

# Watercourse Management

## Introduction

Date: TBC

Location: TBC



**TIMBER**  
QUEENSLAND

Version 2 – August 2023

© This document is property of Timber Queensland. Once uploaded online or printed, this document is considered an uncontrolled version.

# Watercourse Management Agenda

## Topics

- Watercourse Protection Management
- Watercourse Types
  - Stream
  - Gullies
  - Waterways
  - Water Features
- Key Indicators of Watercourses
- Watercourse Protection Zones
  - Buffer
  - Filter
  - Slump Face
  - Headscarp
- Disturbance on Watercourses
- Rules of Thumb
- Watercourse Calculator & Ready Reckoner



# Watercourse Management

## SLIDE PLACEHOLDER

## FOR HOUSEKEEPING

*Timber recycles carbon*



# Watercourse Management

## Why is Watercourse Management Important?

### Objectives

- Minimise harvest impact on watercourses by providing reduced access vegetation buffers and filters on identified watercourses
- Maintain water quality
- Reduce the risk of harvesting activity causing elevated erosion
- Provide clarification and examples on the interpretation of the QPWS Code
- Various legislation and documents detailing information and requirements of watercourse management
- Provide a central supporting document for the industry
- Provide tools and supporting documents to assist industry

*Timber recycles carbon*

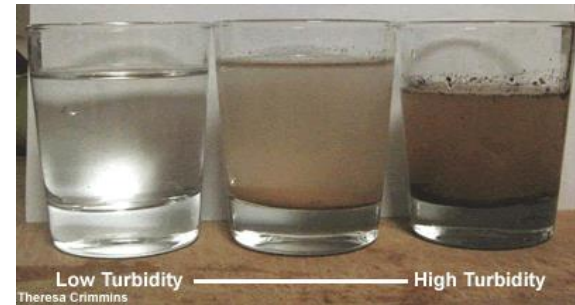


# Watercourse Management

## What is Watercourse Protection/Management?

### Background

- Prevent and minimise disturbance
  - Sedimentation
  - High turbidity
  - Degradation of watercourses
  - Vegetation and soil disturbance
  - Offsite impacts on flora, fauna, ecosystems, and the community.



# Watercourse Management Legislation

Watercourses are protected under a range of environmental legislation including:

- *Environmental Protection Act 1994 (Qld).*
- *Environment Protection and Biodiversity Conservation Act 1999 (Cwlth) [EPBC].*
- *Water Act 2000 (Qld).*
- *Environmental Protection (Water Policy) 2009 (Qld).*
- *Code of practice for native forest timber production on Queensland's State forest estate 2020.*

The Code is the core watercourse protection document for native forest operations on state-owned land in QLD

- Schedule 3- Watercourse protection, is the main section, however, watercourse management is mentioned throughout The Code

There may be additional legislation relevant to watercourse management not listed above.

## Schedule 3 - Watercourse protection

### S3.1 General

Watercourses must be protected from any adverse impacts of harvesting to maintain their physical integrity, environmental values and water quality. The protection system provides protection to areas, subject to single tree selection harvesting, against the [average annual peak stream flows](#).

#### S3.1.1 General protection principles

Protection is to be provided by the establishment and management of:

- a watercourse protection zone around the streams, gullies and waterways that make up the watercourse network; and
- controls on disturbance in the harvesting area.

The aim of this, and other, schedules is to minimise disturbance within the buffer and filter zones. This can also be thought of as acting to maintain the physical integrity and environmental values within the watercourse and buffer and filter zones.

The watercourse protection zone (WPZ) is made up of a:

- **Buffer zone (BZ)** – An area extending beyond the [defining bank](#) into the harvest area designated as a no disturbance zone. Management involves complete protection (exclusion) to maintain watercourse stability and environment. The width of this zone varies with watercourse morphology. This is comprised of two components:
  - Setback** – The minimum exclusion distance from the defining bank that is defined by watercourse type ([Table 3.3](#)).
  - Slump protection** – The minimum setback is extended as necessary, based on [slump](#) and other instability, to protect against disturbance or other threats.
- **Filter zone (FZ)** – An area beyond the BZ in which disturbance is conditionally permitted provided the area is maintained such as it both physically supports the BZ and protects water quality by filtering overland flow.

The area outside the WPZ that is available for harvesting, given all other Code requirements are met, is the harvesting area ([Diagram 3.3](#)).

#### Availability and protection requirements

When determining the availability of each particular tree or effects of a harvesting activity:

- protection requirements are determined by looking in all directions and using the prescribed protective measures applying to the visible features to provide the highest level of protection.
- when determining the availability of a particular tree, applying the highest level of protection and visible features principles may require a greater buffer than is warranted by the closest watercourse.
- where a higher classification watercourse meets a lower class of watercourse (transition point), the higher WPZ extends radially into the lower WPZ.
- avoid any harvesting activities that accelerate, or are likely to accelerate, erosion.

When determining if a particular tree is available for harvesting, determine the protection requirement by:

- 1 Classify the watercourse type** – At the assessment point, look both ways along the watercourse. Refer to [S3.2 Watercourse classification](#) and classify on the basis of the features providing the highest level of protection.
- 2 Consult the minimum protection requirements** for that class of watercourse. Refer to the watercourse protection zone requirements in [Table 3.3](#).

