



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

GREEN INFRASTRUCTURE PROGRAMME



BEST PRACTICE GUIDELINES



URBAN WATERCOURSES

Making progress possible. Together.

CONTENTS

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Please note:

These guidelines are not intended to be prescriptive. Instead, the principles contained in this document are meant to guide property owners, City officials, designers, developers, architects, planners and community members in managing and improving our green infrastructure collectively and sustainably to create safe, contextually appropriate environments.

While every effort has been made to ensure the accuracy and quality of the information in this document, the City cannot be held responsible and will not be liable for any errors or omissions. In the event of conflict of information contained herein, relevant legislation and approved City policies and by-laws shall take precedence.

If you have any comments, suggestions or updates, please send an email to enviro@capetown.gov.za.

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Cover photograph:
Zeekoevlei, False Bay Nature Reserve

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INTRODUCTION

Urban watercourses are an important part of the urban fabric and can enhance quality of life and the spaces around us.

Watercourses can be attractive and multifunctional features in an urban area. They can be places of beauty for people to look at and enjoy, provide recreational amenity and value, be ecologically functional, and support a wealth of biodiversity. They offer opportunities for education, for play, to connect communities, provide access to green open space, and have potential to provide for pedestrian movement and space for non-motorised transport corridors. They can provide us with a wealth of ecosystem services, are important elements of green infrastructure, and can function as green corridors, for both ecological and human purposes.

Sadly, however, many of our urban watercourses are in a poor condition. They have been altered to accommodate increased urban drainage, and are subject to increasing pollution. Many have become ecologically degraded and are not perceived as safe due to issues of 'crime and grime' and potential health impacts, and thus are regarded by many as 'liabilities'.

Despite this, there are a number of examples in Cape Town of the wonderful asset an urban watercourse can be: providing ecosystem services and social, ecological and economic benefits and opportunities. These provide inspiration to turn those watercourses perceived as 'liabilities' into assets, and to realise their potential to provide multiple ecosystem services and opportunities.

Zandvlei Estuary Nature Reserve

Maintaining and rehabilitating our watercourses are important because of the ecosystem services they provide for us. These include the following:

- **Provisioning services:** These are benefits to people that can be extracted from nature, e.g. water, food, and other materials.
 - Watercourses are a source of water, and can provide food and materials, too.
- **Regulating services:** These are benefits provided by ecosystem processes that moderate natural phenomena, e.g. water purification, erosion and flood control, and climate regulation.
 - Watercourses drain stormwater runoff from both developed and undeveloped land; this being especially important during times of flooding. Watercourses (especially wetlands) store water, help regulate water flow and clean polluted water. They support climate regulation through carbon storage, and support climate change resilience by providing a cooling effect that helps mitigate urban heat.
- **Cultural services:** These are the non-material benefits from nature that contribute to the development and cultural enhancement of people, knowledge building, creativity, and recreation.
 - Watercourses provide recreational areas for both social and cultural activities. Watercourses are urban structuring elements and a significant component of the City's open space system and Green Infrastructure Network (GINet). They are part of the aesthetic amenity of our city, and well-maintained watercourses provide an attractive green amenity that adds value to properties and quality of life. They also provide opportunities for education and spiritual contemplation.
- **Supporting services:** These are services that support processes that enable basic sustenance of life, e.g. the provision of habitat, water cycling, nutrient cycling, photosynthesis, soil formation, and sediment retention. Without these, provisioning, regulating and cultural services would not exist.
 - Watercourses can provide habitat for a rich diversity of terrestrial and aquatic life, both fauna (animals) and flora (plants), and in many instances are important ecological corridors. Flora are important for photosynthesis, as well as trapping sediment, recycling nutrients, carbon storage, and improving water quality.

The balance created by healthy and robust indigenous plant and animal communities, in and around our watercourses, will ensure a good-quality, attractive and well-functioning resource that can be utilised and enjoyed by humans in many ways.

In order to achieve the optimal functioning and integrity of our watercourses, we must ensure that watercourses, along with the activities and development that impact on them, are well managed.

DEFINING KEY CONCEPTS

Bioswale: A shallow depression in a piece of land meant to gather and filter stormwater runoff by directing polluted stormwater through soil and vegetation.

Buffer: A strip of land (usually vegetated) adjacent to a watercourse that is required for the protection and enhancement of the watercourse. It can also be referred to as an ecological buffer. See figure 1.

Development: Any man-made alteration to property, including, but not limited to, excavation, construction or upgrading or other structures, fencing, infilling, paving, and municipal services.

Ecosystem: A community of living organisms in conjunction with the non-living components of their environment, interacting as a system.

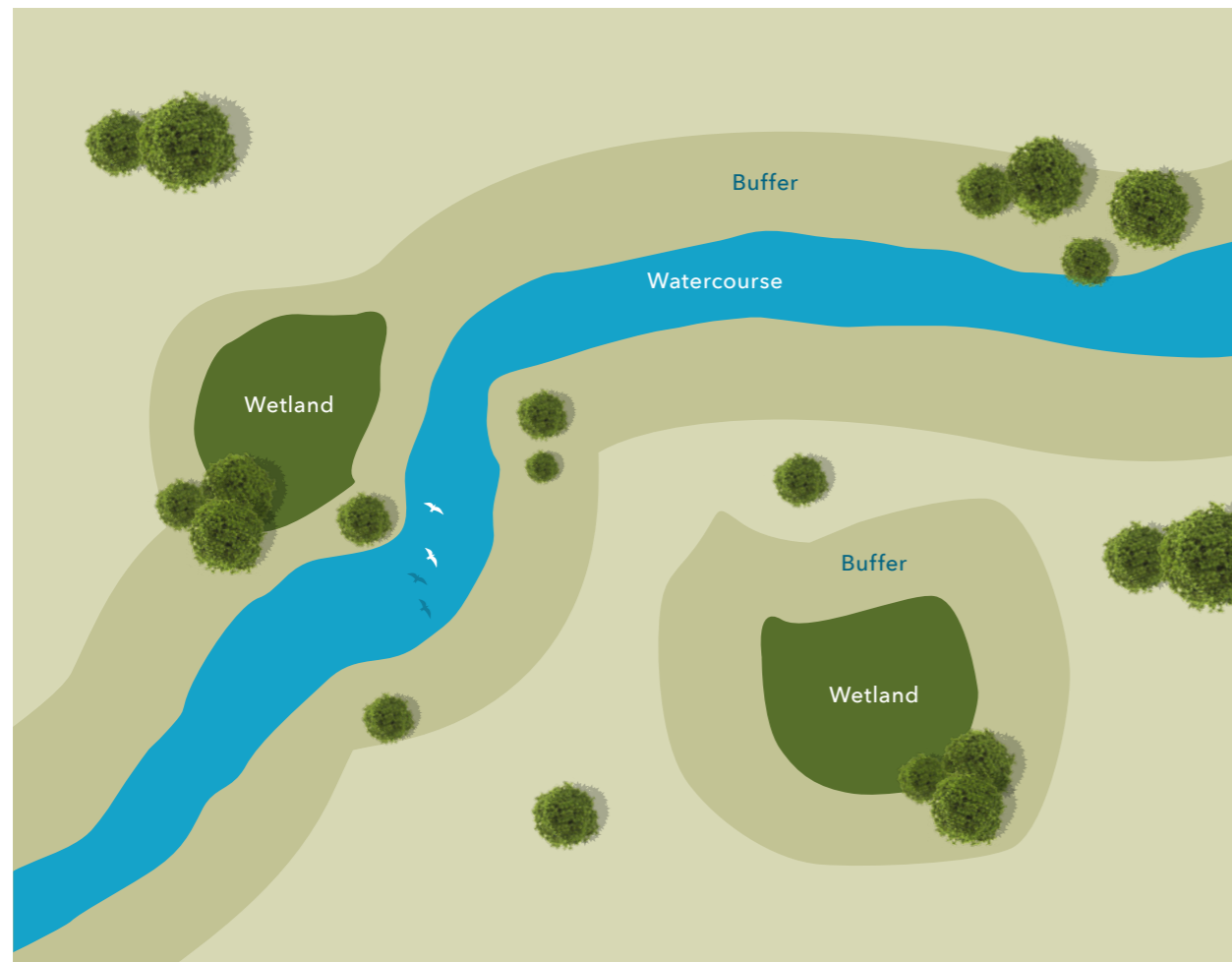


Figure 1: Schematic representation of a buffer.

Ecosystem services: The many and varied benefits to people derived from the natural environment and from healthy ecosystems. They include provisioning, regulating, supporting, and cultural services (see Introduction).

Environmental Management Programme (EMPr): An environmental management tool used to ensure that undue or reasonably avoidable adverse impacts during earthworks, construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of a project are enhanced.

Eutrophication: The process by which a body of water becomes progressively enriched with minerals and nutrients.

Fill: The placement of materials in order to bring ground surface levels up to a desired elevation. 'Clean fill' includes natural sand, soil or rock; 'unclean fill' includes concrete, cement or other waste materials.

Floodlines: Lines on a map or drawing depicting water levels likely to be reached by a flood having a specified recurrence interval. It is used as a tool for planning for the management of flood impacts, and is an informant of the likelihood of flooding.

Floodplain:

As defined from a perspective of assessing activities and flood risk: The area adjacent to a watercourse, which is susceptible to inundation by floods up to the 1:100-year recurrence interval. See figure 2.

As defined from an ecological perspective: A relatively level alluvial (sand or gravel area) lying adjacent to the river channel, which has formed through deposition of alluvial (water-transported) sediments by the watercourse. Typical floodplains generally have a meandering river channel that overtops its banks during flood events, resulting in the floodplain being saturated for extended periods of time.

Gabion baskets or mattresses: Wire mesh baskets filled with rock on site to form flexible, permeable structures for erosion control and slope stability.

Green infrastructure (GI): The natural and semi-natural open spaces, natural ecological and 'engineered' ecological systems, with other environmental features, that integrate with the built environment, to provide a wide range of ecological, community, and infrastructure services. GI provides ecosystem services and is a continuum from naturally functioning systems to low-impact urban design solutions and water-sensitive urban designs for the management of urbanisation impacts. GI assets ideally form an interconnected network within the urban environment.

High hazard zone: The area within a floodplain, based on an analysis of expected characteristics of the 1:100-year floodline, in which the ability to wade or gain vehicle access, as well as the stability of structures such as dwelling or boundary walls, is deemed seriously compromised under those flood conditions. See figure 2.

Hydrozone: The portion of a landscape area where plants with similar water needs are grouped.

Landscaping: The process of making a piece of land more attractive by modifying visible features, e.g. planting trees and shrubs.

Maintenance Management Plan (MMP): A site or area-specific plan compiled for watercourses, in order to guide maintenance and management interventions in a manner that either improves the current state of, and/or reduces the negative impacts on a watercourse to ensure that ecosystem services are preserved or improved, and to prevent further deterioration of the watercourse.

The City has compiled Maintenance Management Plans (CMMs) in terms of the environmental authorisation of its Stormwater Maintenance Programme, in order to guide its maintenance and management interventions regarding watercourses in a manner that minimises environmental degradation of the urban riverine environment. Generic MMPs, covering maintenance interventions regarding built stormwater infrastructure assets, have also been compiled.

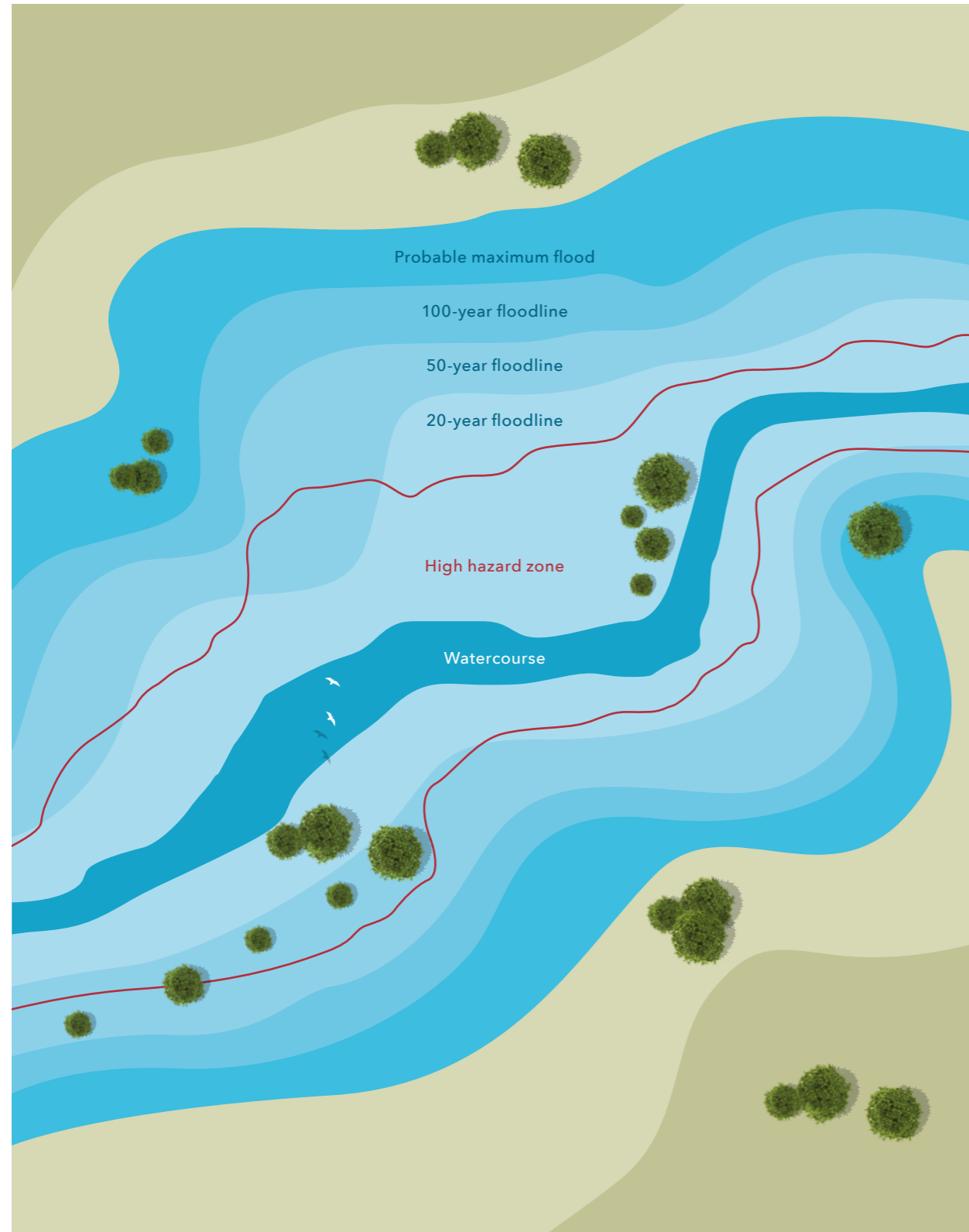


Figure 2: Schematic representation of floodplain depicting watercourse and significant floodlines.

Recurrence interval: The recurrence interval (sometimes called the return period) is based on the probability that the given rainfall or flood event will be equalled or exceeded in any given year.

Rehabilitation: Actions undertaken that aim to improve aspects of ecosystem function and value in a degraded system, in order to recover some of the value and function the system had previously.

Restoration: Actions undertaken that aim to return a system to its full range of natural (historic) processes and functions.

Riparian landowner: Anyone who owns a property where there is a watercourse within or adjacent to the boundaries of their property.

