

RIVER REHABILITATION PLAN



Local Open Space Plan Zone of Choice "West"

September 2007



RIVERINE RESTORATION AND MANAGEMENT PLAN

1 Development, management and maintenance of the flood plain area

1.1 Area between 1:50 and 1:100 year flood lines

- 1 The area between 1:50 and 1:100 year flood lines should ideally be developed as park, recreation or open space areas
- 2 The amendment of the 1:50 year flood line by infilling, will not be supported
- 3 No dumping shall be allowed
- 4 No parking areas or structures should be planned in this area
- 5 No service or waste yard should be planned in this area
- 6 No kikuyu lawn should be planted in this area, but veldgrass or Cynodon lawn shall be allowed.
- 7 Formally paved pathways shall separate manicured areas from natural areas
- 8 Lawn grass (kikuyu) and ground covers from adjacent residential developments or parks should not be allowed to extend into the area below the 1:50 year flood line.
- 9 If additional trees are planned for the area above the 1:50 year flood line, the following species may be considered:

Scientific name	Common name
Trees:	
<i>Acacia karroo</i>	Sweet Thorn
<i>Combretum erythrophyllum</i>	Riverbushwillow
<i>Leucosidea sericea</i>	Ouhout
<i>Rhamnus prinoides</i>	Dogwood
<i>Salix mucronata</i>	Wild Willow

1.2 Adjacent Land Uses and Development Response

- The 1:50 year flood line or 32m buffer on both sides of all streams, measured from the centre line, should be protected and zoned as public open space and developed as parks (preferably 1:100 year flood line where possible)
- No canalisation, transformation through artificial linings or exotic cultivation of watercourses shall be supported
- No infill within the 1:100 year flood plain, resulting in the modification of existing flood lines shall be supported.
- No level changes shall be supported between the flood plains and adjacent developments
- Where a new development contains a watercourse on the property, the design must include such watercourse as an integral part of the development
- Properties to be set back beyond the 32m buffer or above the 1:50 year flood lines, whichever is greatest
- Adjacent land use may include residential and retail development, recreational facilities, schools and sports fields etc
- Light industries shall be allowed where indicated in the RDSF of the area
- No filling stations shall be supported
- Cellular phone masts shall be considered on merit only
- Pedestrian access to streams should be provided, and a continuous public movement through these blue ways should be ensured on designated pathways
- Where possible, the public open space / flood plain should be edged by roads provided with pedestrian pathways



- No solid fences on periphery of rivers/streams, or along street edging or crossing the streams (a minimum of 50% transparency shall be provided)
- Fences of even on the periphery of the public open space should be steel palisade fences (Plascon Olive branch green) or other transparent fencing, for visual links and surveillance
- Fences to allow for movement of small mammals etc through
- Stormwater management and design of adjacent properties to be approved by CoT Roads & Stormwater Division and CoT Open Space Management Section
- Stormwater management plans shall be environmentally appropriate in design, to minimise erosion, siltation etc. Sufficient detail design shall be provided in the submitted stormwater management plan
- Appropriate energy dissipation shall be provided at all stormwater outlets, located above 1:50 year flood lines and positioned at a 45 degree angle to stream channel
- Only free spanning bridges spanning the 1:50 year flood line shall be supported
- Services infrastructure shall not be visible above the ground
- Manhole covers and other elements for services infrastructure shall be designed to blend into the landscape
- Green terramesh for erosion protection where required designed by a hydrologist or civil engineer
- Adjacent properties shall have views out onto the floodplain areas and be visually integrated with the flood plains

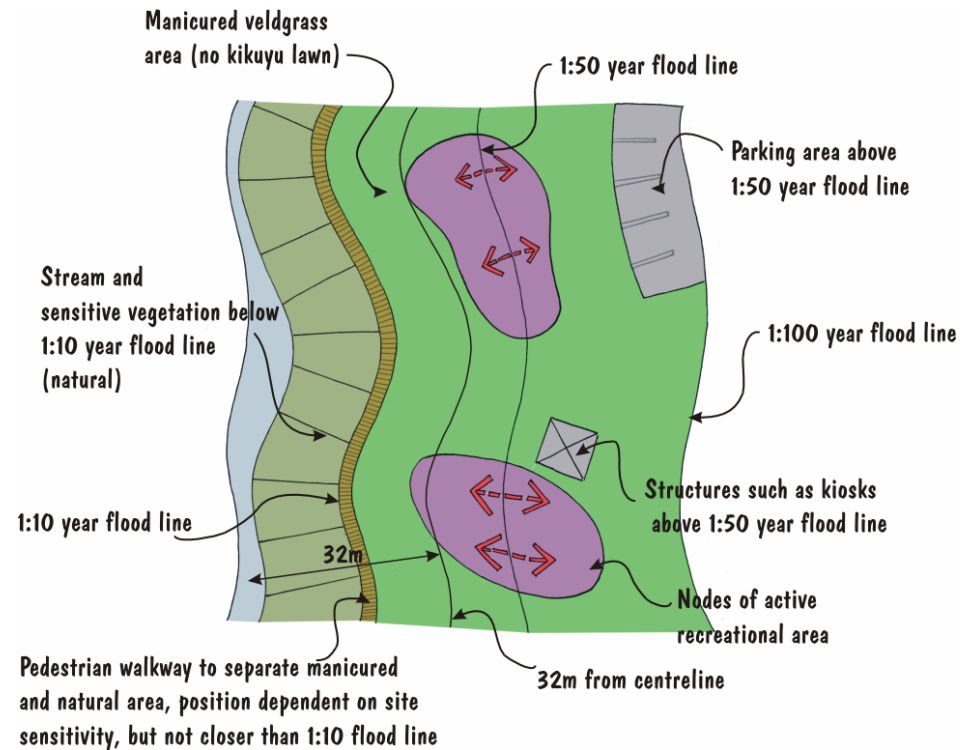


Diagramme illustrating requirements and guidelines for development within flood plains

1.3 Continued, post-development maintenance

Seeds of invasive plants are carried on water and by birds and will be deposited along the banks of the streams from time to time, regular monthly checks must be conducted to respond to any new seedlings in a timely manner.

