Water and Rivers Commission | WN23 November 2001

Water notes

Water notes for rivers management

ADVISORY NOTES FOR LAND MANAGERS ON RIVER AND WETLAND RESTORATION

Determining foreshore reserves

Protection and management of foreshore areas is essential for maintaining healthy waterways and wetlands. Protected foreshores preserve aquatic, littoral and terrestrial habitat for native flora and fauna while providing amenity and maintaining scenic quality and landscape values. They also reduce the impacts of erosion, sedimentation and nutrient influx in waterways.

Policy development for the protection and management of foreshore areas in Western Australia introduces the use of biophysical criteria for defining foreshore reserves. This Water Note briefly describes the process for defining foreshore reserves using biophysical criteria.

What are biophysical criteria?

Biophysical criteria are the physical and biological features of a waterway, as illustrated in Figure 1. They are the factors to be considered in defining the foreshore reserve. Application of these criteria will yield an area of influence for the waterway. This is the land area affected by the waterway, which in turn also affects the health of the waterway. Biophysical criteria are listed opposite.

Degraded foreshore in suburban waterway. [Photo: L. Pen]

- Vegetation: fringing and upland remnant vegetation associated with, or influencing, the waterway.
- Hydrology: flood prone land and areas subject to waterway channel changes.
- Soil type: soil types that define the extent of foreshore vegetation.
- Erosion: soils types prone to erosion.
- Geology: geological features that influence the waterway.
- Topography: landscape features including slope, shape and composition of landforms that influence, or are influenced by the waterway.
- Function: the foreshore function, ie. flood protection, recreation or habitat conservation.
- Habitat: habitats such as river pools, woody debris, riffles and riparian vegetation.
- Climate: climatic variations and resultant changes in water levels.
- Land use: areas that may be harmed by increased land use pressure.
- Heritage: archaeological and ethnographic sites.

Identifying the biophysical factors of a waterway

Identification of the biophysical factors of a waterway yields a foreshore reserve that is reflective of these biophysical factors. The process for identifying a foreshore reserve is described in three basic steps, which are outlined below. However, there may be other factors that need consideration and more information on these can be found in the Water and Rivers Commission's Determining Foreshore Reserves Report No. RR16.

The Commission recommends that proponents prepare an annotated map showing the extent of the proposed foreshore reserve and a brief report outlining the rationale and justification for the delineation of the foreshore. This report may be used to streamline the approval process for any associated development proposal.

Step 1: Background information and preliminary investigations

To begin with you should seek to:

1. understand the waterway, its issues and regional conservation significance;
2. acquire aerial photos to assist in the delineation of the riparian corridor and the assessment of plant communities, river form and adjacent land uses;
3. obtain maps where relevant, showing the extent of the floodway and floodplains, landform, cadastral boundaries, soil, geology and vegetation for the river and adjacent land (these maps are available from the Department of Land Administration, Department of Planning and Infrastructure and the Commission's floodplain mapping section); and
4. identify reports relevant to the river and region, which may cover floodplain mapping, flora and fauna surveys, or ethnographic and cultural significance.

Step 2: Identification of the biophysical criteria

Defining foreshore reserves using biophysical criteria involves a combination of desktop analysis and field inspection. Analysis of the photos, maps and reports collected in Step 1 yields a foreshore reserve for the river while also identifying areas for field inspection. The following factors should be assessed:

- *The extent of the riparian vegetation.*

  Identify adjoining riparian vegetation and associated dryland vegetation. A buffer of riparian or upland vegetation is important for habitat and wildlife corridors as well as for nutrient stripping and erosion control. The extent of the riparian vegetation can be determined with the use of aerial photos and by conducting vegetation surveys.

- *Soil types that typically support riparian vegetation.*

  These soil types are helpful in identifying areas where riparian vegetation may once have existed or in identifying