Riparian zone/habitat: Includes the physical structure and associated vegetation of the areas associated with a watercourse, which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent with a frequency sufficient to support vegetation distinct from adjacent dry areas.

Stormwater: Water resulting from natural precipitation and/or the accumulation thereof, and includes groundwater and spring water ordinarily conveyed by the stormwater system, as well as seawater within estuaries, but excludes water in a drinking-water or wastewater reticulation system.

Stormwater management system: In Cape Town, this includes both the constructed and natural facilities, including pipes, culverts, watercourses and their associated floodplains, whether over or under public or privately owned land, used or required for the management, collection, conveyance, temporary storage, control, monitoring, treatment, use, and disposal of stormwater.

Structure: Any man-made feature affixed to the ground or attached to something located on the ground, including, but not limited to, fences, walls, berms, levees, fill, storage tanks, shelters or buildings.

Sustainable urban drainage system (SUDS): A collection of water management practices that aim to align modern drainage systems with natural water processes. They often use built components that mimic natural features.

Urban area (in terms of the National Environmental Management Act (NEMA)): Areas situated within the urban edge (as defined or adopted by the competent authority), or in instances where no urban edge or boundary has been defined or adopted, it refers to areas situated within the edge of built-up areas.

Water-sensitive urban design (WSUD), also known as water sensitive design (WSD): An approach that seeks to ensure that development in urban areas is holistically planned, designed, constructed and maintained, to reduce negative impacts on the natural water cycle and protect aquatic ecosystems.

Watercourse: A river, spring, stream, channel or canal in which water flows regularly or intermittently. It includes a vlei, wetland, dam or lake into which or from which water flows and includes, where relevant, the bed and the banks of such watercourses.

Wetland: Land that is transitional between terrestrial and aquatic systems, where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and typically supports vegetation adapted to life in saturated soils.

GUIDELINE 1:

ADHERE TO RELEVANT LEGISLATION AND POLICIES

It is a legal obligation and best environmental practice to do so.

- 1.1 In terms of the Constitution of the Republic of South Africa, Act 108 of 1996, local authorities are mandated to administer stormwater management systems in built-up areas. In Cape Town, watercourses form an integral component of the City's overall stormwater management system.
- 1.2 The intention of regulation is to safeguard the riverine environment by ensuring that due process is followed when any work that may adversely affect a watercourse is carried out.
- 1.3 If you are planning to undertake any activity within, or which will affect, a watercourse and/or wetland, check with the provincial Department of Environmental Affairs and Development Planning (DEA&DP) and the national Department of Water and Sanitation (DWS) to determine if an application or authorisation is required. The City's Catchment, Stormwater and River Management (CSR) Branch and/or the Environmental and Heritage Management (E&HM) Branch could also advise. See annexure A for contact details.
- 1.4 In terms of the National Water Act (NWA), 36 of 1998, activities taking place within the regulated area of a watercourse (i.e. those being within the 1:100-year floodline or the delineated riparian habitat of a river, whichever is the greatest, within 100 m from the edge of a watercourse, or within 500 m of a wetland) may require authorisation from the DWS. The type of application is determined through undertaking a risk assessment, which has to be undertaken by an SACNASP registered scientist. Low-risk activities are authorised by a General Authorisation (GA), while medium- and high-risk activities require a Water Use Licence (WUL). Only when the relevant authorisation has been obtained can the activity proceed.
- 1.5 Section 21 (S21) of the NWA defines 11 water uses, for which there is generally a requirement for a GA or WUL authorisation, unless permitted in terms of Schedule 1, if an existing lawful use, or if a responsible authority waives the need for authorisation (see annexure B). The listed water uses most frequently triggered as a result of urban development are S21(c) "impeding or diverting the flow of water in a watercourse", and S21(i) "altering the bed, banks or characteristics of a watercourse". "Taking water from a water resource" is also regarded as a water use in S21(a), and may require authorisation.
- 1.6 Notwithstanding section 21, Schedule 1 of the NWA provides instances where a water use would be permissible without a WUL (see annexure B). This includes the taking of water from a water resource (e.g. a watercourse) for reasonable domestic purposes, or use (e.g. for gardening) on land owned or occupied by the user, or directly from any water resource to which that person has lawful access, provided that the use is not excessive in relation to the capacity of the water resource and needs of other users.
- 1.7 If surface water is used as an alternative water source, in addition to the provisions of the NWA above, permission to abstract stormwater from the stormwater system, which includes watercourses, and approval for installation of alternative systems, are required from the City. The City's guidelines for alternative water use are available at: <https://resource.capetown.gov.za/documentcentre/Documents/Procedures%2c%20guidelines%20and%20regulations/Guidelines%20for%20Alternative%20Water%20Installations.pdf>

A summary of these guidelines is available at: <https://resource.capetown.gov.za/documentcentre/Documents/Procedures%2c%20guidelines%20and%20regulations/Summary%20guide%20to%20installation%20of%20alternative%20water%20systems.pdf>

- 1.8 The National Environmental Management Act (NEMA), 107 of 1998, Environmental Impact Assessment (EIA) Regulations (2014, as amended) identify activities that may not commence without environmental authorisation (EA), and include those relating to watercourses. The delegated authority (in most instances) is DEA&DP. With respect to watercourses, submission of an application is required for selected activities, including:
- **Outside urban areas:** for the development or expansion by more than 100 m² of dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 m²; or infrastructure or structures with a physical footprint of 100 m² or more, when proposed within a watercourse, in front of a development setback line or within 32 m of a watercourse, measured from the edge of a watercourse.
 - **Urban areas and outside urban areas:** for the infilling or depositing of any material of more than 10 m³ into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 m³ from a watercourse, except in certain instances such as where it is for maintenance purposes undertaken in accordance with a Maintenance Management Plan (MMP), or will occur behind a development setback line.

Annexure C lists the relevant sections from the NEMA EIA Regulations Listing Notice 1 (2014, as amended July 2018) that may be applicable in relation to development or activities associated with watercourses. Please note that the EIA Regulations and Listing Notices are amended from time to time and the latest amendments must be checked. These can be found at: www.lawsouthafrica.up.ac.za/index.php/current-legislation (click on 'Environment and Conservation'/'National Environmental Management Act 107 of 1998'/'Regulations and Notices').

- 1.9 An EA may not be required for selected activities, if they are to be undertaken for watercourse maintenance purposes and have been documented in an MMP that has been submitted to DEA&DP for prior approval. A template for the preparation of an MMP is available at: www.westerncape.gov.za/eadp/resource-library/policies-and-guidelines

Annexure D lists the activities in terms of the NEMA EIA Regulations (2014, as amended) that may be considered as part of an MMP application. Contact DEA&DP for further guidance (see annexure A for contact details).

Note: A DWS authorisation may be required in addition to the MMP. It is recommended that this process for authorisation in terms of the NWA be clarified with DWS prior to the drafting and submission of the MMP.

- 1.10 The City's stormwater and watercourse maintenance activities have been authorised in terms of NEMA (a Basic Assessment process was followed) and the NWA (General Authorisations in terms of section 21(c) and/or (i) were obtained), and have been described in a set of watercourse and generic MMPs (CMMPs). An Environmental Management Programme (EMPr) has also been specifically compiled to support maintenance activities that the City undertakes in terms of these CMMPs.

- 1.11 Private landowners cannot make use of the City's EA or GA. They can, however, refer to these approvals in their own applications.
- 1.12 The City's Stormwater Management By-law (2005) prohibits landowners from dumping any material in a river, floodplain or wetland, or reducing the capacity of the stormwater system, without the written consent of Council.
- 1.13 The City has a number of policy documents, by-laws and guidelines that are of relevance to watercourses, including:
- *Our Shared Water Future: Cape Town's Water Strategy* (2019) - Cape Town's forward-looking strategy with respect to water
 - *Floodplain and River Corridor Management Policy* (2009) - indicates where various types of development are prohibited, conditionally permitted or permitted in relation to the watercourse, buffers and the applicable floodlines
 - *Management of Urban Stormwater Impacts Policy* (2009)
 - *Urban Design Policy* (2014) - particularly objective 8, which promotes that development should protect, value and enhance the natural environment through sustainable design (e.g. by understanding natural drainage patterns and applying principles of water-sensitive urban design)
 - *Stormwater Management By-law* (2005)
 - *Public Parks By-law* (2010) - as pertains to activities that are prohibited in public open spaces, which may include watercourses
 - *Stormwater Management Planning and Design Guidelines for New Developments* (2002)
 - *Stormwater Management on Slopes Adjacent to Natural Areas* (2003)
 - *Liveable Urban Waterways Implementation Framework* (2021)

City policies and by-laws are available at: www.capetown.gov.za/Family%20and%20home/Meet-the-city/City-Council/Policies-by-laws-and-publications

- 1.14 Provisions of the National Heritage Resources Act, 25 of 1999, may be applicable in certain instances in relation to older structures associated with watercourses, e.g. old bridges, lei water channels, retaining walls, etc., or in the instance that archaeological or palaeontological artefacts are uncovered in the course of any work in or adjacent to a watercourse. The National Heritage Resources Act can be found at: www.lawsofsouthafrica.up.ac.za/index.php/current-legislation (click on 'National Monuments and Archives').
- 1.15 In the event of an unavoidable loss of wetlands, an offset may be required. The National Wetland Offset Guidelines are available at: http://www.wrc.org.za/wp-content/uploads/mdocs/TT%20660%20-%20Jo_web.pdf



Figure 3: Historic Lourens River bridge (1845), Somerset West.



Upper Liesbeek River Garden

GUIDELINE 2:

PLANNING PROCESS CONSIDERATIONS FOR DEVELOPMENT ADJACENT TO WATERCOURSES

Specific requirements and conditions are sometimes required through the planning process, in order to prevent or mitigate impacts of development on watercourses and to minimise risks associated with flood-prone areas.

- 2.1 The City has specific requirements relating to developments or building in a floodplain and/or flood-prone area. These may include requirements for preparation of a site development plan, a stormwater management plan, and/or a landscape masterplan, as well as designation of floodlines, specialist studies in relation to buffer areas, determination of potential upstream or downstream flood levels or hazards, etc. (see guideline 3).
- 2.2 Relevant City departments should be consulted regarding potential requirements. District office representatives of Development Management, E&HM, and CSRSM should be contacted in this regard (see annexure A).
- 2.3 An Environmental Management Programme (EMPr) and method statements may be required as part of documentation submitted in the NEMA EIA and/or planning approval process. The appointment of an environmental control officer (ECO), to oversee and ensure environmental compliance during construction, may be a condition of authorisation or approval.
- 2.4 The use of appropriate indigenous vegetation is encouraged in the preparation of the landscape plans (see guideline 8 and annexure E).
- 2.5 It is encouraged that buildings and developments face onto natural space and interface positively with the watercourse – to both assist with passive surveillance and safety, as well as to facilitate better amenity value of the watercourse (see guidelines 3 and 10). See figures 4 and 5.
- 2.6 Appropriate boundary treatments must be considered, taking into account hydraulic, hydrological, ecological, and social amenity considerations.



Figure 4: Housing development interacting positively with the public open space and watercourse; visually permeable fencing and houses facing onto the area, providing for passive surveillance.



Figure 5: How properties interface with public open space and watercourses is important. Visually permeable boundary treatments, rather than solid walls, and buildings facing onto, rather than away from, public open space and watercourses enhance the interface and provide for passive surveillance. Permeable boundary treatments also enable water and faunal movement.



Paradise Park, Newlands

GUIDELINE 3:

DEVELOP APPROPRIATELY ADJACENT TO WATERCOURSES TO REDUCE THE IMPACT OF FLOODING ON PEOPLE AND PROPERTY

When the capacity of a watercourse channel is exceeded, the adjacent land may be flooded. The extent and nature of development within the floodplain must therefore be carefully managed to reduce the consequential negative impacts on people and property in the floodplain and downstream and/or upstream. It is also important to retain and enhance the watercourse's ability to effectively convey increased water volumes during rainfall events. Even if a watercourse is only partially obstructed, significant redistribution of flow may be expected, which could adversely affect flood hazards in the floodplain and downstream and/or upstream. Potential impacts on people, property and infrastructure must be taken into account when considering development or settlement adjacent to a watercourse.

- 3.1 Be cognisant of potential flood risks and hazards if purchasing or residing on a property in close proximity to a watercourse.
- 3.2 It is generally more cost effective in the longer term to develop in locations that are intrinsically safe from flooding, rather than retrospectively engage in flood defence works to protect such development. Modifications to natural watercourses, if permitted, require a long-term commitment to the maintenance thereof, particularly as natural processes seek to establish the former status quo. Altering a watercourse can lead to changes in flow regime and impacts such as flooding or erosion. If modification or alteration is unavoidable, prior authorisation may be required (see guideline 1).
- 3.3 Raising of the natural ground level and infilling (e.g. to raise the land above flooding levels) may not be permitted without authorisation in terms of NEMA and/or NWA. It is also not desirable from an ecological perspective. Only clean fill should be utilised in proximity to watercourses.
- 3.4 The permissible extent and nature of land use, development or activities within floodplains are subject to stringent evaluation and control in the interests of public safety.
- 3.5 Obstruction to the free flow of water below the 1:20-year floodline area is not permitted.



Figure 6: Aerial photograph with 1:50-year (orange) and 1:100-year (red) floodlines and floodplain (green) superimposed on it. Note the recent development (A) is located outside of them.



Figure 7: Informal housing structures unlawfully and inappropriately constructed on a floodplain are impacted during rainfall events.

- 3.6 Some development or activities may be allowed between the 1:50-year and 1:100-year floodlines, subject to conditions that the City may impose. For example, formal residential development may occur within the 1:50-year and 1:100-year floodlines, provided the floors are above the 1:100-year flood level, and basements (for non-habitable purposes) to be flood-proofed to the 1:50-year flood level.
- 3.7 Developments with particular evacuation or emergency response issues, and high-risk developments (e.g. hospitals, old age homes, service stations) will only be permitted above the 1:100-year floodline.
- 3.8 No new or additional rights or the exercising of existing development rights will be granted to properties within the high hazard zone (see figure 2).
- 3.9 The 1:50-year and the 1:100-year floodlines must be shown on all new subdivision layouts.
- 3.10 Any proposed development below the 1:100-year floodline must be supported by a report from a suitably qualified and registered professional engineer to demonstrate and ensure, firstly, that any new structure can withstand the forces and effects of floodwaters and secondly, that the activity and/or development will not increase flood hazards for other upstream or downstream property owners or adversely affect flood behaviour. The aforementioned professional will need to map the applicable floodlines and indicate where in relation to these the proposed development is to be located.
- 3.11 Unless a recent and detailed floodline study is available, the City's High Level Master Plan floodlines must be verified/vetted by the developer's professional team to establish flood risk. Where floodlines have not been previously determined by the City for a particular watercourse, the developer is required to determine these, at their own cost, in accordance with the City's standards and requirements.
- 3.12 In terms of the City's Floodplain and River Corridor Management Policy (2009), all development must be set back beyond the applicable floodline or ecological buffer zone (whichever is the greater).
- 3.13 The City's Floodplain and River Corridor Management Policy (2009) provides a detailed framework for assessment of proposals in terms of land use/development/activities in relation to flood recurrence interval and ecological buffers.



Figure 8: Inappropriate and illegal construction activities within the floodplain.