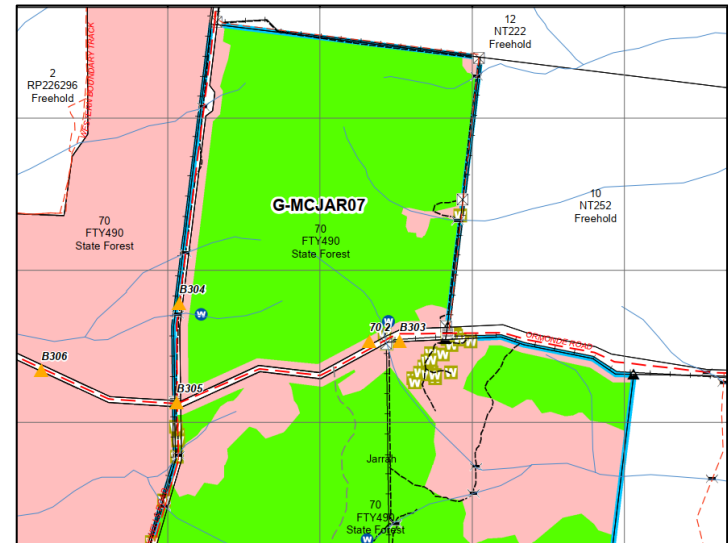
# Watercourse Management Contractual Documents

Department of Agriculture and Fisheries (Forestry) [DAF] develop contractual documents for native forest operations on state-owned land, including:

- Sales Permit
  - Adhere to the CoP and legislation
  - Protecting and implementing excluded areas (WPZ)
  - Watercourse crossing requirements (see additional TQ materials)
- Operational Harvesting Plan (OHP)
  - Watercourses will be shown on the attached OHP map at the appropriate scale
  - Discusses watercourse crossings (see additional TQ materials)
  - Discusses paint requirements for WPZ
  - Location of fuel, storage tanks, and drums
  - Spill procedures (fuel, oil leaks), when close to WPZ

**NOTE:** The watercourses shown on the OHP are NOT always accurate. The watercourses need to be identified on the ground.

Watercourses can be located the same way DAF locate, by searching on Qglobe.



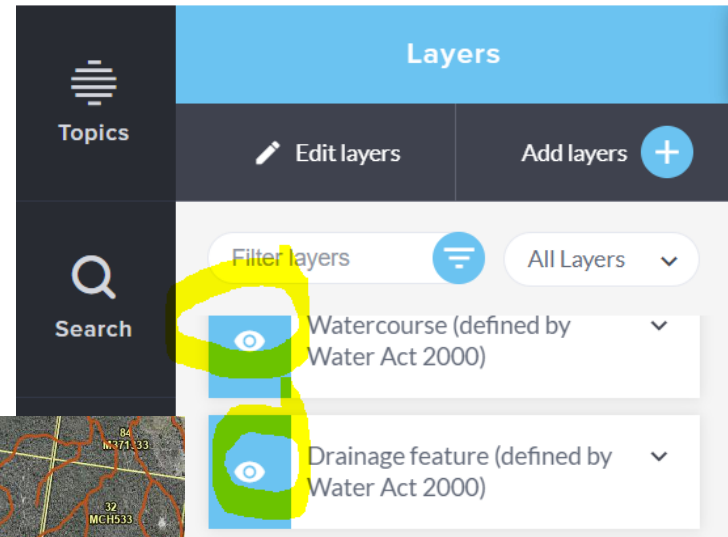
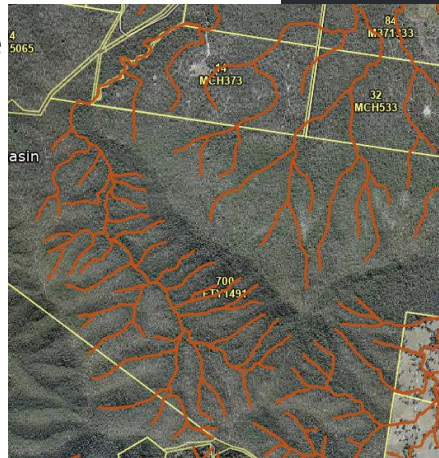
# Watercourse Management Contractual Documents

The watercourses shown on the OHP are NOT always accurate

The watercourses need to be identified on the ground

Watercourses can be located using Qglobe

- [Queensland Globe \(information.qld.gov.au\)](http://information.qld.gov.au)
- In topics, search for **Surface water mgmt (unsupplemented water)**
- Turn the later on, by clicking the eye, and in simple instructions, use the mouse to navigate to your sales area. If you are an experienced user, your MUID can be searched for.





# Watercourse Management Tools to assist

**TQ have developed several tools to assist:**

- Guide to Watercourse Protection
- Guide to Drainage
- Guide to Watercourse Crossings
- The Timber Queensland Watercourse Protection Calculator has been developed to assist in WPZ calculations
- WPZ Calculations Ready Reckoner (Handbook version)

Note – all tools are summarised, and are not to replace legislation or the code.

*Timber recycles carbon*



# Watercourse Management

## Understanding Watercourse Management

The QPWS Code is based on a concept of a Watercourse Protection Zone (WPZ) for the following watercourse Types:

- Streams
- Gullies (U-shape and V-shape)
- Waterways
- Water features

Each watercourse type has:

- Different characteristics
- Different WPZ requirements
- Different protection measures
- Different allowable activities

# Watercourse Management

## Working near a watercourse?

### Follow 4 steps

#### Watercourse Management

1. Classify the watercourse type
2. Find minimum protection
3. Consider the situation (current and future)
4. Apply protection

*Found on page 27 within the CoP.*

*Timber recycles carbon*



# Watercourse Management

## Step 1

### Classify the watercourse

#### Streams

Rivers and creeks with distinct bed and banks, a channel or braided channel.