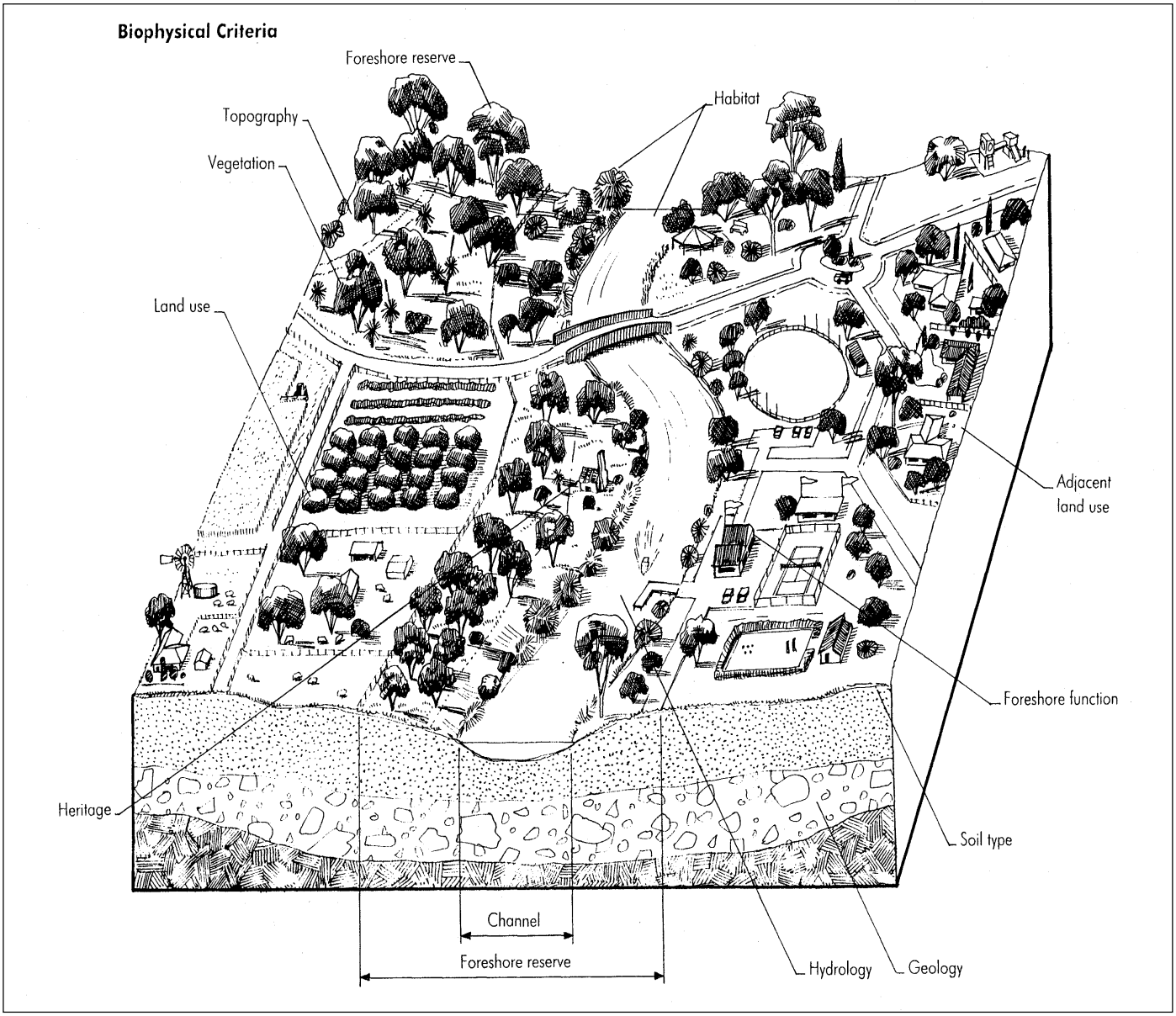

Figure 1. Representation of the biophysical criteria of a waterway.

plant species suitable for revegetation. Make use of aerial photos, soil maps and site inspections.

- *The extent of the floodway and floodplain.*

  Locate land susceptible to flooding, primarily the floodway and floodplain, using topographic maps, aerial photos, floodplain mapping (available from the Commission) or site inspections. Floodplain mapping may include information on the level of prospective flooding, such as the 1 in 100 year flood level. Plant species and communities may also help in identifying these areas.

- *Soil types that are prone to erosion.*

  Soils that are typically loose, gravelly and loamy in texture are more susceptible to erosion. Sloping sites have greater potential for erosion. Soils with low permeability have higher surface run off, which increases superficial erosion, while the opposite applies for soils with relatively high permeability. Identify these areas using soil maps, land capability maps, aerial photos and site inspections.

- *Landforms important to watercourse function.*

  These include drainage lines, steep slopes, ridges, cliff faces, low-lying or seasonally inundated lands and sand dunes. These areas may be subject to bank subsidence, stock trampling, scouring, undercutting and other forms of erosion. Identify these landforms using contour maps, aerial photos and site inspections.