- 3.14 Buffers provide services such as water quality improvement and ecological habitat benefits (see guideline 6). Regardless of the width of the floodline or ecological buffer (both of which need to be determined by a professional engineer/ecologist), a minimum setback of up to 10 m from the edge of the watercourse is required to facilitate access for management and/or maintenance of the system.
- 3.15 If there is dispute regarding the centreline or 'top of bank' of a river, a suitably qualified and registered professional may need to be appointed to advise on and resolve this.
- 3.16 Buildings should be located on the upper extremities of a property and should as far as possible front onto the watercourse to enhance visual surveillance.
- 3.17 Existing buildings in flood-prone areas should be flood-proofed. No new buildings should be constructed in flood-prone areas.
- 3.18 Steps, walkways, bridges, jetties, platforms or similar structures are not permitted on the banks of watercourses, unless authorised by the City. Bridges may be permitted if there are no footings in the river and the bridge does not obstruct the flow of water, or the integrity of the watercourse and buffer, or impact on flooding.
- 3.19 Fencing below the 1:50-year floodline should be visually permeable from ground level and must not adversely affect the free flow of water (e.g. palisade-type fencing). This is to allow for the uninterrupted movement of water and fauna, and debris (in flood situations). Fences crossing watercourse are discouraged. No live electric fencing security wires are allowed at ground level.
- 3.20 Hard or impervious areas alongside a watercourse should be reduced, unless they form part of a formal walkway or non-motorised transport (NMT) route that has been correctly located and designed.
- 3.21 Hard or impervious areas should be minimised, and pervious and vegetated surfaces maximised to encourage infiltration and groundwater recharge, and reduce the rate and volume of stormwater runoff. An accelerated flow of stormwater into watercourses could exacerbate flooding and erosion.



Figure 9: Property adjacent to a watercourse with appropriate permeable palisade-type fencing.



Figure 10: Pervious walkway along the Lourens River. Note landscaping with suitable plant species and appropriate palisade-type fence on the property boundary.

3.22 To help dissipate runoff energy, vegetated swales, filter strips or baffles could be used. This can help limit bank erosion, as well as help improve water quality.

3.23 All hardened surfaces within the 1:100-year floodline should ideally be permeable.

3.24 Where surface hardening takes place on a development site, landowners must demonstrate that the post-development runoff volumes do not exceed the pre-development runoff volumes.



Green Point Urban Park

GUIDELINE 4:

RESPONSIBLE WATERCOURSE BED AND/OR BANK MODIFICATION AND STABILISATION

While it is preferable for watercourses to retain their natural bed and bank profiles, as a consequence of development and the significantly altered catchments, this is not always possible in an urban environment.

As a principle, interference with watercourses should, as far as possible, be limited.

In certain instances, beds and banks of watercourses, especially rivers, may need to be modified and stabilised. This should only be undertaken with professional input. The design and nature of the intervention should always aim to minimise downstream, upstream and instream impacts, enhance ecological integrity and improve social utilisation of the watercourse.

- 4.1 Depending on the nature and extent of the work to be undertaken, authorisation may be required (see guideline 1). Pay particular attention to the requirements of S21 of the NWA if the activity will impede or divert the flow of water in a watercourse, alter the bed, banks or characteristics of a watercourse, or take water from a water resource (see annexure B). Riparian landowners have a responsibility to ensure that their reach of the watercourse is managed in accordance with the law and following best management practice.
- 4.2 The primary reason for watercourse bed and/or bank modifications or stabilisation will be to manage erosion that is putting infrastructure or property at risk. Remember that the processes of erosion and sediment deposition are natural, and will continue as the watercourse seeks to find a balance in energy and sediment dynamics.
- 4.3 If watercourse bed and/or bank modification or stabilisation is required, solutions that are appropriate to the watercourse must be sought. It is recommended that professional advice on appropriate methods of context-specific stabilisation be obtained.
- 4.4 River bed and/or bank modification and stabilisation must not negatively affect adjacent landowners or properties upstream or downstream. When modifying or reinforcing one bank, you must be mindful not to increase the water velocity elsewhere, or deflect the direction of flow. A change in velocity or direction could cause erosion or undercutting of the river banks either downstream or on the opposite or adjacent banks.
- 4.5 Where lateral space is available on the river banks, the preferred option for addressing erosion is to retain as much of the natural river characteristic as possible, by means of utilising river channel profile enhancement and revegetation, rather than entirely hard engineering solutions (canalisation, gabion structures, etc.). The latter sometimes cannot be avoided in river reaches where there are space constraints or where flow velocity is characteristically high, such as on the outside of river bends. River channel profile enhancement may require small sections of gabion baskets or mattresses if, for example, there is critical infrastructure crossing the river that requires protection or where profile enhancement alone cannot adequately address the erosion concerns.

The specific measures that could be implemented are likely to include channel bed widening and/or roughening, reshaping, flattening and sculpting of banks to reduce erosion and increase structural habitat diversity. Banks should be reshaped to a gradual sloping river bank with an approximately 1:4 to 1:6 gradient, ensuring the natural drainage lines and contours are not altered, and planting with appropriate instream and/or riparian vegetation. This would include ensuring adequate compaction when reinstating the slopes, and possible use of environmentally friendly erosion-control geofabrics to stabilise the slope while allowing for revegetation through the woven mats. Consideration should be given to ease of access to the watercourse for people and fauna, as appropriate, and designed and shaped accordingly. If necessary, provide escape points suitably designed for both people and animals.

4.6 If gabion mattresses or baskets, or similar engineered options are to be used to protect the banks from erosion or scour, these are to be appropriately designed and located to ensure they do not cause further damage to the watercourse. Gabion walls are usually angled back towards the slope, or stepped back with the slope, rather than stacked vertically. This arrangement provides a lower centre of gravity than a vertically stacked structure and, as such, increases the stability of the structure. The geotextile fabric plays an important role in retaining the fine material while allowing for water to drain through it.

Providing opportunities for vegetation planting and/or growth should be given consideration during the design stage. Vegetation can serve both an ecological and screening function. For example, if using stepped gabions, with the lowest exposed step set at river bed level, this may allow planting to be carried out behind the gabion or even in sediment that accumulates on the edge of the gabion, outside of the main flow zone. Such planting, using appropriate indigenous riverine species, both screens gabion structures and provides a degree of sheltered marginal vegetation habitat at wetted bank level. Careful selection and placement of stones in the front face can result in an attractive end result.

4.7 The life expectancy of gabions depends on the lifespan of the wire, not on the contents of the basket. The structure will fail when the wire fails. Galvanised steel wire is most commonly used, but PVC-coated and stainless steel wire are also used. PVC-coated galvanised wire gabions have been estimated to last for up to 60 years. Their strength and effectiveness may increase with time in some cases as silt and vegetation fill the interstitial voids and, in so doing, further reinforce the structural integrity. Poorly designed or constructed gabions, or those that use substandard materials, will fail quickly and then require costly repairs or replacements.

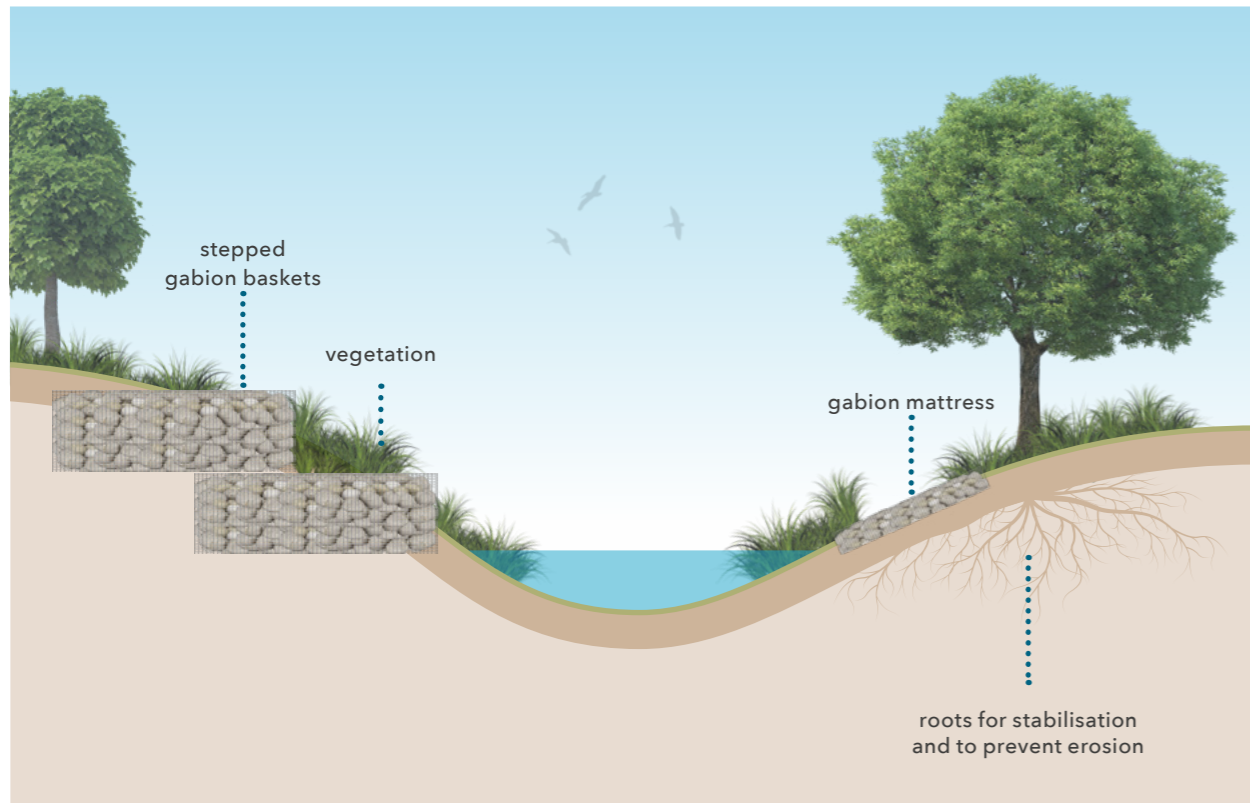


Figure 11: Gabion structures and vegetation help stabilise banks and prevent erosion.



Figure 12: Eroded river bank, which has been shaped and stabilised using gabion mattresses.





Figure 13: Example of gabion baskets (far bank), and gabion mattresses (near bank), along with riparian vegetation planting along mattress edge.

- 4.8 Gabion structures, if properly designed and constructed, will function effectively for many years. They do, however, require some maintenance and regular inspection of the structural integrity to maintain the functionality of the stormwater structures. The most common maintenance activities will include replacing lost stones, repairing any damaged wire, and restoring the gabion structure profile.
- 4.9 Where slopes and discharge or flow rates allow, stabilisation of slopes by planting with indigenous riparian vegetation is an ecologically preferred option to the use of 'hard' stabilising structures. Plants, if selected carefully, provide a quality, sheltered habitat that will also encourage moisture retention, pollution filtration, soil binding, uptake of nutrients, and the deposition and/or retention of sediment.
- 4.10 Vegetation may be an effective way to control erosion in channels. The resistance to erosion will, however, depend on the type and density of vegetation cover, erodibility of the soil, and the silt content of the water. Fine sands are more erodible than clay soils or gravel.
- 4.11 Retaining walls or structures that have been in place for a considerable length of time, or which are heavily overgrown with vegetation, or which have historic significance, should be assessed for structural integrity, and input obtained from a heritage professional or City heritage staff (see annexure A for contact details) prior to a decision to retain or replace. If the integrity of the retaining wall or structure is intact, it is likely to be preferable for it to be retained and thus minimise disturbance to the watercourse. If its integrity is questionable, e.g. cracked and unstable, it is likely going to need to be replaced.
- 4.12 Terracing and planting of grape vines on river banks are neither desirable nor in line with sound floodplain or watercourse management practices.



Figure 14: Example of a river bank where riparian planting is being used for stabilisation.



Figure 15: Well vegetated and stable river banks on the upper Liesbeek River.

GUIDELINE 5:

PREVENT POLLUTION OF WATERCOURSES TO ENABLE HEALTHY ECOLOGICAL FUNCTIONING AND A SAFE WATERCOURSE WITH IMPROVED WATER QUALITY

We need to protect our watercourses from pollution to safeguard human health, to ensure a healthy riverine ecosystem and the ecosystem benefits it provides, and to ensure that the opportunities watercourses can provide for us, for example for recreation, can be realised.

An important aspect that affects the condition of a watercourse is the quality of its water. Improved water quality will have positive implications for downstream and adjacent properties and recreational users, and may improve the ecological status of the watercourse. Development and hard surfacing reduce infiltration and increase the volume and rate of runoff. Runoff that enters the watercourse could be carrying pollution and sediment, which may detrimentally affect the watercourse.

Activities that take place alongside a watercourse have the potential to have an immediate effect on the health of the watercourse, but activities taking place elsewhere in the catchment can also play a role.

Point sources of pollution (direct pollution) that could reach a watercourse usually come from a particular site activity or installation and are often piped (e.g. discharge of sediment-laden water from a construction site, or release of chemicals or effluent from industry). Diffuse pollution (from elsewhere in the catchment and picked up during rainfall events) can also reach a watercourse via surface water runoff or groundwater flow, and can have negative impacts on water quality. Examples of diffusion pollution include high nutrient runoff from market gardens or horse paddocks, and contaminated runoff from paved areas and roads.

It is important that unsuitable substances (e.g. fats and oils) and foreign objects (e.g. rags, cloth and sand) are not disposed of into the sewerage system, as these can cause blockages, resulting in sewer overflows, which then can flow into the stormwater drains, which discharge to watercourses. Remember to 'Bin It, Don't Block It'. https://resource.capetown.gov.za/documentcentre/Documents/Graphics%20and%20educational%20material/Bin_It_Dont_Block_It_leaflet_ENGLISH.pdf

We all need to take responsibility to prevent pollution of watercourses, both by our actions and by being active citizens and assisting with efforts to clean up our watercourses and reporting issues that can affect them, when observed.

Bin It. Don't Block It.

This sewer blockage prevention campaign is aimed at informing residents and businesses about the importance of keeping the sewer system clean and free from litter and pollution. It also explains how human behaviour is crucial to the well-being of City infrastructure and the natural environment.

To report a problem or issues that can cause pollution of our watercourses, such as leaking sewerage pipes, overflowing sewers, illegal dumping, sediment-laden water or pollution running into watercourses, etc., please contact the City using one of the following options:

- Online: www.capetown.gov.za/servicerequests
- Email: water@capetown.gov.za
- SMS: 31373 (maximum 160 characters)
- Call: 0860 103 089
- Visit a City walk-in centre: <https://www.capetown.gov.za/Family%20and%20home/See-all-City-facilities/Our-service-facilities/Walk-in%20centres>

Please give the street address and get a reference number.