Terraces, flood plains and chains of waterholes may also be present.

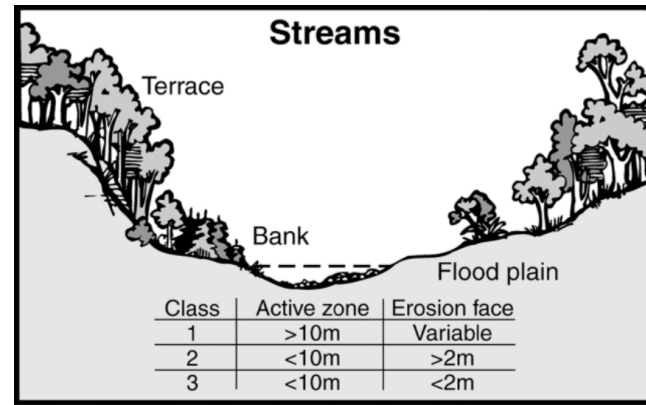
Two types:

- Stream 1: greater than 10m active zone
- Stream 2: less than 10m active zone

#### Characteristics

- Vegetation characteristics present
- Flow may be permanent, semi-permanent, intermittent, or limited to periods after heavy rain.

*Timber recycles carbon*



**Active zone** – This is a zone of active erosion or deposition characterised by either:

- any **erosion face** greater than 10cm high; or
- a scour/deposition area greater than 1m in width.

Deposited material may be loose, unconsolidated sand, gravel or water-washed stone. The zone may be obscured by litter or be associated with a significant reduction in surface cover. Width is measured across the deposited material or scour where no erosion face exists.



# Watercourse Management

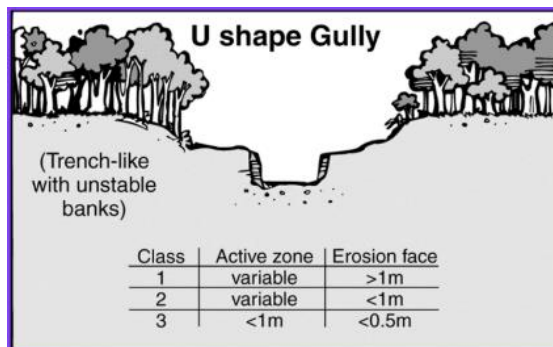
## Step 1

### Classify the watercourse

#### U-Shape gullies

U-shaped gully beds and banks are clearly defined with at least one steep bank and clear evidence of soil erosion. Gullies can be ongoing or broken.

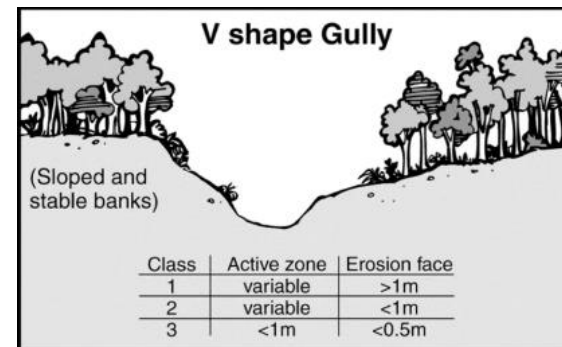
- Typically more trench like
- Undercutting may be visible
- Often unstable
- Topsoil and subsoil equally prone to erosion
- Effects greater area
- Vegetation less likely on banks
- Greater restrictions on forest operations



#### V-Shape gullies

V-shaped gullies have clearly defined beds with at least one steep bank and clear evidence of soil erosion. Gullies can be ongoing or broken.

- Typically more stable and not undercut
- Topsoil more prone to erosion than subsoil
- Slumping can be present
- Higher water velocity in 'v'
- More likely to have vegetation
- More forest operations allowed



# Watercourse Management

## Step 1

Classify the watercourse

U-Shape gullies



V-Shape gullies



*Timber recycles carbon*

# Watercourse Management

## Step 1

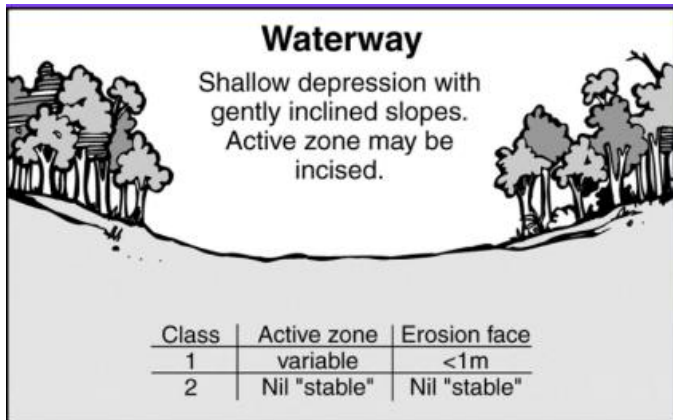
### Classify the watercourse

#### Waterways

Dish shaped, gently inclined, shallow, and open depressions.

May be difficult to see due to seasonally waterlogged.