- *Valuable habitat areas.*

  Identify aquatic habitats such as pools, riffles, billabongs, marshes and waterfalls, and terrestrial habitats such as mudflats, samphire marshes, trees, fallen logs, sedgelands, vegetated corridors and overhangs. It is recommended that any rare, endangered or locally significant species that may rely on the watercourse and adjacent lands for survival are identified. Make use of aerial photos, flora and fauna surveys and site inspections. The Department of Conservation and Land Management's records may also be of use.

- *Adjacent land use pressures that may affect the foreshore area.*

  The impact of land use on foreshores should be considered. Land uses with less impact (such as rural-residential) may permit narrower foreshore reserves than land uses having higher impact (such as rural, industrial and high-density residential development). The location of existing or future infrastructure such as roads, powerlines and sewerage should be identified, along with any existing or proposed firebreaks, buildings and fencing. The need for public access and recreation nodes should also be identified. Determine adjacent land use from town planning schemes, structure plans, and outline development plans, subdivision proposals, aerial photos and site inspections. This information may be obtained through your local shire office.

- *Archaeological and ethnographic sites adjacent to the waterway.*

  Identify sites of cultural, archaeological or religious significance and any sites of historical association. These sites should be included in the foreshore reserve where possible. Identification of sites of Aboriginal significance should involve consultation with the Department of Indigenous Affairs and local Aboriginal elders. Make use of existing reports and engage in community consultation.

Step 3: Finalisation of the alignment and presentation of information

The areas identified by earlier steps may now be overlayed on a map or sketch of the waterway (see Figure 2). The outer edge of these areas defines the foreshore reserve. Consideration of the purpose or function (recreation, conservation, flood protection or public access for example) of the foreshore reserve will determine which factors to assign greater weighting.

Developers also need to be aware that the Commission will normally require some form of physical demarcation between a foreshore reserve and land to be developed for other purposes. The form of the demarcation may be a road, dual use path, fence etc.

The resultant foreshore alignment recognises the dynamic biophysical processes of the river or estuarine system as a whole, including its coastal interface and catchment area. It recognises, from a regional perspective, the issues of adjacent land use pressure, social impacts and recreational pressures. The alignment also reflects an analysis of the risks and consequences of an inadequate foreshore reserve.

The final negotiated foreshore alignment represents an agreed position between all interested parties, while noting that an ideal outcome will not always be possible. The process outlined in this document identifies the ideal foreshore reserve from a biophysical perspective and recognises that the final delineation is often the best that can be achieved under the prevailing circumstances. Where this is much less than ideal, the consequences and issues will have been identified, allowing for the future management of the foreshore reserve.

Foreshore reserve delineated by a footpath. [Photo: L. Pen]