- 5.1 Unfortunately, many of Cape Town's watercourses suffer from pollution. Please refer to the City's Inland Water Quality Report for more details about the water pollution challenges in Cape Town and a description of the pollution in specific watercourses. This report is available at: <https://www.capetown.gov.za/Family%20and%20home/transport-and-vehicles/road-safety/our-stormwater-system>
- 5.2 Any person accessing a watercourse, or using the watercourse for any activity, must be reasonably aware of the water quality and take the necessary precautions, where required, and shall remain responsible for any associated risks that may arise therefrom.
- 5.3 Everybody must take all responsible measures to prevent pollution of watercourses, including increased sedimentation due to construction activities. Should any pollution incident occur, the polluter and/or landowner will be held responsible, and could be liable for a fine and the cost of rehabilitation.
- 5.4 Only rainwater and stormwater runoff is permitted in the stormwater system. No solid or liquid waste should be discarded in the stormwater system, including watercourses. Everyone should be aware that roadside stormwater drains often discharge into watercourses. Land-based solid waste pollution entering watercourses via the stormwater system is a major concern, and impacts not only watercourses, which ultimately discharge into the sea, but also causes pollution of the coastal and marine environment.
- 5.5 Solid waste is not only unsightly in a watercourse, but it can also block watercourses, leading to possible flooding. Community action through residents and NGOs can assist with keeping watercourses clean of litter. Local ratepayers' associations, body corporates, businesses, or others could consider supporting and funding local clean-up programmes. These could be on a volunteer or job creation project basis (see guideline 11).
- 5.6 Do not litter or dump garden refuse, rubble and other forms of waste in or adjacent to watercourses.
- 5.7 Do not hose down dirty paved surfaces or discharge contaminated water into a watercourse.
- 5.8 Cement batching may neither take place in a watercourse nor its buffer. Cement should be mixed outside the riparian zone and board and plastic sheeting used to protect the ground.
- 5.9 Washing of cement, concrete, paint or oils from construction equipment is not permitted within a watercourse or its buffer. Any wash water should also be prevented from entering stormwater drains, which lead to watercourses.
- 5.10 Directing swimming pool overflow water or backwash discharge water, or pumping chlorinated swimming pool water into a watercourse or the stormwater system is not permitted, and doing so is a contravention of the Stormwater Management By-law (2005). Chemicals, especially chlorine, from swimming pool water have a negative impact on a watercourse's ecology.
- 5.11 The use of pesticides, herbicides and fertilisers in areas adjacent to a watercourse or on any slopes that would discharge into a watercourse should be limited, in order to minimise the impact of these on the watercourse. Fertilisers can cause eutrophication of the aquatic system, and herbicides and pesticides can negatively impact fauna and flora.



Figure 16: Warning signage regarding a polluted watercourse.

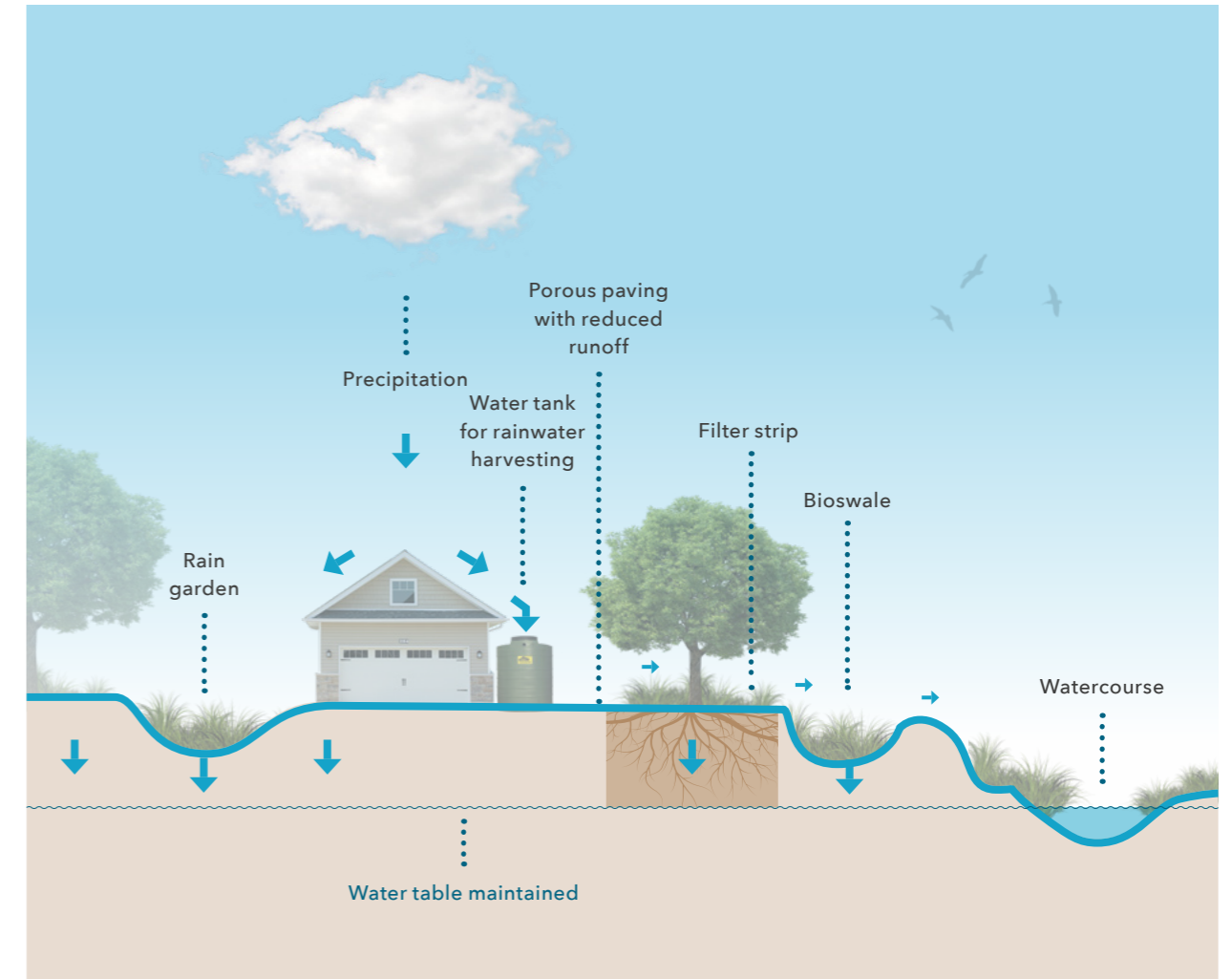


Figure 17: Examples of SUDS options for improving stormwater management and water quality.

- 5.12 Septic tanks or French-drain systems for sewage treatment should not be constructed within a watercourse floodplain.
- 5.13 The seepage of contaminated groundwater with high *E.coli* counts and nutrients (from leaking septic tanks and sewerage pipes) could reach and pollute watercourses. Periodically check your septic tank and sewerage pipes for leaks, and ensure your septic tank is cleaned and maintained. Please notify the City if you detect a leaking sewer pipe (see the City contact details in the introduction to this section or annexure A).
- 5.14 Do not block sewers and please report any sewer overflows as soon as they are observed (see the City contact details in the introduction to this section or annexure A). Overflowing sewage can find its way into the stormwater systems and then flow into a watercourse, and negatively impact water quality and ecological function. For more information see: <https://www.capetown.gov.za/Family%20and%20home/residential-utility-services/residential-water-and-sanitation-services/prevent-blocked-sewers>

- 5.15 Neither greywater nor night soil should be discharged into a watercourse or the stormwater system.
- 5.16 Development and hard surfacing reduce infiltration and increase the volume and rate of runoff. Runoff that enters the watercourse could be carrying pollution and sediment, which may detrimentally affect the watercourse. To ensure that a watercourse is not polluted by contaminated runoff, it can be intercepted and cleaned before entering a watercourse. An example is to introduce sustainable urban drainage system (SUDS) elements, such as a bioswale or filter strip, to aid infiltration and water treatment.
- 5.17 Ideally, do not keep animals within 30 m of the top of bank of a watercourse. For horses, it is important to provide an alternative water source to keep them out of the watercourse. Do not store or apply manure in the buffer. Keep at least 30 m between areas of manure application and the watercourse.



Figure 18: Solid waste caught by a litter boom.

GUIDELINE 6:

ESTABLISH A BUFFER ADJACENT TO THE WATERCOURSE TO PROTECT THE WATERCOURSE AND ENHANCE THE RESILIENCE OF THE ECOSYSTEM

Watercourses need to be protected from the impacts of urban activities and infrastructure, or other developments, if they are to continue to provide habitats and services for humans.

Providing a buffer is an important way of protecting a watercourse from possible negative effects, and they have been adopted as a standard protection measure for water resources. Buffers can reduce impacts on a watercourse from upstream activities and adjoining land uses, for example disturbance associated with unsuitable activities, and polluted runoff from hardened surfaces or agricultural practices.

Buffers also provide opportunity for stormwater infiltration and treatment, and offer space for natural flood events, thereby helping protect urban infrastructure from the effects of flooding. They are important for riparian ecosystems and provide habitats for species of plants and animals, including reptiles, crustaceans, insects, amphibians, birds, and small mammals. Well-vegetated buffers can assist with stream bank stabilisation and protection from erosion. Buffers can also provide the opportunity for a range of societal benefits, such as public green open space that can be used for appropriate low-impact recreational activities.

Buffers are also needed to enable City maintenance teams to undertake necessary management and maintenance interventions within the watercourse.

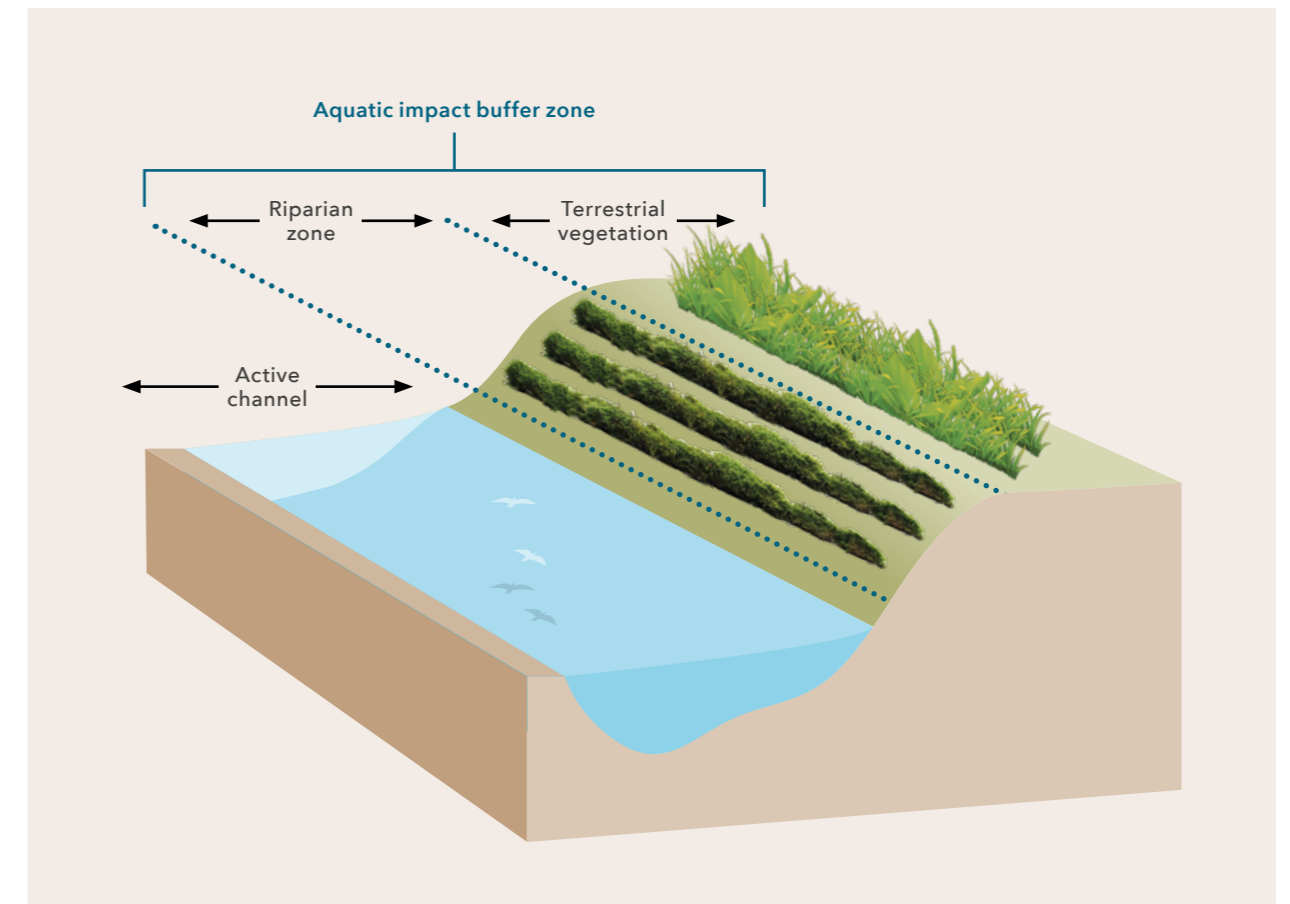


Figure 19: Representation of a buffer strip.

- 6.1 The City requires that all developments adjacent to watercourses are adequately set back from the watercourse, in order to protect the watercourse from the potential impacts of urban development and associated activities.
- 6.2 The width of a setback or buffer depends on the ecological importance and sensitivity of the watercourse, and on the characteristics of the proposed development or activity. Buffer widths vary considerably, but at a minimum are about 10 m for small streams or concrete canals.
- 6.3 Indicative buffers, as determined by freshwater ecologists for all major watercourses within the city, must be used to inform planning on a site. The determination of such buffer may be a requirement in a planning application to the City or an application to DEA&DP or DWS. An updated national buffer determination tool is available in cases where no buffer has been predetermined, or when refinement of existing buffer recommendations is needed. Contact the City's CSR Branch for more information (see annexure A for contact details).



Figure 20: Silvermine River wetlands showing the buffer zone on either side, which includes for appropriate recreational infrastructure, maintenance access, and helps protect the watercourse and wetland from impacts of urbanisation.
Blue line – river channel (notional); green overlay – wetland;
dark orange overlay – buffer; lighter orange overlay – buffering open space.



Figure 21: Cycling tracks in the buffer zone. Note the use of permeable material for the pathway.



Figure 22: Picnic facilities in the buffer zone.

- 6.4 The buffer should remain in its natural state or, if it is in poor condition, should be improved. Guidance and recommendations in this regard can be provided by the City's CSR Branch. Guideline documents are also available, which contain information on rehabilitation and enhancement of buffers (see annexure F or <https://sites.google.com/site/bufferzonehub/>).
- 6.5 No person may, without permission, cause or permit any disturbance, excavate, construct or develop within the buffer. Any activity or development within the buffer that affects its ability to carry out the protection of the aquatic ecosystem, or that adds negative impacts, will not be permitted.
- 6.6 Where a development or component thereof falls within a buffer, detailed impact studies, by an appropriately qualified and registered environmental professional, must be undertaken to inform decision making.
- 6.7 The buffer along a particular watercourse system may be fixed or variable in width, but ideally should not be interrupted by impervious sections that would allow stormwater to concentrate and flow into the watercourse without first flowing as sheet flow through the buffer.
- 6.8 Site-specific context and conditions may result in some deviation from continuous buffers or achieving sheet flow runoff. In these instances, such deviations must be designed taking ecosystem services and long-term system functioning and maintenance into consideration.
- 6.9 Appropriate land uses and activities for buffers can include controlled walking of dogs; recreational areas for fishing, picnicking, walking or cycling; opportunities for bird-watching; sites for environmental education; dry-season play areas or informal sports fields; and space for the improvement of stormwater runoff quality, using swales, treatment wetlands or other, similar sustainable urban drainage systems.
- 6.10 Where pathways or access routes are required, it is preferable to use permeable pavers or 'soft' landscaping that will allow for the infiltration of stormwater.
- 6.11 Riparian landowners should keep watercourses and their buffers clear of all rubble, litter, and invasive alien vegetation (see guidelines 5 and 7).

GUIDELINE 7:

INVASIVE PLANT SPECIES IN OR ADJACENT TO A WATERCOURSE NEED TO BE CONTROLLED AND/OR REMOVED AND DESTROYED

Invasive species impact negatively on the natural functioning of ecosystems. Terrestrial and aquatic invasive plant species are both of concern in terms of the impact they can have on watercourses.