- Active zone vegetated
- Seasonally waterlogged
- Hold water after rain

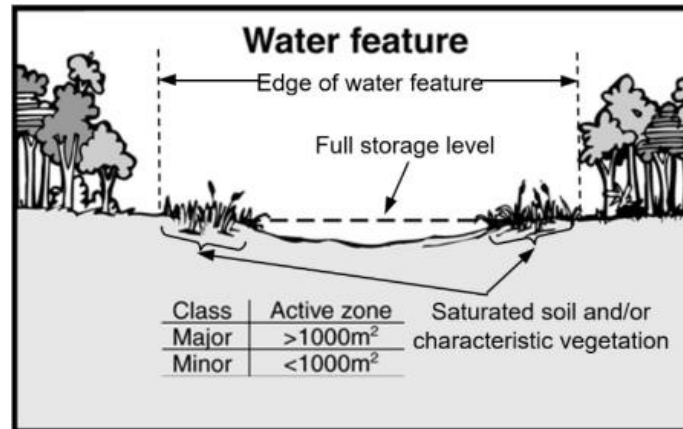


#### Water features

Natural or artificial waterholes, impoundments, wetlands or springs and soaks.

There are two water feature classes:

- Major Water Feature area greater than 1,000m<sup>2</sup>
- Minor Water Feature area less than 1,000m<sup>2</sup>



# Watercourse Management

## Step 1

Classify the watercourse

Waterways



Water features



*Timber recycles carbon*



# Watercourse Management

## Step 1

### Mapped Watercourses

#### Watercourse Management

- Marking watercourses
  - Where tree marking occurs, trees located within or bordering the watercourse protection zone (WPZ) will be marked with red paint (or marked otherwise).
- Operational Harvesting Plan
  - Where known, watercourses are demonstrated on Operational Harvest Plans (OHPs).
  - DAF uses spatial layers to identify and display known watercourses on maps.
  - Note: There can be errors in watercourse locations. Always inspect on the ground to find watercourses.

# Watercourse Management

## Step 1

Use key indicators to assist classify the watercourse type

### Active Zone

**Active Zones** – deposited material including silt, and stone, and scouring.

**Characteristic vegetation on stream bank** – tea trees, river red gum, forest red gum, yapunyah.

**Characteristic vegetation on stream bed** – dead aquatic vegetation, water couch, rushes, and sedges.

**Other characteristics** - springs, damp soil/mud, soaks, evidence of animal traffic.

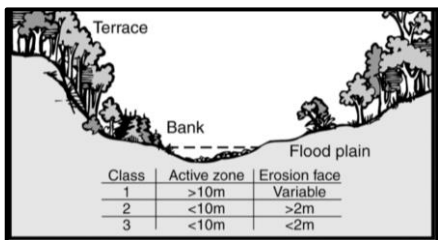
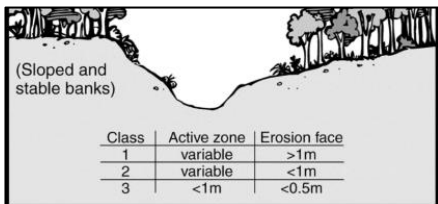
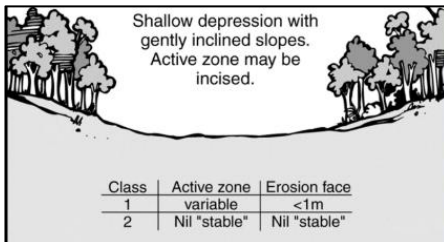
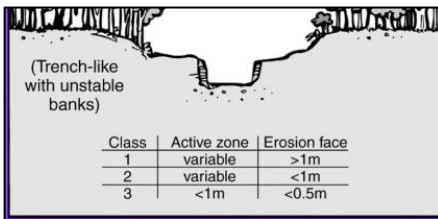
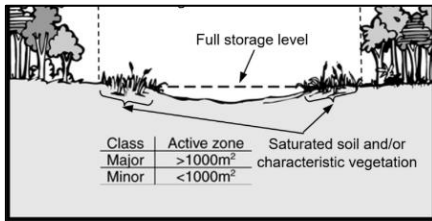


### Average Annual Peak Flow

- Watercourses can be measured against the average annual peak flow, meaning the highest peak and the average watercourse flow.
- The peak flow level may be visible by benches, laminations, scour or deposition or the interface between annual and perennial vegetation.



# Watercourse Management Quiz (optional quiz)



Match pictures (draw the collect line)

- Water Feature
- Stream
- V Shape Gully
- U Shape Gully
- Water Way

# Watercourse Management

## Step 2

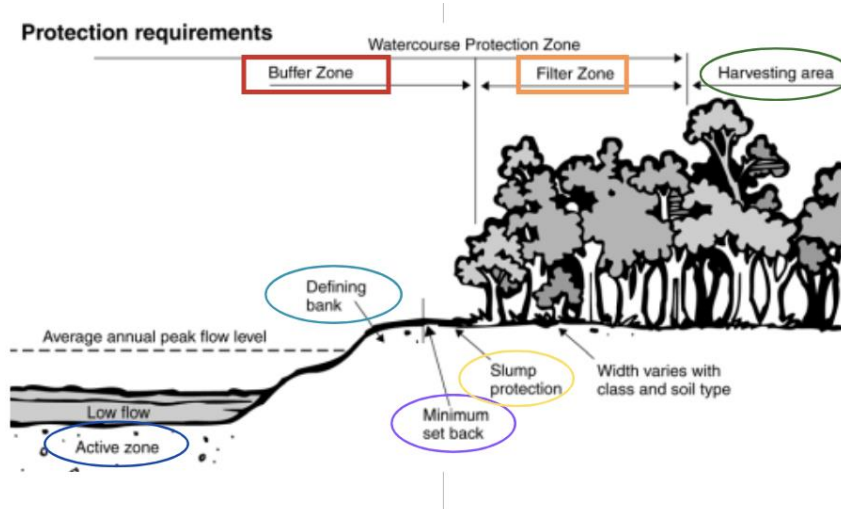
### Find the minimum Watercourse Protection Zone (WPZ)

We protect watercourses by applying **Watercourse Protection Zones (WPZ)**.

