



# CONSERVATION MANAGEMENT AND REHABILITATION PLAN

## REDEVELOPMENT OF UMGABABA BEACH NODE ETHEKWINI MUNICIPALITY

DAEA Reference: DM/0056/06

April 2013

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This report is based on information from the original Environmental Management Plan prepared by FutureWorks! as part of the environmental authorisation process.

### Terms of Reference

The eThekweni Municipality has recognised the Umgababa Beach node development as an important and viable tourism asset within the Umgababa rural investment node. Phase 1 of the development process entails the provision of basic beach facilities and the creation of an environment that is conducive for the use of the facility by both the local community and tourists. The following activities are included:

- The upgrade of existing buildings to house information, orientation and security kiosks;
- The relocation of the existing swimming pool further inland and the construction of a second swimming pool;
- The upgrade of the day visitors site and construction of braai facilities;
- The construction of ablution facilities and showers;
- The construction of a walkway;
- The upgrade and expansion of existing roads (including stormwater infrastructure, pavements and parking bays);
- The provision of street lights and upgrade of existing lighting;
- The upgrade and renovation of the lifeguard tower and construction of a temporary structure on top of the existing building; and
- The rehabilitation of dune embankments and indigenous landscaping.

Environmental Authorisation for **Phase 1** of the proposed development was granted by the then KwaZulu-Natal Department of Agriculture, Environmental Affairs and Rural Development (DAEARD) on 5 July 2010, in accordance with the National Environmental Management Act, Act No 107 of 1998 and the Environmental Impact Assessment Regulations 2010. The conditions attached to the environmental authorisation stipulated that the required Environmental Management Plan must include the following:

*Clause 1.15.3 A Conservation Management and a Vegetation Rehabilitation Plan (inclusive of a management plan for the grassland areas on site and an Invasive Alien Vegetation Removal and Monitoring Plan). The plan must also include a burning plan (if applicable), shoreline management plan, management and restoration of the natural areas, alien vegetation programme, monitoring protocol and a protocol to deal with incidents such as spills, unplanned fires and erosion.*

*Clause 1.27 A programme to rescue and safely relocate locally significant flora and fauna from the site must be approved by Ezemvelo KZN Wildlife and the eThekweni Environmental Management Department prior to the commencement of construction.*

*Clause 1.38 A rehabilitation plan for the stabilisation of collapsed dune embankments must be developed, implemented and included in the EMP.*

This document is submitted on behalf of eThekweni Municipality - Economic Development and Investment Promotion Unit - in compliance with the above requirements. The Dune Rehabilitation Plan is synonymous with the Shoreline Management Plan, which is a stand-alone document and a further project deliverable of this appointment.

# 1 PURPOSE AND OBJECTIVES

## 1.1 Purpose

The purpose of this document is to establish sound environmental principles and guidelines in regards to:

- a) conservation of the natural environment present at the proposed Umgababa Beach Node redevelopment site; and
- b) rehabilitation of the degraded surrounding natural areas.

## 1.2 Objectives

The objectives for each component are outlined below:

### **Conservation:**

- To reduce the impact of construction on the terrestrial and marine environments;
- To protect the existing natural environment (landscape, fauna and flora) of the development site during construction and operation of the beach node;
- To maintain and/or enhance the natural environment and functionality through direct intervention (dune rehabilitation, alien invasive plant removal);
- To offer a simple monitoring protocol to document the condition of the natural landscape and key features, as well as rehabilitation efforts; and
- To assign responsibility for conservation during construction and operation of the beach facilities.

### **Rehabilitation:**

- To facilitate rehabilitation of degraded natural areas on-site;
- To outline the methods to be used to adequately control and eradicate invasive alien species (Section **Error! Reference source not found.**); and
- To assign responsibility for rehabilitation actions as part of construction as well as during operation of the beach facilities, once constructed.

## 1.3 Updated Project-specific EMP

The eThekweni Municipality appointed an independent environmental consultant, *FutureWorks!*, to compile and submit a site-specific draft EMP as part of the Basic Assessment Process to obtain environmental authorisation for the project. The EMP was prepared in accordance with the *eThekweni Municipality Generic Standard Environmental Management Plan for Construction Activities (2002)*, and detailed permissible and non-permissible activities during the construction, operation and maintenance of the proposed Umgababa Beach Node redevelopment. Thus construction works will also be executed in compliance with eThekweni's environmental requirements.