Many invasive alien plant species consume large quantities of water and can have a detrimental effect on water quantity, flow and quality, and can also modify the soil. They tend to multiply exponentially to the detriment of indigenous vegetation and, when in watercourses, often lead to the establishment of these undesirable invasive alien plants downstream.

Aquatic invasive alien plant species have often been ornamental horticultural plants that have 'escaped' from gardens and became established in watercourses. An example of this is water hyacinth (*Eichhornia crassipes*) that, with its striking purple flowers, was brought to South Africa as an ornamental water plant, but now invades our waterways and, with its rapid reproduction rate, often forms thick impenetrable mats. These not only impact the ecology of the watercourse, but can also cause blockages with consequent flooding, as well as entrap litter.

Indigenous plants, e.g. the bulrush (*Typha capensis*) and common reed (*Phragmites australis*), can also become invasive in watercourses under certain conditions and, in those instances, also require control.

Resources and information on various aspects related to invasive species, e.g. species information, methods of control, and relevant legislation, can be found at: <https://invasives.org.za>

- 7.1 The control of invasive alien plants is regulated by both the National Environmental Management: Biodiversity Act (NEMBA), 10 of 2004, and the Conservation of Agricultural Resources Act (CARA), 43 of 1983. Depending on various factors, e.g. the species, degree of concern, and location, different obligations for eradication or control apply, with these relating to various category lists of species. Refer to <http://invasives.org.za/legislation/what-does-the-law-say> for information on invasive species legislation and regulations.
- 7.2 If a Category 1a listed species (in terms of NEMBA Regulations) is found on your property, the landowner must immediately notify, in writing, the listed species occurrence to Biosecurity Services and the City's Invasive Species Unit (ISU) (see annexure A for contact details). The landowner must eradicate the species and prevent it from spreading, while taking all steps to prevent or minimise harm to biodiversity.
- 7.3 If a Category 1b, or Category 3 listed species (in terms of NEMBA Regulations) is found within 32 m from the edge of a watercourse, or within the 1:100-year floodline (whichever is the greatest), the landowner must control such species according to prescribed methods. This may be applicable to some Category 2 listed species too.
- 7.4 Category 2 species (in terms of NEMBA Regulations) require a permit if these are found on your property, and Category 3 plants (in terms of NEMBA Regulations) are generally ornamental and may be retained, but no new planting, trade or propagation of these plants is permitted.
- 7.5 Invasive aquatic plants are introduced plants that have adapted to living in, on, or next to water, and that can grow either submerged or partially submerged in water. The following are invasive aquatic plants that require control and/or removal. All of these, with the exception of fringed water lily (*Nymphoides peltata*), are found in Cape Town.

CATEGORY 1A

Cabomba (<i>Cabomba caroliniana</i>)
Fringed water lily (<i>Nymphoides peltata</i>)
Hydrilla (<i>Hydrilla verticillata</i>)
Purple loosestrife (<i>Lythrum salicaria</i>)
Yellow flag iris (<i>Iris pseudacorus</i>)
Yellow water lily (<i>Nuphar lutea</i>)
Water primrose (<i>Ludwigia peruviana</i>)

CATEGORY 1B
Azolla (<i>Azolla filiculoides</i>)
Canadian waterweed (<i>Elodea canadensis</i>)
Dense waterweed (<i>Egeria densa</i>)
Giant reed (<i>Arundo donax</i>)
Indian shot (<i>Canna indica</i>)
Kariba weed (<i>Salvinia molesta</i>)
Morning glory bush (<i>Ipomoea carnea</i>)
Parrot's feather (<i>Myriophyllum aquaticum</i>)
Purple morning glory (<i>Ipomoea purpurea</i>)
Spiked water-milfoil (<i>Myriophyllum spicatum</i>)
Water hyacinth (<i>Eichhornia crassipes</i>)
Water lettuce (<i>Pistia stratiotes</i>)
CATEGORY 2
Watercress (<i>Nasturtium officinale</i>)

7.6 Early Detection and Rapid Response (EDRR) can stop the spread of new and emerging invasive species before they become established. Cape Town's EDRR programme has identified 25 target plant species that are of concern of becoming invasive (see annexure G). The list of these target plant species and more information on them can be found at: www.capetowninvasives.org.za/target-species/target-plants

It is requested that the location of any of these species, along with a photograph, is reported to: invasive.species@capetown.gov.za. Sightings can also be reported at: <https://edrr.capetowninvasives.org.za/>. Of the listed target species, the ones of emerging concern in or around Cape Town watercourses are: purple loosestrife (*Lythrum salicaria*), yellow flag iris (*Iris pseudacorus*) and yellow water lily (*Nuphar lutea*). (See figure 23)

7.7 Any action taken to control weeds or invasive plants should be undertaken utilising recognised techniques and approaches, and must be executed in a manner that will have minimal negative environmental impact. More information on control methods can be obtained at: <https://www.arc.agric.za/arc-ppri/weeds/Pages/Management-of-invasive-alien-plants.aspx>
The City's ISU can also advise (see annexure A for contact details) or advice can be sought from an appropriately qualified specialist.

Figure 23: Target species of emerging concern in and around Cape Town watercourses.



Figure 24: Invasive species, water hyacinth (*Eichhornia crassipes*), being cleared from a watercourse.



Figure 25: Invasive kikuyu grass (*Pennisetum clandestinum*) and nasturtiums (*Tropaeolum majus*) (bottom right of photograph) being cleared.

- 7.8 Manual removal methods include hand-pulling, shovelling, and using scythes and brushcutters; mechanical removal includes the use of excavators or drag lines; chemical control methods comprise the use of herbicides; and biological control uses one organism (e.g. insects) to control another problem species (e.g. invasive aquatic plants).
- 7.9 Mechanical dredging of sediment and associated vegetation (e.g. reeds) should be undertaken with care to minimise the creation of unstable steep-sided and deep channels, which have reduced ecological function. Mechanical dredging is, however, often a necessary management intervention. It is an activity that may require a WUL authorisation.
- 7.10 Where small and/or accessible areas require weed or vegetation clearing, manual techniques should, where possible, be used.
- 7.11 As a general principle, start clearing as far as possible upstream, and work in a downstream direction. Also, start at the highest point on the bank and move downwards.
- 7.12 Temporary stockpiling of removed vegetation may be required and, if possible, should be located outside the riparian area or buffer. Remove the stockpile as soon as the material has dried sufficiently to allow for transport to an authorised solid waste disposal facility.
- 7.13 The spread of kikuyu grass (*Pennisetum clandestinum*) into the buffer and riparian zone should be controlled and, if possible, the grass removed and replaced with low-maintenance indigenous plant species.
- 7.14 Areas that have been cleared should be rehabilitated using appropriate indigenous vegetation (see guideline 8 and annexure E).
- 7.15 Shallow, slow-flowing water may support invasion of bulrush (*Typha capensis*) and common reed (*Phragmites australis*), both of which are common indigenous plants. They may cause waterways to become choked, resulting in an increased risk of flooding. Any species that becomes invasive and develops a monoculture by outcompeting desirable species should be controlled.
- 7.16 The bulrush (*Typha capensis*) also produces large quantities of seasonal, windblown fluffy seeds that may be associated with allergies and respiratory problems in adjacent residential areas. It is, however, effective in filtration and water quality improvement and provides habitat for some bird and other animal species, and should therefore be controlled rather than eradicated from an area.
- 7.17 The common reed (*Phragmites australis*) plays an important ecological role in wetlands, including filtering water and offering shelter to many bird species and other animals. It can also provide for human uses, such as material for light construction work (e.g. as thatching grass) and for making mats and baskets. It, too, should be controlled rather than eradicated.
- 7.18 Invasive plant species management and reed clearing activities should ideally take place between January and June every year, outside of the nesting and breeding season for wetland and riverine fauna (see guideline 9).



Figure 26: The bulrush (*Typha capensis*) assists with water filtration and water quality improvement, and provides habitat for fauna species such as the common waxbill (*Estrilda astrild*). (Photo credit: C&S Dorse)

GUIDELINE 8:

PLANT LOCALLY INDIGENOUS SPECIES THAT ARE APPROPRIATE TO THE PARTICULAR AREA AND WATERCOURSE

By keeping the aquatic and riparian system as natural as possible, its biodiversity value is enhanced and it is enabled to better perform its vital ecosystem service and green infrastructure functions. In Cape Town, watercourses form part of our Biodiversity Network.

Indigenous riparian species provide shelter and food for riverine fauna, stabilise river banks, assist with flood and erosion control, and can assist with improving water quality. They also help create an aesthetically pleasing natural environment.

- 8.1 A number of indigenous plant species are generally suitable for planting and landscaping adjacent to a watercourse (see figure 27). The context of planting must, however, always be considered, and species selected accordingly. Annexure E provides a table of suitable indigenous species that can be used for landscaping, together with information relating to their planting context (e.g. aspect, soil type, water conditions, hydrozone, river reach, and garden size), and growth form (i.e. tree, geophyte, shrub, climber, groundcover or aquatic species).
- 8.2 The distinction between landscaping, rehabilitation and restoration must be highlighted; with appropriate plants and source thereof dependent on what activity is being undertaken. Advice of appropriate experienced professionals needs to be sought, especially relating to plant selection in the instance of restoration or rehabilitation activities.
- 8.3 If your property is alongside or maybe includes a watercourse, retain a buffer area between your garden and the watercourse. This buffer area will help prevent the spread of plants from your garden (e.g. kikuyu grass (*Pennisetum clandestinum*)) into the watercourse. The buffer area can be vegetated with suitable indigenous plants, which will enhance ecological function (see annexure E for a list of suitable species).

Figure 27: Examples of appropriate plants for landscaping.



- 8.4 Terracing or reshaping of the natural contours of watercourse banks is discouraged. It is best to ensure natural gradients and slopes of banks, with the planting of indigenous riparian vegetation on the banks (see guideline 4 and annexure E for a list of suitable species). This will assist with enhancing the ecological functioning and visual attractiveness of the watercourse.

- 8.5 Protective measures during the initial planting period may be required, e.g. various types of biodegradable netting, stakes, or horizontally secured logs (see figures 28 and 29). Planning should take place such that the plants have established themselves sufficiently prior to flooding events in areas prone to erosion. Placement of appropriate species within the relevant hydrological zones is also important to ensure the best results (see annexure E for a list of suitable species). Floodlines, where applicable, should also be taken into consideration as some plants, especially woody plants like trees, could affect the flood behaviour. The City's CSRSM Branch needs to be consulted to ensure that trees planted do not impact on water flow in the event of high flow conditions (see annexure A for contact details). Allowance should be made for irrigation over short, dry hot periods and during summer, if planting occurs early and in dry soil areas of embankments.
- 8.6 In the instance where a City approval for development is required, planting and landscaping along a watercourse must be in line with a landscape or rehabilitation plan to the City's approval. Such a plan will typically require the planting of locally occurring indigenous riverine plants and/or the rehabilitation of indigenous vegetation, retention of exotic (non-invasive alien) and indigenous trees and, as far as possible, retention of natural contours and bank slopes.
- 8.7 Felling of exotic (non-invasive alien) or indigenous trees, or removal of indigenous vegetation within and adjacent to watercourses is discouraged, unless required from a safety perspective, e.g. impacts on flooding, or impacts on infrastructure in or adjacent to the watercourse.
- 8.8 Remember to ensure landowner permission before commencing with any planting or similar activities in or adjacent to a watercourse.

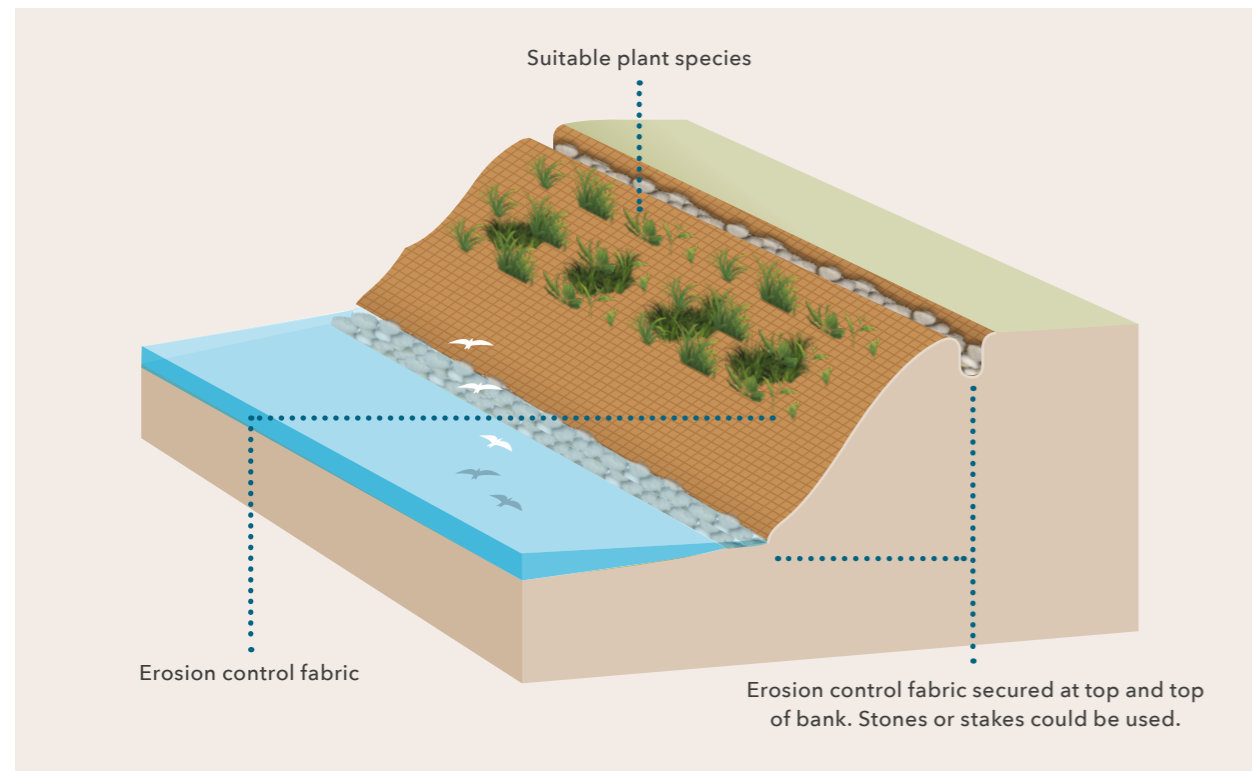


Figure 28: Erosion control fabric secured at top and toe of bank. Stones or stakes could be used.