A WPZ is a protected or minimal impact zone adjacent to classified watercourse. The watercourse does not have to carry water on a permanent basis to become a WPZ.

A WPZ consists of a **buffer** and a **filter**.  
**Min Setback + (Buffer + Filter) = WPZ**

- The WPZ is taken from the **minimum setback** - this is minimum exclusion from the defining bank.
- The **defining bank** is the bank or if no bank present the active flood plain point.
- Consider head scarp and slump faces when calculating.



# Watercourse Management

## Step 2

### Find the minimum Watercourse Protection Zone (WPZ)

#### The Buffer

**The buffer** is essentially an exclusion zone, aimed at fully protecting vegetation and beds and banks of the watercourse. **The buffer is:**

- A no harvest, no disturbance zone
- No machines adjacent to a watercourse bank and applies to extraction along side
- The buffer includes the setback and slump protection
- Access only via a designated crossing [pg 54]
- There are additional allowable activities for V-shaped gullies and waterways [pg 35]
- Refer to the CoP for further actions

The buffer distance changes depending on the watercourse type, and whether there is a head scarp, or slump face present.

#### The Filter

**The filter** allows limited harvest/ operation opportunities by rubber tyre machines.

The filter aims to fulfill a filter function, meaning minimal disturbance and avoidance of compaction and erosion.

Trees may be harvested in the filter using a walkover technique, and are subject to:

- Directional fall away from the filter zone
- No earth disturbance to extract the log
- Harvesting debris must be removed
- Logs extraction machinery does not enter the filter to extract a log
- Crossing only at designated crossings (all machines)
- Avoid high saturated soil levels
- Refer to the CoP for further actions

No matter the circumstance, the filter remains the same for each watercourse type. I.e Stream 2= 20m filter buffer



# Watercourse Management

## Step 2

### Find the minimum Watercourse Protection Zone (WPZ)

#### The Buffer (pg 35) Continued...

**The buffer** is essentially an exclusion zone, aimed at fully protecting vegetation and beds and banks of the watercourse. **The buffer is:**

- Trees are not to be felled into the BZ unless they are done so in accordance with [S3.8](#)
  - Harvesting debris must be removed with minimal disturbance to soil or vegetation.
  - The burning of accumulations of fuel in the bz must be avoided  
Trees are not to be felled across the gully or waterway when the soil is wet (nearing field capacity) or saturated.
  - Felling across the gully or waterway is not to occur if a flood or storm is imminent, e.g. If the weather forecast is for storms or heavy rains that is likely to result in seasonal flow.
  - Felling is not to occur if such action is likely to trigger accelerated erosion or instability of the bed or banks.
- The felled trees must bridge the active zone.
  - The trees must be promptly removed, e.g. Within two day
  - No tree is to be felled if any part of the tree above ground (bole or buttress) is within or touches the BZ.
  - Machines are not permitted in the zone unless at a crossing.
  - Roading or snigging is prohibited along the bed of any watercourse.
  - New road crossings (across streams or gullies), major snig track crossings, and minor snig track crossings on U-shaped gullies must be marked in the field
  - Minor snig tracks by rubber-tired machines may only cross V-shaped gullies and waterways where the total height of any erosion face associated with the active zone is less than 30cm, and when
  - Refer to page 34-36 for all of the conditions

All buffer conditions are required however, the main ones have been summarised in the TQ documents

# Watercourse Management

## Step 2

### Find the minimum Watercourse Protection Zone (WPZ)

#### The Filter (pg 35) Continued...

- Operations are prohibited when soils are wet (nearing field capacity) or saturated.
- Fell trees away from the BZ to minimise soil or understorey disturbance.
- Trees are not to be felled into the FZ unless these can be felled with minimal disturbance to soil surface cover or understorey. Disturbed areas are to be stabilised as necessary.
- Tracked snigging machines (e.g. dozer) are not to operate within the FZ except for the construction of, and/or snigging across, designated crossings.
- Major snig tracks must not enter the filter zone unless at a crossing.
- Rubber-tyred snigging, forwarding and all felling machines must minimise disturbance and use walk-over techniques where possible.
- Harvesting debris which represents a fire hazard to retained trees greater than 10cm dbhob is to be removed and placed at least 2m from the tree.
- Actual or potential erosion channels created by extraction are to be stabilised by the placement of litter and careful drainage

All filter conditions are required however, the main ones have been summarised in the TQ documents

*Timber recycles carbon*



# Watercourse Management

## Step 2

### Find the minimum Watercourse Protection Zone (WPZ)

#### Slump Face

A **slump face** is a near vertical active erosion face in a stream or gully-protection is 3 times the size of the height of the slump.

This needs to be considered in WPZ calculations. To assist we have developed WPZ calculations ready reckoner.



#### Head Scarp

A **head scarp** is the head of a gully or nick point in a gully erosion face. This needs to be considered in WPZ calculations.