This site-specific draft EMP forms the basis of this document.

## 2 CONSERVATION MANAGEMENT

The Umgababa Beach Node development site retains valuable environmental assets that require conservation (protection) and /or rehabilitation. Existing natural areas play several important roles, such as of providing an example for appropriate landscaping and re-vegetation, a natural source of seed to rehabilitate areas, and as suitable habitat for local fauna. In order to successfully re-establish natural processes and coastal habitat, existing areas must be protected during construction activities and against its associated impacts, and be conserved into the future to maintain the natural biodiversity of this section of coastline.

### 2.1.1 Construction Phase

The following conservation specific conditions are applicable to the Construction Phase.

- Areas that contain sensitive natural vegetation and ecosystems (e.g. dunes) and potentially unstable areas (e.g. steep northern embankments) must be demarcated with appropriate fencing or hazard tape, and must remain marked for the duration of the construction phase. These areas are No-go Areas (this must be explained to all workers) and must be excluded from all development activities – workers entering these zones, for any reason other than rehabilitation work, must be disciplined.
- Footprints of proposed activities are restricted to outside of sensitive areas (e.g. dunes / forested areas / embankments).
- No vegetation may be cleared without prior permission from the applicable Engineer.
- Trees that are not to be cleared should be marked beforehand with danger tape. Only trees that have NOT been marked beforehand are therefore allowed to be removed. The ECO (and expert horticulturalist if appointed) must be given the opportunity to mark vegetation that is to be conserved before the Contractor begins clearing of the site.
- The removal, relocation, pruning, destruction of protected trees must be authorised in writing by the Department of Forestry & Fisheries prior to such activity. If a permit is not required, in relation to indigenous trees, then the activity must be approved by the ECO. Where ever possible indigenous trees should be relocated/trimmed rather than felled and to this end excavation and clearing is to be kept to a minimum.
- Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported material).
- Immediate re-vegetation of stripped areas and removal of aliens by weeding must take place. This significantly reduces the amount of time and money that must be spent on alien plant management during rehabilitation.
- Alien vegetation encroachment onto the site as a result of construction activities must be controlled during construction (**See Section Error! Reference source not found. below for more detail**).
- Gathering of firewood, fruit, muthi plants, crops or any other natural material on site or in areas adjacent to the site is prohibited.
- Disturbance to birds, animals and reptiles and their habitats should be minimised wherever possible.
- The hunting of birds and animals on site and in surrounding areas is forbidden. Snares and traps on site and in surrounding areas are also forbidden.
- Pesticides may not be used on the property. Herbicides may be used to control listed alien weeds and invaders only.
- Only appropriate herbicides that break down on contact with the soil should be used. Residual herbicides may not be used on the property.

### 2.1.2 Operational Phase

The following conservation specific conditions are applicable during the Operational Phase.

- Alien plant growth must be controlled constantly. Hand pulling is the preferred technique, but herbicides may be used in cases where infestation is dense or cut stumps need treatment.
- Trees have a natural lifespan, this must be acknowledged and new saplings encouraged to grow beneath old dying trees on the property.
- No hunting of any wildlife may be undertaken on the property.
- The coastal dune areas may not be cleared without first obtaining permission from the eThekweni environmental management department.
- 100% indigenous plant coverage must be maintained on site.
- Walkways on the property must be maintained in a good state with appropriate soil erosion control measures in place at all times.
- Fencing around dune areas and other important habitats must be maintained to restrict people accessing these sensitive areas.
- Walkways in close proximity to sensitive areas must be clearly signed at all times, and people must be encouraged not to leave the paths, collect flowers, plants or wildlife.

## 2.2 Fauna and Flora Rescue Programme

Care must be taken to conserve existing plant and animal life on, and in areas surrounding the site. A Rescue Programme for indigenous plants and fauna must be implemented, consisting of the following activities.