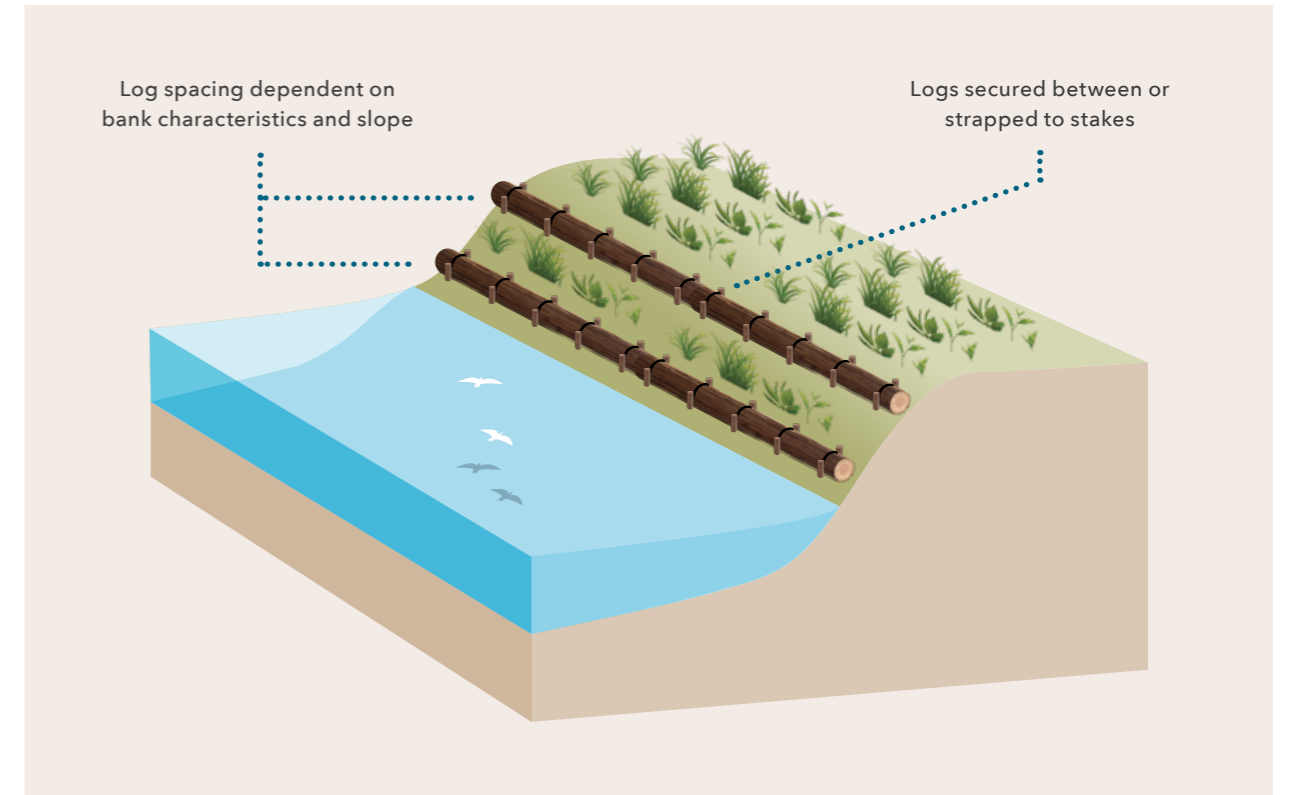


Figure 29: Bank stabilisation using horizontally secured logs between which suitable species are planted.



GUIDELINE 9:

BE AWARE OF FAUNA THAT LIVE IN OR USE WATERCOURSES AND LIMIT POTENTIAL IMPACTS ON THEM

By keeping the aquatic and riparian system as natural as possible, or rehabilitating and restoring them, where appropriate, their biodiversity value is enhanced, and they can support and provide shelter and food for riverine fauna. Riparian vegetation also supports a wide range of bird and other species.

Many of our more natural watercourses and their adjacent green space support an abundance of indigenous fauna, ranging from larger mammals, such as the shy but charismatic Cape (African) clawless otter (*Aonyx capensis*), through to amphibians, such as the endangered western leopard toad (*Sclerophrys pantherina*); to small fish, such as the Cape galaxias (*Galaxias zebratus*); and invertebrates. Their continued survival is, however, dependent on reducing impacts of urbanisation and actions of people on our watercourses.

Residents bordering a watercourse have the capacity (albeit often inadvertently) to influence the status of the watercourse by planting exotic plant species that spread from gardens, introducing exotic birds, fish and other animal life, building weirs, creating artificial pools, and 'reclaiming' land by filling in the floodplain. All these actions can impact on fauna inhabiting watercourses and their environs.

- 9.1 Be aware that your garden and watercourses may be home to important indigenous amphibious and aquatic fauna species, e.g. the western leopard toad (WLT) (*Sclerophrys pantherina*), Cape rain frog (*Breviceps gibbosus*), Cape galaxias (*Galaxias zebratus*), and Cape kurper (*Sandelia capensis*).



Figure 30: Cape (African) clawless otter (*Aonyx capensis*)



Figure 31: Western leopard toad (*Sclerophrys pantherina*) (Photo credit: C&S Dorset)



Figure 32: Signage warning motorists to be careful of WLTs crossing the road.

- 9.2 The endemic and endangered WLT, which lives and breeds in low-lying areas in the Southern Suburbs and Cape Flats, have, as a result of urban development, moved into residential gardens where they live most of the time until they migrate, once winter rains fall, to various watercourses to breed.
- 9.3 If you live in a WLT area, create a toad-friendly garden, with fences that allow for movement in and out of your garden rather than walls or, if you have a wall, ensure that it has some openings at ground level. Preferably plant indigenous plant species and avoid using insecticides and herbicides. If you have a swimming pool, install a 'toad saver' netting device. Never move a WLT from where you find it, rather contact an expert (see annexure A for contact details).
- 9.4 In areas where the endangered western leopard toad (WLT) (*Sclerophrys pantherina*) occurs, care needs to be taken when working in and adjacent to watercourses between July and December, in order to limit impact on their breeding and early development. At a minimum:
- Between 1 July and 31 September, avoid mowing or removal of riverine vegetation (especially submerged and emergent aquatic weeds and invasive species) within 500 m of a WLT breeding site. This is to allow for breeding migrations.
 - Between 1 November and 31 December, avoid mowing or removal of riverine vegetation (including aquatic weeds and invasive species) within 500 m of a WLT breeding site. This is to allow for toadlet emergence.
- It is also important to note that WLTs spend 11 months of the year foraging around these waterbodies (some remaining quite close but they can move up to 2 km away) in our suburban gardens and open spaces. Adequate shelter and protection from threats during this period are also critically important for their survival, and indigenous vegetation provides optimal habitat for them and numerous other species.
- 9.5 Within a natural watercourse, aspects such as (i) good cover (e.g. vegetation or rocks) for fish and other aquatic life, (ii) abundant leaf material, (iii) diverse water speeds and pools, (iv) many resting places, and (v) sorted gravel that provides habitat, all assist with improved ecological functionality and providing habitat for fauna.
- 9.6 Where these have been lost in urban watercourses, actions can be taken to reintroduce some of these elements to enhance faunal habitat. Some community groups are actively improving habitat, with positive results for fauna (see guideline 11).
- 9.7 Most importantly, do not introduce alien fauna, such as fish or terrapins from your fish tank or pond, into watercourses.

GUIDELINE 10:

IMPROVE THE AMENITY VALUE OF URBAN WATERCOURSES

Watercourses can be attractive and multifunctional features in an urban area, places of beauty, and of recreational amenity and value. They offer opportunities for education, for play, and for communities to connect in green open spaces.

Sadly, within the urban environment, watercourses are often perceived as undesirable spaces due to issues of 'crime and grime'. Many watercourses are edged by walls at the back of residential properties and around sports facilities, resulting in a lack of surveillance, and are often considered as 'derelict unattractive features' in the landscape. Dumping is often prevalent and, together with poor maintenance and pollutants that enter the system, results in an area of environmental degradation, rather than one providing a positive amenity value.

We need to protect and enhance the social and amenity value of watercourses and their buffers. These areas lend themselves to be used as community amenities, providing aesthetically pleasing natural areas in urban settings, where people and communities can congregate, recreate and enjoy activities (e.g. bird-watching and walking), and benefit from nature (both physically and psychologically). Well-designed and maintained facilities, such as footpaths, benches and appropriate play equipment, can add to the amenity value of these areas. Our urban watercourses need to become liveable urban waterways – ecologically functional and socially beneficial green infrastructure corridors.

- 10.1 Aesthetic and social implications of development and activities adjacent to a watercourse and its buffer must be considered, and opportunities sought to enhance the watercourse's ecological and amenity function.
- 10.2 The use of indigenous vegetation and appropriate planting can form part of and enhance the city's green open space system, both visually and functionally, and provide important green infrastructure services. A planted system is also more aesthetically pleasing than 'hard' engineering solutions, and the benefits are greater than merely providing a stormwater function.
- 10.3 Many species of plants and animals, including reptiles, insects, amphibians, birds, and small mammals, thrive in our watercourses and watercourse corridors, where these are sufficiently wide and natural, and where they are not too severely impacted by human development or activities. Planning for increased amenity value of our watercourses needs to take faunal species into account, as their presence can enhance the visitor experience and amenity value of these spaces.
- 10.4 Design in a manner that attracts faunal species, e.g. plant indigenous species that will attract birds and insects, have gradual slopes that will facilitate faunal movement into and out of the watercourse, and retain vegetation that provides for habitat.
- 10.5 Where appropriate, the construction or installation of footpaths, cycle paths, seating or other recreational facilities, e.g. bird hides, picnic facilities, play equipment, should be considered. This will improve the multifunctionality of the watercourse.
- 10.6 The material used for pathways within a watercourse buffer should be carefully considered, with the aim of enabling infiltration rather than runoff.
- 10.7 Signage could be developed and installed for information, awareness-raising and education purposes, thus helping create an 'outdoor classroom'.
- 10.8 Consider tree planting to provide areas of shade. If on public land, liaise with the City's Recreation and Parks Department for permission. Trees can also be requested from them (see Green Infrastructure Best Practice Guidelines for Trees: https://resource.capetown.gov.za/documentcentre/Documents/Procedures,%20guidelines%20and%20regulations/Green_Infrastructure_Programme_%20Trees.pdf). The City's CSRM Branch also needs to be consulted to ensure that trees planted do not impact on water flow in the event of high flow conditions (see annexure A for contact details).



Figure 33: Upper Liesbeek River Garden, which has resulted from a civil society partnership, leading to an improved river corridor and a valuable social amenity.



Figure 34: Education signage at Edith Stephans Nature Reserve.



Figure 35: Signage at Lower Silvermine Wetlands.

- 10.9 Where possible, do not remove existing trees growing along watercourses, unless they are specified invasive alien species or removal is required for safety or flood risk-related reasons. Where possible, prune trees rather than remove them (see Green Infrastructure Best Practice Guidelines for Trees: https://resource.capetown.gov.za/documentcentre/Documents/Procedures,%20guidelines%20and%20regulations/Green_Infrastructure_Programme_%20Trees.pdf)
- 10.10 Consider establishment of a community-based group to maintain, enhance and promote the amenity value of a watercourse or section thereof, or support and/or join an existing community-based group or NGO that is already involved in initiatives that help improve the amenity and/or ecological value of watercourses (see guideline 11).
- 10.11 Buildings and new developments should be orientated to face onto the watercourse to interface positively with it, to facilitate better amenity value of the watercourse. This, together with permeable boundary treatments (see guidelines 2 and 3), will promote and enhance surveillance, which, in turn, will enhance the feeling of safety of users of the watercourse, and promote utilisation.
- 10.12 No structures are permitted that restrict the general public's right of access to public open spaces or City land.
- 10.13 Access and/or service servitudes could be created alongside or provide access to watercourse corridors for servicing and/or maintenance requirements. Pedestrian pathways, which benefit a wider community rather than just the riparian landowner, could also be introduced. Ideally, riparian land in City ownership should remain so for public benefit.
- 10.14 The better the connectivity along a watercourse, the greater the opportunity for creation of recreational amenity.
- 10.15 Areas of shallow standing water and open channels could constitute safety threats to children and some adults. If appropriate, warning signs should be placed and local residents educated with regard to potential dangers.



Figure 36: Children enjoying an environmental education experience at the Upper Liesbeek River Garden. (Photo credit: A de Wet)

GUIDELINE 11:

WORK WITH YOUR COMMUNITY TO HELP IMPROVE AND MAINTAIN YOUR WATERCOURSE

Urban watercourses can be wonderful and valuable community assets, if appropriately managed and utilised. There are many examples of communities working together and with other stakeholders, to help enhance and improve the watercourse and adjacent public open space in their area, making them into valued community assets where people gather to recreate and enjoy green open space. Working together, we can achieve watercourse enhancements, which have social, ecological, and economic benefits.

- 11.1 Public awareness and accountability about how development and activities can influence the quality of water and the physical integrity of the instream and riparian environment are all important. This will help ensure that the condition of the watercourse can be maintained and/or improved.
- 11.2 Work with your neighbours and the City, and consider establishing a 'Friends' group or an 'Adopt a River Reach' group to lobby for, develop and implement projects and programmes that will result in maintenance and improvement of the watercourse. For example, development of a cohesive river corridor management plan, rehabilitation or landscaping plans, or regular litter clean-ups can all be considered.
- 11.3 Support existing NGOs and community groups who are working to improve watercourses and watercourse corridors. For information on different community groups working on watercourses, contact the City's CSRM Branch (see annexure A for contact details).
- 11.4 Private landowner participation is important for the success of watercourse protection and enhancement. Even small endeavours by each landowner, within an overarching framework or vision, can lead to cumulatively beneficial outcomes for a watercourse.
- 11.5 Engage with other communities who are working together to help improve their watercourse corridors (see annexure H). Lessons learnt can be shared between areas, and used or adapted to be context specific. Participate in relevant Catchment Management Forums, or other forums that may be established, to share knowledge and information. The City's CSRM Branch can advise if there is a Catchment Management Forum or another suitable forum available in your area (see annexure A for contact details).
- 11.6 A Compendium of Liveable Urban Waterways Case Studies is being developed. This profiles watercourses in the city that have been enhanced and which are providing social, ecological, and economic benefits. In it are examples where community action has resulted in watercourse improvements, and lessons learnt are highlighted. Once completed, the case study compendium will be available on the City's website.



Figure 37: Civil society actively working to improve the Liesbeek River canal. (Photo credit: M Winter)

ANNEXURE A:

KEY CONTACT DETAILS

Service requests

To report problems, such as leaking sewage pipes, overflowing sewers, illegal dumping, sediment-laden water or pollution running into watercourses, please contact the City using one of the following options:

- Online: www.capetown.gov.za/servicerequests
- Email: water@capetown.gov.za
- SMS: 31373 (maximum 160 characters)
- Call: 0860 103 089
- Visit a City walk-in centre: www.capetown.gov.za/facilities

Please give the street address and get a reference number.

Western leopard toad hotline

- Call: 082 516 3602

CITY OF CAPE TOWN DEPARTMENTS

City departments can be contacted as per details below. Alternatively, the City's call centre can be contacted on 0860 103 089.

Development Management Department

- Head office and district offices: <https://resource.capetown.gov.za/documentcentre/Documents/Forms%2C%20notices%2C%20tariffs%20and%20lists/TDA%20DM%20-%20Contacts.pdf>
- Additional information: <https://www.capetown.gov.za/Departments/Development%20Management%20Department>

Environmental Management Department

Environmental and Heritage Management Branch, district offices:

- Online: https://resource.capetown.gov.za/documentcentre/Documents/Forms%2c%20notices%2c%20tariffs%20and%20lists/EHM_District_Offices_Contact_List.pdf

Biodiversity Management Branch: Invasive Species Unit:

- Call: 021 444 2357
- Email: invasive.species@capetown.gov.za

Water and Sanitation Department

Catchment, Stormwater and River Management Branch:

- Call: 021 400 1205
- Email: water@capetown.gov.za

NATIONAL AND PROVINCIAL DEPARTMENTS

National Department of Water and Sanitation (DWS)

- Call: 021 941 6100
- Online: www.dws.gov.za

National Department of Forestry, Fisheries and the Environment (DFFE)

- Environmental crime hotline: 0800 205 005
- Online: www.environment.gov.za

Biosecurity Compliance

- Call: 021 441 2700
- Email: iascompliance@env.gov.za

Provincial Department of Environmental Affairs and Development Planning (DEA&DP)

- Call: 021 483 4091
- Email: enquiries.eadp@westerncape.gov.za
- Online: www.westerncape.gov.za/eadp

ANNEXURE B:

NATIONAL WATER ACT EXTRACTS

SECTION 21

Section 21 water use includes -

- (a) taking water from a water resource;
- (b) storing water;
- (c) impeding or diverting the flow of water in a watercourse;
- (d) engaging in a stream flow reduction activity contemplated in section 36;
- (e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- (f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- (g) disposing of waste in a manner which may detrimentally impact on a water resource;
- (h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- (i) altering the bed, banks, course or characteristic of a watercourse;
- (j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- (k) using water for recreational purposes.

