hunter Valley Flood Mitigation Act 1956*.

Under the provisions of Sections 256 (1) (b) of the Water Management Act 2000 (Hunter Valley Flood Mitigation Works), consent from the Minister is required for construction of a flood work within the declared floodplain.

Section 256 (1) of the Water Management Act 2000 reads:

1. A person must not:
 - a. construct any building, fence or structure in, on, or adjacent to, a levee bank, or
 - b. construct a flood work on a floodplain, except with the consent of the Minister.

The definition of a flood work from the Dictionary of the *Water Management Act 2000* reads:

flood work means a work (such as a barrage, causeway, cutting or embankment):

- a. that is situated:
 - I. in or in the vicinity of a river, estuary or lake, or
 - II. within a floodplain, and
- b. that is of such a size or configuration that, regardless of the purpose for which it is constructed or used, it is likely to have an effect on:
 - I. the flow of water to or from a river, estuary or lake, or
 - II. the distribution or flow of floodwater in times of flood, and includes all associated pipes, valves and equipment, but does not include any work declared by the regulations not to be a flood work.

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DIPNR, 2005. Floodplain Development Manual: the management of flood liable land, April 2005. ISBN: 0 7347 5476 0.