The head scarp protection zone is a no machine and no disturbance area. **This protection zone is added to the buffer and filter.**





# Watercourse Management

## Step 2

### Find the minimum Watercourse Protection Zone (WPZ)

#### General Harvesting Area

The general harvesting area, is considered an area that does not have a watercourse.

- Conduct operations adhering to other requirements of The QPWS Code
- No WPZ restrictions
- Avoid soil disturbance
- Avoid diverting water into the filter and buffer

#### Active Zone

When calculating the WPZ, consider the active zone:

- Erosion face (greater than 10cm)
- Scouring area greater than 1m wide

# Watercourse Management

## Step 3

Consider your situation (when applying the WPZ)

### Watercourse Management

- Assess your current and future situation and determine whether you're going to create disturbance during forest operations.
- The watercourse type (step 1) determines the measurements of the WPZ (step 2).
- Remember- the WPZ is Minimum Setback + (buffer + filter)

### Wetland Protection Requirements

- In addition to the WPZ, if you are working around a wetland water feature you need to:
  - Retain all trees (<60cm) within the wetland, for a distance of 30m from the defining bank (high water mark)
  - Apply additional protection for high-impact earthworks
    - Where the wetland/water feature is located within the defining banks, but is not in the main channel, the S3 and S6.3.2 buffers still need to be applied
    - A high-impact earthworks buffer of 200m\* must be applied to the wetland/water feature and/or watercourse<sup>3</sup>
    - Where these are located in a:
      - i. Great Barrier Reef catchment;
      - ii. wetland located on a Map of Referrable Wetlands;
      - iii. Wetland Protection Area;



# Watercourse Management

## Step 3

### Consider your situation (when applying the WPZ)

#### High Impact Earthworks

\*Refer to the definition of high-impact earthworks in S26 of the Sustainable Planning Regulation 2009, page 187.

High-impact earthworks— High-impact earthworks means operational work that involves changing the form of land, or placing a structure on land, in a way that diverts water to or from a wetland.

high impact earthworks do not include operational work that is—

- (a) necessary to maintain infrastructure including any core airport infrastructure, buildings, dams, fences, helipads, **roads**, stockyards, **vehicular tracks**, watering facilities and **constructed drains** other than **contour banks**, other than to source construction material; or
- (b) (b) carried out for a **forest practice**; or
- (c) (c) excavating not more than **100m<sup>3</sup> of material**, or using not more than **100m<sup>3</sup> of material as fill**; or
- (d) (d) excavating not more than **1000m<sup>3</sup> of material**, or using not more than **1000m<sup>3</sup> of material as fill**, if the excavating or filling is more than **200m** from the wetland in a wetland protection area; or
- (e) (e) excavating to establish underground infrastructure, other than infrastructure for drainage or stormwater flows, if the excavated land is to be restored, as far as practicable, to its original contours after the infrastructure is established; or
- (f) (f) **carried out to restore or conserve the ecological processes or hydrological functions of a wetland protection area**; or
- (g) (g) carried out completely or partly in a declared fish habitat area, if the work is assessable development under schedule 3, part 1; or (h) the constructing or raising of waterway barrier works, if the work is self-assessable development under schedule 3, part 2;
- (h) the **maintenance of government-supported transport infrastructure**, including any of the following relating to the infrastructure— (i) rehabilitation; (ii) replacement; (iii) repair; (iv) recurrent servicing; (v) preventive and remedial action; (vi) removal; (vii) alteration; (viii) maintaining systems and services; or
- (i) Others



*Timber recycles carbon*

# Watercourse Management

## Step 3

Consider your situation (when applying the WPZ)

### What is disturbance?

- Pushing material (dirt, debris etc) into the water
- Felling trees into or damage to vegetation and waterway from felling trees into
- Not using the correct material to construct new road crossings, major snig tracks and minor snig tracks
- Offsite impacts such as sediment run off, dust, poor drainage, oil and fuel
- Managing surrounding area to avoid disturbance (erosion control, fuel storage locations, corduroy/log crossings where required)
- Leaving debris in the watercourse or within 2 metres

**Think of minimal impact, what can I do to prevent disturbance and impact on watercourses by using WPZs and therefore protecting soil and water.**

*Timber recycles carbon*

# Watercourse Management

## Step 3

Consider your situation (when applying the WPZ)

### Other Considerations?

When determining whether you need to enter or apply a WPZ, consider:

- Are the trees marked within the WPZ?
- Is it a commercial/quality tree located within the WPZ?
- Can I fell the tree away from the WPZ?
- Do I need to cross the waterway or is there another way?
- Is it worth risking potential disturbance within the WPZ?

*Timber recycles carbon*



# Watercourse Management

## Step 4

### Apply Protection

#### Rules of Thumb

- DAF apply highest level of soil erodability (High 5-7)
- WPZ is measured from the full storage level, or beds and banks
- The defining bank will be the point where the forest ground falls away into the watercourse
- If you apply a WPZ (filter and buffer) to one side of the waterway, then apply to both sides
- Gullies and waterways have slumps or head scarps, apply the greatest protection buffer
- Streams only have slump protection
- If the bank is unstable, apply U-shaped gully protection
- Protection of U-shape gullies includes slump and erosion face height together
- If the gully head scarp is less than 2m high, then the buffer is automatically 5m
- For over 2m high, apply the calculation using the provided calculator
- Head scarp protection is additional to the WPZ
- If tree marking occurs, red paint is used to mark WPZ

# Watercourse Management

## Step 4

### Apply Protection

#### Rules for Machines

- Avoid excessive soil disturbance
- Avoid diverting water into the WPZ
- Target natural gaps during operations
- Slope limits may exclude areas from the buffer and filter zone
- Remove harvesting debris from buffer zone, with minimal disturbance
- When working in the FZ, fall trees away from the BZ
- If there is erosion (active zone), don't disturb or cross
- If crossing is allowed, use cordouy
- No tracked machines in the buffer or filter
- Crossings must be minimum of 10m from head scarp protection zones
- Felling can occur in filter zone, if minimal disturbance

# Watercourse Management

## Step 4

### Apply Protection

#### Minimum Distances From the WPZ for the Following:

- Landing and snig track drainage = 10m
- Road drainage = 20m
- Fuelling, fuel storage and waste disposal = 40m [pg 36]

These distances are also outlined in various other schedules within the CoP.