SCHEDULE 1: PERMISSIBLE USE OF WATER

In terms of the National Water Act, 36 of 1998, Schedule 1, Permissible Use of Water:

- (1) A person may, subject to this Act -
 - (a) take water for reasonable domestic use in that person's household, directly from any water resource to which that person has lawful access;
 - (b) take water for use on land owned or occupied by that person, for -
 - (i) reasonable domestic use;
 - (ii) small gardening not for commercial purposes;
 - (iii) the water of animals (excluding feedlots) which graze on that land within the grazing capacity of that land;
 from any water resource which is situated on or forms a boundary of that land, if the use is not excessive in relation to the capacity of the water resource and the needs of other users;
 - (c) store and use runoff water from a roof;
 - (d) in emergency situations, take water from any water resource for human consumption or firefighting;
 - (e) for recreational purposes -
 - (i) use the water or the water surface of a water resource to which that person has lawful access; or
 - (ii) portage any boat or canoe on any land adjacent to a watercourse in order to continue boating on that watercourse; and
 - (f) discharge -
 - (i) waste or water containing waste; or
 - (ii) runoff water, including stormwater from any residential, recreational, commercial or industrial site, into a canal, sea outfall or other conduit controlled by another person authorised to undertake the purification, treatment or disposal of waste or water containing waste, subject to the approval of the person controlling the canal, sea outfall or other conduit.
- (2) An entitlement under this Schedule does not override any other law, ordinance, by-law or regulation, and is subject to any limitation or prohibition thereunder.

ANNEXURE C:

NATIONAL ENVIRONMENTAL MANAGEMENT ACT EXTRACTS

NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 107 OF 1998, Regulations No. R. 983, 4 December 2014

The following are the listed activities in terms of EIA Regulations Listing Notice 1 (2014, as amended July 2018) that are **most likely to be relevant to development or activities in relation to watercourses**.

Note: The listed activities are periodically amended. Always refer to the legislation or contact DEA&DP to confirm activities listed.

ACTIVITY 12

The development of -

- (i) dams or weirs, where the dam or weir, including infrastructure and water surface areas exceeds 100 square metres; or
- (ii) infrastructure or structures with a physical footprint of 100 square metres or more, where such development occurs -
 - (a) within a watercourse;
 - (b) in front of a development setback; or
 - (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse, excluding -
 - (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;
 - (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;
 - (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;
 - (dd) where such development occurs within an urban area;
 - (ee) where such development occurs within existing roads, road reserves or railway line reserves; or
 - (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within six weeks of the commencement of development and where indigenous vegetation will not be cleared.

ACTIVITY 13

The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.

ACTIVITY 19

The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse, but excluding where such infilling, depositing, dredging, excavation, removal or moving -

- (a) will occur behind a development setback;
- (b) is for maintenance purposes undertaken in accordance with a maintenance management plan;
- (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;
- (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or
- (e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.

ACTIVITY 27

The clearance of an area of one hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for -

- (i) the undertaking of a linear activity; or
- (ii) maintenance purpose undertaken in accordance with a maintenance management plan.

ACTIVITY 48

The expansion of -

- (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or
- (ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more, where such expansion occurs -
 - (a) within a watercourse;
 - (b) in front of a development setback; or
 - (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse, excluding -
 - (aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;
 - (bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;
 - (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 23 in Listing Notice 3 of 2014, in which case that activity applies;
 - (dd) where such expansion occurs within an urban area; or
 - (ee) where such expansion occurs within existing roads, road reserves or railway line reserves.

ACTIVITY 50

The expansion and related operation of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, where the combined capacity will be increased by 50 000 cubic metres or more.

ACTIVITY 66

The expansion of a dam where -

- (i) the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, was originally five metres or higher and where the height of the wall is increased by 2,5 metres or more; or
- (ii) where the high-water mark of the dam will be increased with 10 hectares or more.

ANNEXURE D:

ACTIVITIES FOR WHICH A MAINTENANCE MANAGEMENT PLAN CAN BE DEVELOPED

Note: The NEMA EIA Regulations change periodically and they should be referred to in order to ensure that the most updated regulations and activities are used.

Extract from DEA&DP document: *Information Document for drafting a Management Maintenance Plan for a Watercourse*, available at: www.westerncape.gov.za/eadp/resource-library/policies-and-guidelines

The use of this document for the development of an MMP for a watercourse **will only** be considered when the proposed maintenance activities constitute any one of the following listed activities identified in terms of the NEMA EIA Regulations, 2014 (as amended):

EIA REGULATIONS LISTING NOTICE 1 OF 2014 (AS AMENDED):

- **Activity 19, Listing Notice 1:** The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving -
 - (a) will occur behind a development setback;
 - (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or
 - (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.

Note: Points (d) and (e) will not apply as these activities fall within the coastal zone.

- **Activity 27, Listing Notice 1:** The clearance of an area of one hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for -
 - i The undertaking of a linear activity; or
 - ii Maintenance purposes undertaken in accordance with an MMP.

EIA REGULATIONS LISTING NOTICE 2 OF 2014 (AS AMENDED):

- **Activity 15, Listing Notice 2:** The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for -
 - I The undertaking of a linear activity; or
 - II Maintenance purposes undertaken in accordance with an MMP.
- **Activity 24, Listing Notice 2:** The extraction or removal of peat or peat soils, including the disturbance of vegetation or soils in anticipation of the extraction or removal of peat or peat soils, but excluding where such extraction or removal is for the rehabilitation of wetlands in accordance with an MMP.

EIA REGULATIONS LISTING NOTICE 3 OF 2014 (AS AMENDED):

- **Activity 12, Listing Notice 3:** The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with an MMP.
 - i Western Cape
 - (i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;
 - (ii) Within critical biodiversity areas identified in bioregional plans;
 - (iv) On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; or
 - (v) On land designated for protection or conservation purposes in an Environmental Management Framework adopted in the prescribed manner, or a Spatial Development Framework adopted by the MEC or Minister.

Note: Point (iii) will not apply as this activity falls within the coastal zone.

ANNEXURE E: GUIDELINES FOR SPECIES SELECTION

The following table (continued on the next spread), lists indigenous species suitable for landscaping.

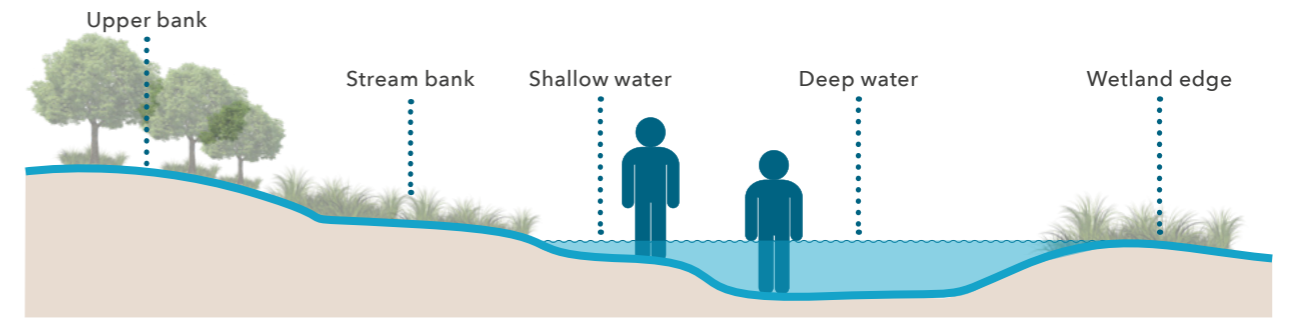


Figure 38: Hydrozones

Botanical name	iNaturalist hyperlink	Common name*	Growth form	Aspect: sun	Aspect: semi-shade	Aspect: shade	Soil: sandy	Soil: loam	Soil: clay
<i>Aponogeton distachyos</i>	Aponogeton distachyos	Cape pond weed	aquatic	×	×		×	×	×
<i>Asparagus scandens</i>	Asparagus scandens	Climbing asparagus	climber		×	×	×	×	
<i>Athanasia crithmifolia</i>	Athanasia crithmifolia	Samphire athanasia	tall shrub	×			×	×	
<i>Berzelia lanuginosa</i>	Berzelia lanuginosa	Common button bush	tall shrub	×			×	×	
<i>Bolboschoenus maritimus</i>	Bolboschoenus maritimus	Sea club-rush	sedge	×			×	×	×
<i>Brabejum stellatifolium</i>	Brabejum stellatifolium	Wild almond	tree, large	×	×		×	×	
<i>Carex clavata</i>	Carex clavata	Swamp grass	sedge	×	×	×	×	×	
<i>Cassine peragua</i>	Cassine peragua	Cape saffron	tree, large	×	×			×	
<i>Chasmanthe floribunda</i>	Chasmanthe floribunda	Cobra lily	geophyte	×	×		×	×	×
<i>Cliffortia odorata</i>	Cliffortia odorata	Wild vine	short shrub, ground-cover	×	×		×	×	
<i>Cunonia capensis</i>	Cunonia capensis	Red alder	tree, large	×	×		×	×	
<i>Curtisia dentata</i>	Curtisia dentata	Assegai tree	tree, large	×	×			×	
<i>Cyperus textilis</i>	Cyperus textilis	Umbrella sedge	sedge	×	×	×	×	×	×
<i>Diospyros whyteana</i>	Diospyros whyteana	Bladder-nut	tree, small		×	×	×	×	×
<i>Elegia capensis</i>	Elegia capensis	Horsetail restio	restio	×			×	×	
<i>Elegia tectorum</i>	Elegia tectorum	Cape thatching reed	restio	×			×	×	
<i>Erica caffra</i>	Erica caffra	Water tree erica	tall shrub/small tree	×	×		×	×	
<i>Eriocephalus africanus</i>	Eriocephalus africanus	Wild rosemary	short shrub	×	×		×	×	×
<i>Falkia repens</i>	Falkia repens	African morning glory	groundcover	×	×	×	×	×	×
<i>Felicia aethiopica</i>	Felicia aethiopica	Dwarf felicia	short shrub	×	×		×	×	×
<i>Felicia amoena</i>	Felicia amoena	Blue aster	short shrub, ground-cover	×			×	×	
<i>Ficinia nodosa</i>	Ficinia nodosa	Knotted club-rush	sedge	×			×	×	
<i>Gunnera perpensa</i>	Gunnera perpensa	Wild rhubarb	tall shrub	×	×		×	×	×
<i>Halleria lucida</i>	Halleria lucida	Tree fuchsia	tree, small	×	×		×	×	
<i>Helichrysum cymosum subsp. cymosum</i>	Helichrysum cymosum cymosum	Gold carpet	groundcover	×	×		×	×	×
<i>Helichrysum patulum</i>	Helichrysum patulum	Honey everlasting	short shrub	×	×		×	×	×
<i>Ilex mitis</i>	Ilex mitis	African holly	tree, large	×	×		×	×	
<i>Isolepis prolifera</i>	Isolepis prolifera	Budding club-rush	sedge	×	×		×	×	
<i>Juncus capensis</i>	Juncus capensis	Cape rush	sedge	×			×	×	
<i>Juncus effusus</i>	Juncus effusus	Common rush	sedge	×	×		×	×	

* Common names may vary.

Water timing: perennial	Water timing: seasonal	Water movement: flowing	Water movement: standing	Water movement: damp	Water movement: well-drained	Hydrozone: deep water	Hydrozone: shallow water	Hydrozone: stream banks or wetland edge	Hydrozone: upper bank	Location: mountains	Location: foothills	Location: lowlands	Garden size: small	Garden size: large
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Botanical name	iNaturalist hyperlink	Common name*	Growth form	Aspect: sun	Aspect: semi-shade	Aspect: shade	Soil: sandy	Soil: loam	Soil: clay
<i>Juncus lomaphyllus</i>	Juncus lomaphyllus	Fringe-leafed rush	sedge	✗			✗	✗	✗
<i>Kiggelaria africana</i>	Kiggelaria africana	Wild peach	tree, medium	✗	✗		✗	✗	✗
<i>Kniphofia uvaria</i>	Kniphofia uvaria	Red-hot poker	geophyte	✗	✗		✗	✗	
<i>Leonotis leonurus</i>	Leonotis leonurus	Wild dagga	tall shrub	✗	✗		✗	✗	✗
<i>Lobelia anceps</i>	Lobelia anceps	Swamp lobelia	groundcover	✗	✗	✗	✗	✗	
<i>Monopsis lutea</i>	Monopsis lutea	Gold lobelia	groundcover	✗			✗	✗	✗
<i>Nymphaea nouchali</i> var. <i>caerulea</i>	Nymphaea nouchali caerulea	Blue waterlily	aquatic	✗			✗	✗	✗
<i>Nymphoides thunbergiana</i>	Nymphoides thunbergiana	Floating hearts	aquatic	✗			✗	✗	✗
<i>Olea europaea</i> subsp. <i>africana</i>	Olea europaea cuspidata	Wild olive	tree, medium	✗	✗		✗	✗	✗
<i>Ornithogalum thyrsoides</i>	Ornithogalum thyrsoides	Chincherinchee	geophyte	✗			✗	✗	✗
<i>Orphium frutescens</i>	Orphium frutescens	Sea-rose	short shrub	✗	✗		✗	✗	
<i>Pelargonium capitatum</i>	Pelargonium capitatum	Rose-scented geranium	short shrub	✗	✗		✗	✗	
<i>Pelargonium cucullatum</i>	Pelargonium cucullatum	Hooded-leaf geranium	tall shrub	✗	✗		✗	✗	✗
<i>Pennisetum macrourum</i>	Pennisetum macrourum	Riverbed grass	grass	✗			✗	✗	✗
<i>Plecostachys serpyllifolia</i>	Plecostachys serpyllifolia	Cobweb bush	groundcover	✗	✗		✗	✗	
<i>Podalyria calyptata</i>	Podalyria calyptata	Water blossom pea	tall shrub/small tree	✗	✗		✗	✗	
<i>Podocarpus latifolius</i>	Podocarpus latifolius	True yellowwood	tree, medium	✗	✗		✗	✗	
<i>Polygala myrtifolia</i>	Polygala myrtifolia	September bush	tall shrub	✗	✗		✗	✗	✗
<i>Potamogeton pectinatus</i>	Stuckenia pectinata	Fennel-leaved pond-weed	aquatic	✗	✗		✗	✗	✗
<i>Prionium serratum</i>	Prionium serratum	Palmiet	aquatic	✗	✗		✗	✗	
<i>Psoralea aphylla</i>	Psoralea aphylla	Leafless fountain-bush	tall shrub	✗	✗		✗	✗	✗
<i>Psoralea pinnata</i>	Psoralea pinnata	Fountain bush	tall shrub	✗	✗		✗	✗	
<i>Rapanea melanophloeos</i>	Rapanea melanophloeos	Cape beech	tree, large	✗	✗		✗	✗	✗
<i>Restio paniculatus</i>	Restio paniculatus	Calopsis	restio	✗			✗	✗	✗
<i>Restio quadratus</i>	Restio quadratus	Quad reed	restio	✗	✗		✗	✗	
<i>Rumohra adiantiformis</i>	Rumohra adiantiformis	Seven-weeks fern	fern	✗	✗	✗	✗	✗	
<i>Salix mucronata</i> subsp. <i>mucronata</i>	Salix mucronata mucronata	African willow	tree, medium	✗	✗		✗	✗	
<i>Salvia africana-lutea</i>	Salvia aurea	Brown salvia	tall shrub	✗			✗	✗	
<i>Scolopia mundii</i>	Scolopia mundii	Red-pear	tree, large	✗	✗	✗	✗	✗	✗
<i>Senecio halimifolius</i>	Senecio halimifolius	Tobacco bush	short shrub	✗	✗		✗	✗	
<i>Sparaxis bulbifera</i>	Sparaxis bulbifera	Airleaf satinflower	geophyte	✗			✗	✗	✗
<i>Sideroxylon inerme</i>	Sideroxylon inerme	White milkwood	tree, large	✗	✗		✗	✗	✗
<i>Tarchonanthus littoralis</i>	Tarchonanthus littoralis	Coastal camphor bush	tree, small	✗	✗		✗	✗	
<i>Todea barbara</i>	Todea barbara	King fern	fern	✗	✗	✗	✗	✗	
<i>Wachendorfia thyrsiflora</i>	Wachendorfia thyrsiflora	Marsh butterfly lily	geophyte	✗	✗		✗	✗	
<i>Watsonia meriana</i>	Watsonia meriana	Watsonia	geophyte	✗			✗	✗	✗
<i>Zantedeschia aethiopica</i>	Zantedeschia aethiopica	Arum lily	geophyte	✗	✗	✗	✗	✗	

* Common names may vary.