Once the flood plain area has been rehabilitated, the following regular management actions must be undertaken:

- 1 Regular monthly site investigations must be undertaken to assess the following:
 - Recurrence of erosion
 - Re-growth of invasive exotic trees
 - Germination of new invasive plants
 - Status of the vegetative cover on the embankment above the flood plain
- 2 Remedial action must be implemented immediately to prevent extensive damage. Remedial action shall follow the rehabilitation guidelines above.

2 Restoration of the flood plain and riparian vegetation

Goals:

- To protect the riparian vegetation within the flood plain of the streams in the study area
- To rehabilitate disturbed riparian vegetation within the flood plain of the streams in the study area
- Rehabilitation is aimed at improving the status and function of the ecosystem and does not include the reconstruction of the original plant community.

Objectives

- To rehabilitate areas disturbed by recent construction work
- To rehabilitate erosion within the flood plain that has occurred over time
- To remove alien invasive plant species growing in the floodplain
- To avoid altering the stream or influencing the current flood lines during restoration work – no infilling shall be allowed in the flood plain
- No canalisation of the streams will be supported
- To design a stormwater system with sufficient energy dissipation structures and outlets to spread water out over the flood plain (stormwater may not be concentrated at one or two outlets only)
- Various habitat zones should be delineated and suitable plant species for rehabilitation of these zones should be identified with specialist input.
- A gradual transition from riparian vegetation to wet grassland to grassland should be established as part of the rehabilitation work
- Wetland filtration areas shall be re-established between residential areas and the riparian areas
- Reinstatement of large woody debris, important for rehabilitation of streams and corridors (Large woody debris may enter a stream channel as a result wind blowing down branches or trees).
- Litter and/or silt traps, culverts etc shall be checked regularly and cleaned as required

Recommended actions:

- 1 Submit a detailed rehabilitation plan to CoT Open Space Management Section for review and approval prior to commencement of construction
- 2 The limit of the area requiring rehabilitation shall be determined and the vegetation outside of this area shall not be disturbed.
- 3 All foreign material (including dumped rubble and litter) should be removed from the surface, leaving cleared soil
- 4 No indigenous trees may be removed
- 5 No existing boulders within the riparian area may be moved at any cost
- 6 Earthworks may not influence the contours to alter the 1:100 or 1:50 year flood plains
- 7 Large woody debris should be reintroduced into stream channels.
- 8 Stabilising of eroded areas with engineering input to determine the need for green terramesh, “reno-matresses”, gabions or other suitable material to prevent renewed erosion
- 9 Removal of all invasive exotic plant species following accepted eradication practices and biodegradable herbicides (if required) including:
 - *Eucalyptus spp.*,
 - *Jacaranda mimosiolia*,
 - *Melia azedarach*,
 - *Morus alba*,
 - *Salix babylonica*,
 - *Populus alba*,
 - *Sesbania punicea*,
 - *Acacia mearnsii*,
 - Kikuyu,
 - *Solanum mauritianum* and
 - *Arundo donax*.

- 10 The localised areas where invasive trees were removed shall be levelled and stabilized by compaction.
- 11 Re-vegetation of the entire area as follows:
 - Stabilising of steep areas with geotextile to prevent erosion while grasses establish
 - Re-establishing indigenous hydrophytic grass clumps and sedges;

Scientific name	Common name
Shrubs, sedges and bulbs:	
<i>Berula erecta</i>	
<i>Cyperus spp.</i>	
<i>Gomphostigma virgatum</i>	Otterbossie
<i>Juncus effuses</i>	Rush
<i>Juncus kraussii</i>	
<i>Melianthus major</i>	
<i>Typha capensis</i>	Bulrush
<i>Wachendorfia thyrsiflora</i>	Bloodroot
Grasses:	
<i>Acroceras macrum</i>	Nile grass
<i>Cynodon dactylon</i>	Couch grass
<i>Digitaria eriantha</i>	Finger grass
<i>Eragrostis curvula</i>	Weeping love grass
<i>Eragrostis teff</i>	
<i>Imperata cylindrical</i>	
<i>Leersia hexandra</i>	Wild ricegrass
<i>Panicum maximum</i>	Guinea grass
<i>Setaria sphacelata var sphacelata</i>	



- The disturbed areas must be loosened to a depth of 50mm
- 30mm Mulch should be spread over the topsoil and worked in to a depth of 50mm
- Hydroseeding of the area with an accepted indigenous veldgrass mix, including the species specified below:

Scientific name	Common name
Grasses:	
<i>Cynodon dactylon</i>	Couch grass
<i>Digitaria eriantha</i>	Finger grass
<i>Eragrostis curvula</i>	Weeping love grass
<i>Eragrostis teff</i>	
<i>Imperata cylindrica</i>	Cottonwool grass
<i>Panicum maximum</i>	Guinea grass

- Watering with a temporary irrigation system during and after germination for a minimum period of three months
 - Inspection of rehabilitation works by CoT Open Space Management Section during implementation, at completion and after three month's establishment.
 - Re-seeding where germination is not acceptable (minimum coverage of 75%) and continued maintenance of these areas
- 12 The rehabilitation must be undertaken under supervision of a qualified ecologist or landscape architect and all engineering elements should be refined by a landscape architect to ensure a natural end-product.
- 13 Final approval by CoT Open Space Management Section is required after completion, for the issuing of occupational certificates.