*Timber recycles carbon*



# Watercourse Management

## Step 4

### Apply Protection

#### Note:

- Please note, this is not all of control measures detailed within the CoP.
- Refer to the QPWS CoP for all information.
- This document and supporting materials does not replace the CoP.
- Aim to document all decisions and seek permission from DAF where required.
- Conduct pre-planning to ensure watercourses are assessed prior to commencing forest operations.
- Refer to additional TQ documents for drainage and watercourse crossings

*Timber recycles carbon*



# Watercourse Management Definitions

## Recap

- A **Water Protection Zone (WPZ)** is an area that surrounds drainage or a watercourse, where harvesting or forest activities are restricted, and/or soil disturbance is minimised through excluding harvest machinery
  - The WPZ is the Buffer + Filter
- A **slump face** is a near vertical active erosion face in a stream or gully-protection is 3 times the size.
- A **head scarp** is the head of a gully or nick point in a gully erosion face.
- A **active zone** is an erosion face (greater than 10cm) or scouring area greater than 1m wide
- A **buffer** is essentially an exclusion zone, aimed at fully protecting vegetation and beds and banks of the watercourse
- A **filter** allows limited harvest/ operation opportunities by rubber tyre machines
- A **defining bank** is a terrace or bank that confines the average annual peak flow
- **Average annual peak flow** is the long term average or high annual watercourse flow level
- **Harvest area** is the area that does not include exclusion zones, and available for harvesting

# Watercourse Management Calculations

## Apply

TQ have developed two supporting documents to assist with WPZ calculations:

- **Watercourse Ready Reckoner**
  - Printable handbook
  - Contains completed calculations
- **Watercourse Calculator**
  - Download from Excel
  - TQ aim to get this into a Microsoft Forms, to be used on phones

*Timber recycles carbon*



# Watercourse Management Calculations

## Apply Ready Reckoner

How to use:

- Determine the type of watercourse
- Go to the watercourse page
- Does the watercourse have a slump (SF) or head scarp (HS)?
  - If yes, find the metres in the table (1m- 6m, and 10m found in table)
  - If no, use '0'
- Look at the buffer and filter, and total watercourse protection zone
  - **The Buffer** is in **Red**
  - **The Filter** is in **Orange**
- Apply the watercourse protection zone (WPZ) (**Red + Orange**)
- Remainder of area (**Harvest Area**) can be harvested as per remainder of The QWPS Code

*Timber recycles carbon*

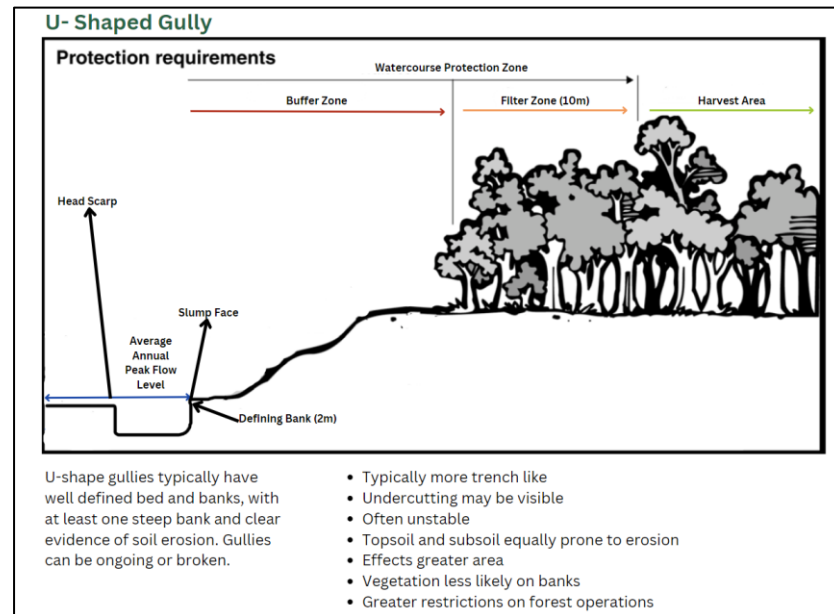
# Watercourse Management Ready Reckoner Calculations

## Examples

Watercourse	Determine		Apply				
	Slump Face	Defining Bank	Slump Buffer	Buffer	Filter	B+F	
Stream 1	0	2	0	2	30	32	
Stream 1	1	2	3	5	30	35	
Stream 1	2	2	6	8	30	38	
Stream 1	3	2	9	11	30	41	
Stream 1	4	2	12	14	30	44	
Stream 1	5	2	15	17	30	47	
Stream 1	6	2	18	20	30	50	
Stream 1	10	2	30	32	30	62	

Watercourse	Determine		Apply				
	SF or HS	Defining Bank	SF or HS Buffer	Buffer	Filter	B+F	
Gully U-Shape	0	2	0	2	10	12	
Gully U-Shape	1	2	3	5	10	15	
Gully U-Shape	2	2	6	8	10	18	
Gully U-Shape	3	2	9	11	10	21	
Gully U-Shape	4	2	12	14	10	24	
Gully U-Shape	5	2	15	17	10	27	
Gully U-Shape	6	2	18	20	10	30	
Gully U-Shape	10	2	30	32	10	42	

The Ready Reckoner also demonstrates the location of buffer, filter and general harvesting area and includes key characteristics.