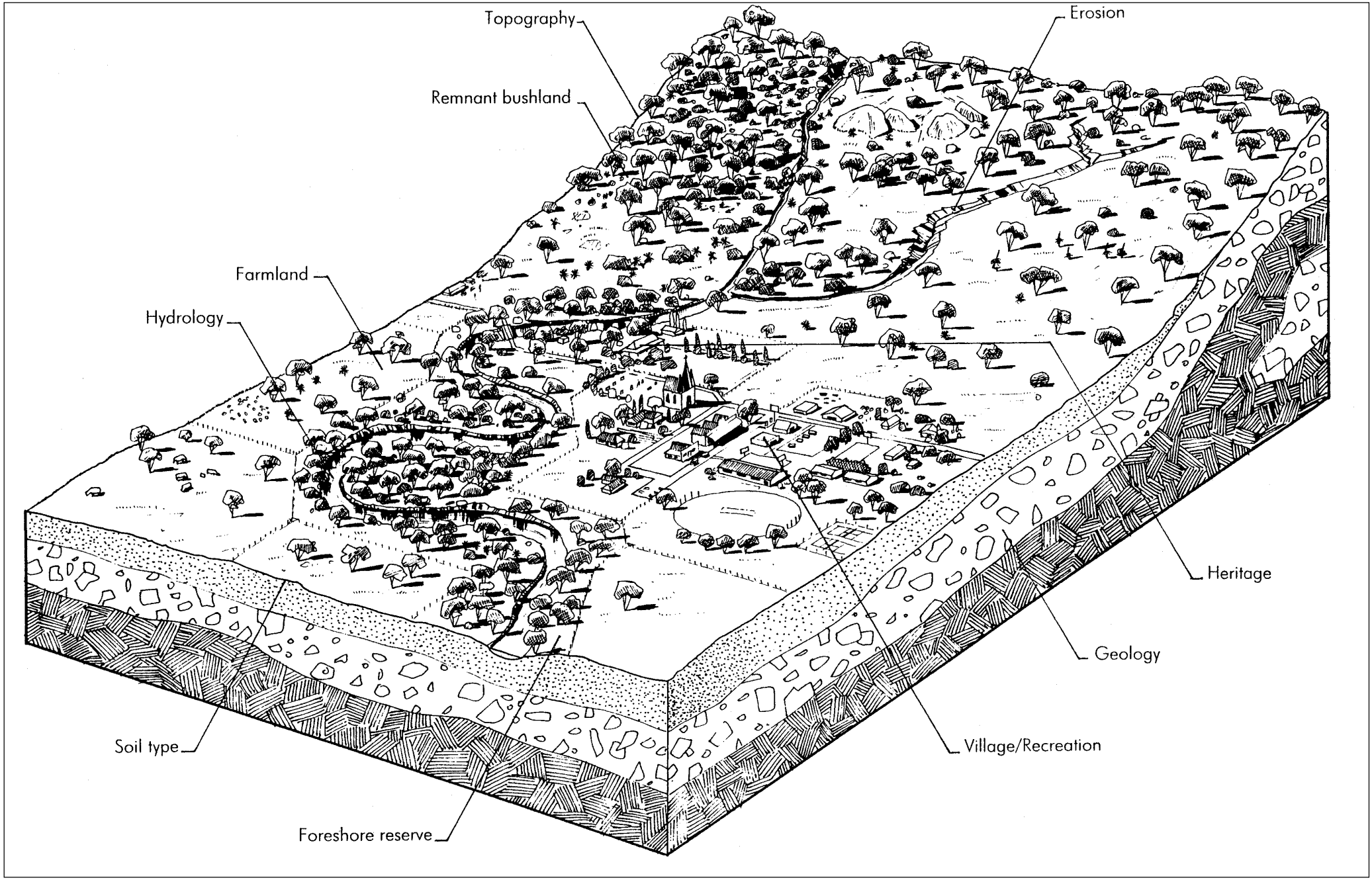

Figure 2. Stylised diagram of a river denoting the foreshore reserve delineation.

Biophysical Criteria – A check list for application

Presented below is a checklist of the tasks required to properly assess any foreshore area using biophysical criteria to determine the foreshore reserve.

Step 1: Background information and preliminary investigations

- ❑ Understand the waterway, its significance and the management issues.
- ❑ Obtain aerial photos to assess vegetation complexes, river form, function and adjacent land uses.
- ❑ Obtain maps showing the extent of floodway and floodplains, topographical features, cadastral boundaries, soils, underlying geology and vegetation complexes.
- ❑ Obtain any relevant reports on the river and region. This may include floodplain mapping, development proposals and flora and fauna survey reports.
- ❑ Plan a site visit once you are confident you have the necessary background information.
- ❑ Negotiate and communicate with relevant stakeholders as required.

Step 2: Identifying the biophysical criteria of the waterway

- ❑ Identify the extent of the riparian vegetation.
- ❑ Identify soils that support riparian vegetation.
- ❑ Locate the floodway and floodplain – 1 in 100 yr flood levels, peak flow and river hydrology.
- ❑ Identify any soil types prone to erosion.
- ❑ Identify landforms, including any drainage lines that may be important to watercourse function.
- ❑ Identify valuable habitat areas.
- ❑ Identify adjacent land use pressures with potential to affect the foreshore.
- ❑ Investigate and identify any other factors influencing decisions on foreshore widths, such as Aboriginal sites, other heritage sites, and residential and recreational amenity.
- ❑ Negotiate and communicate with relevant stakeholders as required.

Step 3: Are there any other factors you need to consider?

- ❑ Identification of other issues to be considered.
- ❑ Analyse any risks and consequences resulting from the proposed foreshore alignment.

Step 4: Finalisation of the alignment and presentation of information

- ❑ Annotated diagram showing the foreshore delineation.
- ❑ Rationale for the delineation in the form of a brief report.

References and further reading

Available from Water and Rivers Commission

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