Water timing: perennial	Water timing: seasonal	Water movement: flowing	Water movement: standing	Water movement: damp	Water movement: well-drained	Hydrozone: deep water	Hydrozone: shallow water	Hydrozone: stream banks or wetland edge	Hydrozone: upper bank	Location: mountains	Location: foothills	Location: lowlands	Garden size: small	Garden size: large
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ANNEXURE F:

REFERENCES AND RESOURCES

USEFUL WEBSITES:

- Cape Town Invasives: www.capetowninvasives.org.za
- City of Cape Town Development Management Department: www.capetown.gov.za/Departments/Development%20Management%20Department
- City of Cape Town Environmental Management Department: www.capetown.gov.za/Departments/Environmental%20Management%20Department
- City of Cape Town Water and Sanitation Department: www.capetown.gov.za/Departments/Water%20and%20Sanitation%20Department
- Invasive Species South Africa: www.invasives.org.za
- National Department of Forestry, Fisheries and the Environment:
 - www.environment.gov.za/branches/biodiversity_conservation
 - www.environment.gov.za/branches/environmental_programmes
- National Department of Water and Sanitation: www.dws.gov.za
- Water Research Commission: <http://wrc.org.za>
- Western Cape Government Department of Environmental Affairs and Development Planning: www.westerncape.gov.za/eadp

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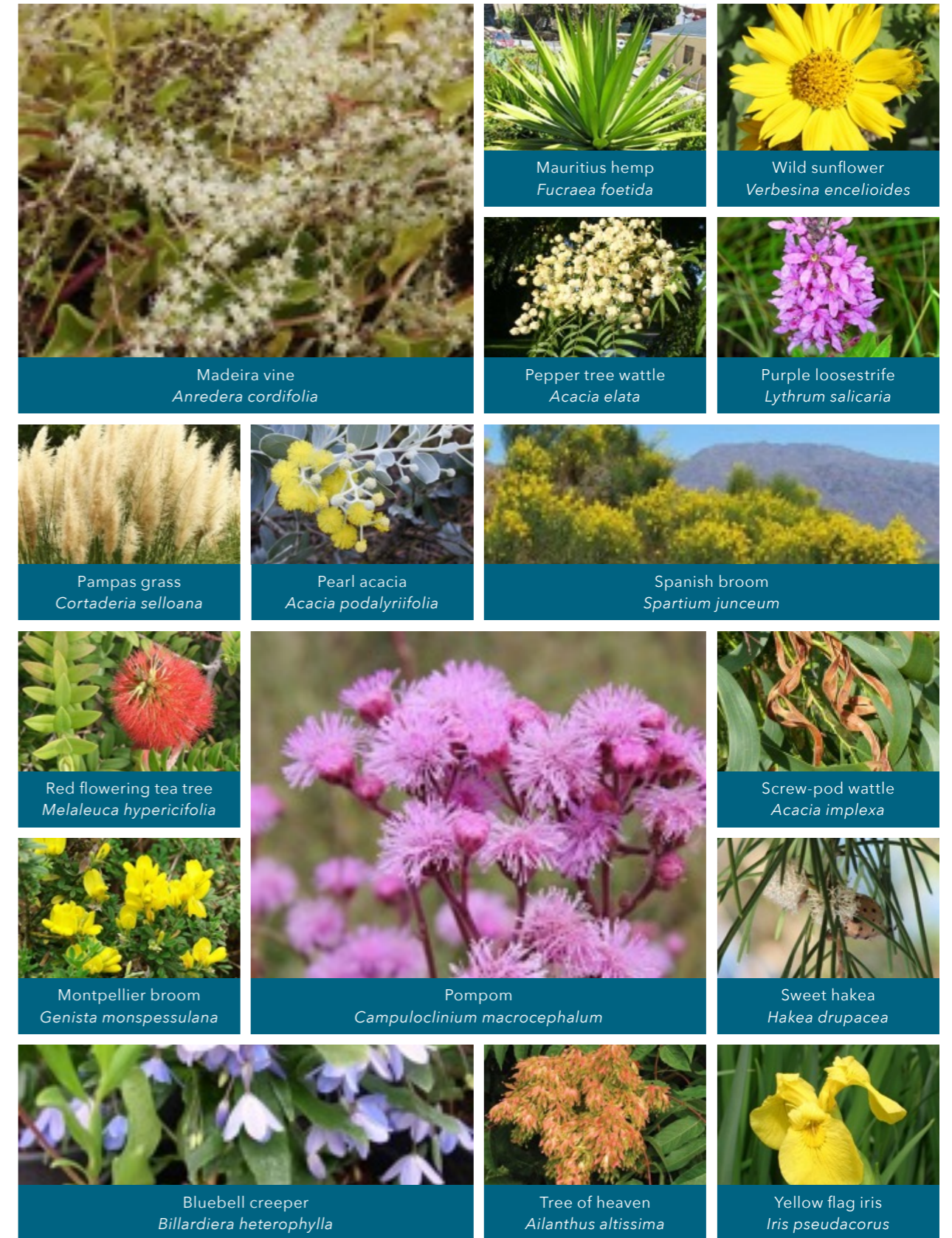
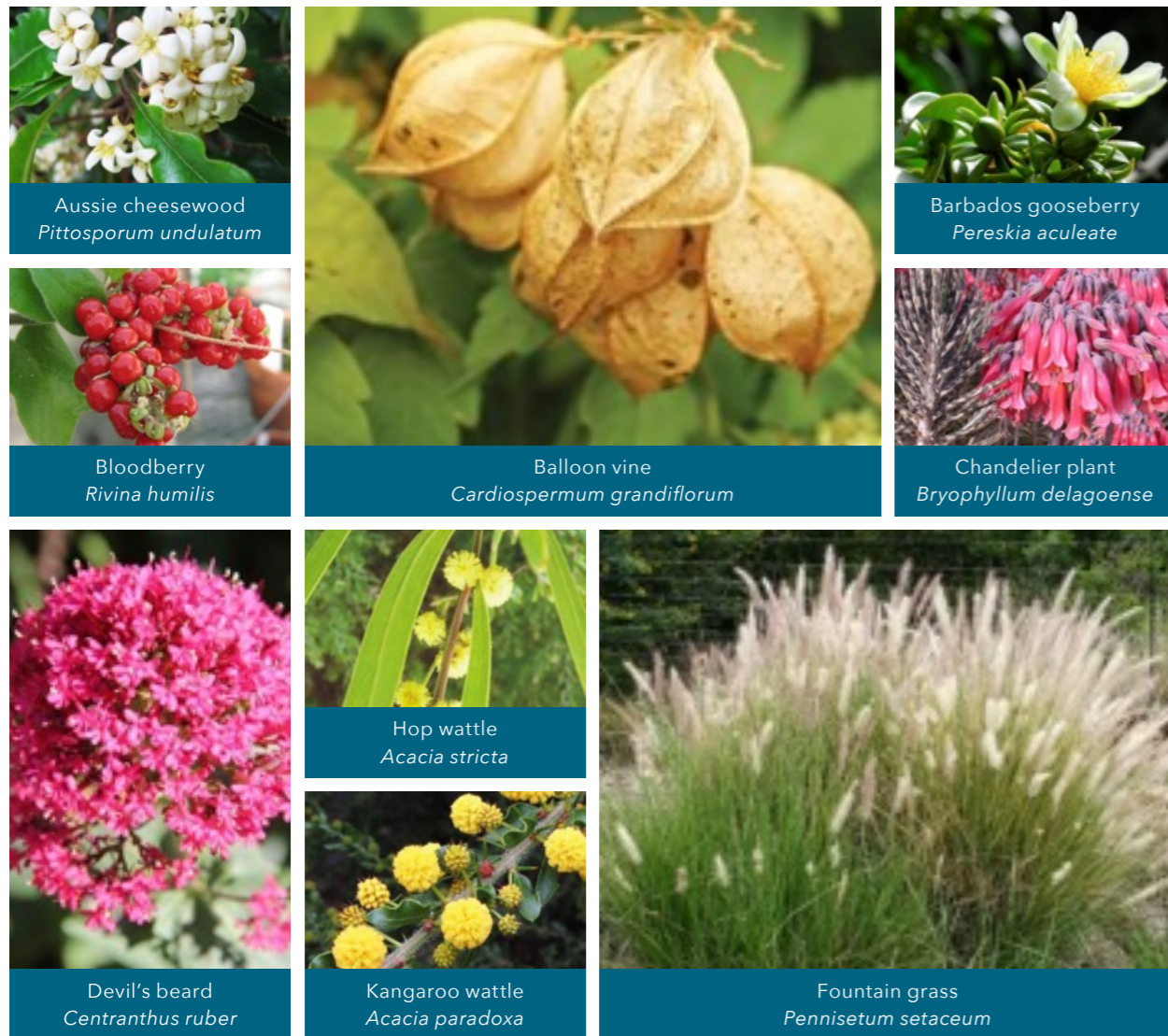
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ANNEXURE G:

CAPE TOWN'S EARLY DETECTION AND RAPID RESPONSE (EDRR) PROGRAMME: 25 TARGET PLANT SPECIES

Source: <https://edrr.capetowninvasives.org.za> (March 2021)

These are species of concern as they may become invasive.



ANNEXURE H:

NGOs AND COMMUNITY ORGANISATIONS

Below is a list of some of the various NGOs and community organisations who are actively working to help improve and maintain watercourses.

FRIENDS OF CONSTANTIA VALLEY GREENBELTS

- <https://m.facebook.com/FoCVGB/>
- <https://crra.co.za/friends-of-constantia-valley-greenbelts/>

FRIENDS OF DIE OOG

- <https://www.facebook.com/friendsofdieoog/>
- <https://dieoog.org.za/>

FRIENDS OF KIRSTENHOF WETLAND

- <https://www.facebook.com/Friends-of-Kirstenhof-Wetland-FKW-1385576761762942/>

FRIENDS OF PARADISE PARK

- <https://newlandsresidents.org.za/community/friends-of-paradise-park/>

FRIENDS OF RIETVLEI

- <https://www.facebook.com/friendsofrietvlei/>
- <https://friendsofrietvlei.co.za/>

FRIENDS OF SILVERMINE NATURE RESERVE - RIVERINE ROVERS

- <https://izele.org/455/friends-of-silvermine-nature-area-riverine-rovers/>

FRIENDS OF THE LIESBEEK

- <https://www.facebook.com/groups/friendsoftheliesbeek/>
- <https://fol.org.za/>

FRIENDS OF THE RIVERS OF HOUT BAY

- <https://www.facebook.com/forhb/>
- <http://friendsoftheriversofhoutbay.co.za/>

FRIENDS OF ZEEKOEVLEI AND RONDEVLEI

- <https://www.facebook.com/Friendsofzeekoevlei/>
- <http://www.zeekoevlei.co.za/friends-of-zeekoevlei-rondevlei/>

LOURENS RIVER CONSERVATION SOCIETY

- <https://www.facebook.com/LourensRiverConservationSociety/>

MOSSELBANK RIVER CONSERVATION TEAM

- <https://www.facebook.com/Mosselbank-River-Conservation-Team-398181364241437/>

PRINCESS VLEI FORUM

- <https://www.facebook.com/PrincessVleiForum/>
- <http://www.princessvlei.org/>

PRISTINE EARTH COLLECTIVE

- <https://www.facebook.com/pristineearthcollective/>
- <https://pristinecollective.com/>

RENEW THE ELSIESKRAAL RIVER

- <https://www.facebook.com/RenewElsieskraal/>

THE LITTERBOOM PROJECT

- <https://www.facebook.com/thelitterboomproject/>
- <https://www.thelitterboomproject.com/>

UPPER LIESBEEK RIVER GARDEN

- <https://www.facebook.com/pages/category/Park/Upper-Liesbeek-River-Garden-644644978943338/>

WESTERN CAPE WETLANDS FORUM

- <https://www.facebook.com/wcwetlandsforum/>

ZANDVLEI TRUST

- <https://www.facebook.com/pages/category/Nonprofit-organization/Zandvlei-Trust-178085508924234/>
- <https://zandvleitrust.org.za/>



ANNEXURE I:

LIST OF ACRONYMS AND ABBREVIATIONS

CARA:	Conservation of Agricultural Resources Act, 43 of 1983
CMMP:	City of Cape Town's Maintenance Management Plan
CSRM:	Catchment, Stormwater and River Management (City of Cape Town branch)
DEA&DP:	Department of Environmental Affairs and Development Planning (provincial department)
DFFE:	Department of Forestry, Fisheries and the Environment (national department)
DWS:	Department of Water and Sanitation (national department)
E&HM:	Environmental and Heritage Management (City of Cape Town branch)
EA:	environmental authorisation
ECO:	environmental control officer
EDRR:	Early Detection and Rapid Response
EIA:	Environmental Impact Assessment
EMPr:	Environmental Management Programme
GA:	General Authorisation (in terms of NWA)
GI:	green infrastructure
GINet:	Green Infrastructure Network
ISU:	Invasive Species Unit
MMP:	Maintenance Management Plan
NEMA:	National Environmental Management Act, 107 of 1998
NEMBA:	National Environmental Management: Biodiversity Act, 10 of 2004
NGO:	non-governmental organisation
NMT:	non-motorised transport
NWA:	National Water Act, 36 of 1998
SACNASP:	South African Council for Natural Scientific Professions
SUDS:	sustainable urban drainage system
WLT:	Western leopard toad
WSUD:	water-sensitive urban design
WUL:	Water Use Licence (in terms of NWA)

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