# Watercourse Management Calculator

## How to use

- Download the excel document
- Select the cell & use drop down arrow to select your situation
  - Erosion rating
  - Watercourse type
  - Slump face or head scarp
  - Height of slump face or head scarp
- Calculations will automatically occur using background formulas
- See output for results on buffer, filter and total WPZ

Timber Queensland Watercourse Calculator		
INPUT	Select the cell & use drop down arrow to select your situation	Notes
Erosion Rating	5-7 High	There are two erosion classes for watercourse protection. Two classes are used for Buffer width. Select <b>5-7 High</b> if uncertain.
Watercourse type	Stream1-active zone >10m	Check the Images and inspect the watercourse. You have 8 watercourse types to choose from. <b>Select the watercourse type from the drop down list</b>
Slump face or Head Scarp	SlumpFace	A <b>Slump face</b> is a vertical erosion bank in a stream or gully. A <b>Head Scarp</b> is a vertical erosion nick point in a gully or gully head. You must <b>select an option or nil</b> from the drop down list.
Slump face or Head Scarp height (m)	6	This is the observed height in metres of the Slump Face or Scarp Head. Select the height in metres from the drop down list. Select "0" if there is no Slump face or Head Scarp.
CALCULATION (automatic)		
Min Buffer width from defining bank for watercourse type	2	
Additional Buffer for Slump Face	18	
Additional Buffer for Head Scarp	0	
OUTPUT (automatic)		
Total Buffer from defining bank (m)	20	
Total Filter (m)	30	
Total Buffer+Filter (m)	50	

# Watercourse Management Quiz (optional quiz)

Use the ready reckoner calculations to determine the WPZ for each of the following scenarios:

1. V Shape Gully, with a slump face of 3m.
  - Buffer= \_\_\_\_\_m
  - Filter= \_\_\_\_\_m
  - Total WPZ= \_\_\_\_\_m
2. Minor Water Feature, and no (0m) slump face or head scarp.
  - Buffer= \_\_\_\_\_m
  - Filter= \_\_\_\_\_m
  - Total WPZ= \_\_\_\_\_m
3. Stream 2, with a slump face of 5m.
  - Buffer= \_\_\_\_\_m
  - Filter= \_\_\_\_\_m
  - Total WPZ= \_\_\_\_\_m

# Watercourse Management SPARE

*Timber recycles carbon*



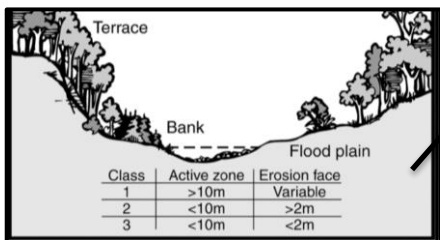
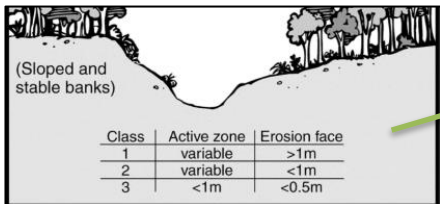
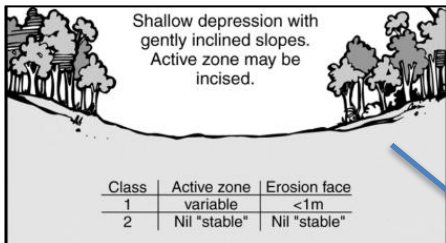
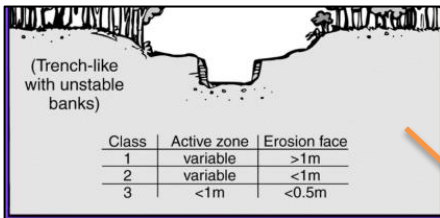
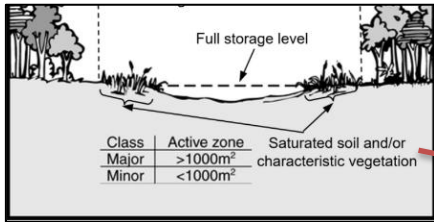


# Watercourse Management Quiz (Answers) Next Slides

*Timber recycles carbon*



# Watercourse Management Quiz (Answers)



Match pictures (draw the collect line)

Water Feature

Stream

V Shape Gully

U Shape Gully

Water Way

# Watercourse Management Quiz (Answers)

Use the ready reckoner calculations to determine the WPZ for each of the following scenarios:

1. V Shape Gully, with a slump face of 3m.
  - Buffer= 12 m
  - Filter= 5 m
  - Total WPZ= 17 m
2. Minor Water Feature, and no (0m) slump face or head scarp.
  - Buffer= 10 m
  - Filter= 10 m
  - Total WPZ= 20m
3. Stream 2, with a slump face of 5m.
  - Buffer= 17 m
  - Filter= 20 m
  - Total WPZ= 37 m