- Construction must avoid ecologically sensitive areas and extensive areas of natural habitat as much as possible. The area to be cleared must be kept to an absolute minimum.
- The ECO (and expert horticulturalist if appointed) must be given the opportunity to mark vegetation that is to be avoided/rescued and temporarily stored or relocated before the Contractor begins clearing the site.
- The cleared indigenous vegetation should be used in landscaping where feasible. Provisions should therefore be made for screened vegetation storage area adjacent to the site camp, away from major construction activities and operations, where plants will be maintained.
- The removal, relocation, pruning, destruction of indigenous or protected trees must be authorised in writing by the Department of Forestry & Fisheries for such activity. If a permit is not required, then the activity must be approved by the ECO.
- Relocation and pruning must be undertaken with care and by suitably trained individuals to ensure the survival of the respective plants. Damage must be kept to a minimum.
- Similarly, ECO / ecologist must be given the opportunity to inspect the site and identify fauna (including bird nests) to be relocated (where feasible) and suitable sites of relocation.
- Every attempt must be made to avoid direct encounters with fauna during construction. Where this is not feasible, fauna should be relocated with minimal stress to the animals. This should be undertaken by suitably trained individuals to appropriate areas.
- Ezemvelo KZN Wildlife must be contacted for the relocation of large animals.
- No animals are to be trapped (except for relocation), hunted or killed.

### 3 REHABILITATION PLAN

All disturbed areas, or areas which have been engineered/disturbed for the purpose of the re-development, are to be rehabilitated using an indigenous landscaping approach, also involving the removal of alien as well as invasive alien vegetation. Locally occurring indigenous vegetation must be sourced from surrounding nurseries where possible and not from the natural landscape (unless rescued from the footprint or servitude area on the site). The eradication of invasive alien plant species (IAPs) is critical for the rehabilitation of the Umgababa Beach Node development site, thus a separate Invasive Alien Vegetation Control Plan is provided under Section 0 below. Overall, rehabilitation will aid in the restoration of local biodiversity and indigenous green areas, as well as preventing erosion within the site.

#### 3.1.1 Construction Phase

The following rehabilitation specific conditions are applicable during the Construction Phase.

- Any natural vegetation in the development footprint should be stripped to a soil depth of 150mm, and immediately translocated to an area identified for rehabilitation.
- Top-soiling and re-vegetation of areas disturbed by construction activities, earthworks and removal of aliens by weeding must commence immediately after the completion of an activity. This significantly reduces the amount of time and money that must be spent on alien plant management during rehabilitation.
- Re-vegetation and landscaping must take place using as much locally indigenous plant material as possible. The species list contained in **Appendix 1** is a guide; additional species would need to be approved by the ECO.
- Rehabilitated areas must be regularly watered and kept free of weed re-growth.
- Dune areas that are to be rehabilitated should be replanted to indigenous dune vegetation, intermixed with a range of pioneer species (contained in **Appendix 1**) and maintained until the vegetation is well established. This must be undertaken under the guidance of the ECO and a coastal expert to ensure that coastal dune functionality is improved.
- Areas that exist in a natural state, such as the southern embankments, may not be cleared or replanted to any other kind of vegetation than the naturally occurring habitat species.
- Any eroded soil on paths / roadways / other areas must be collected and replaced in the area from which it was eroded. These high risk erosion areas must be protected from further soil erosion.
- All embankments are to be trimmed, shaped and re-planted to the satisfaction of the ECO.
- Rehabilitation must be executed in such a manner that surface runoff will not cause erosion of disturbed areas during and after rehabilitation.
- Construction vehicles entering sandy beach areas must first be authorised to do so (i.e. relevant authorisation/permit from eThekweni Parks Department).
- Construction vehicles are required to use formal access roads and limit disturbance to surrounding sensitive areas.
- Sandy beaches and coastal dunes must be stabilised and rehabilitated immediately after completion of construction or in event of accidental damage caused.
- Vegetation rehabilitation areas must be clearly demarcated /flagged to limit disturbance by the public.
- All waste (construction, general litter etc) must be removed as part of site rehabilitation.



### 3.1.2 Construction Site Closure

The following rehabilitation specific conditions are applicable to Construction Site Closure.

- All remaining construction infrastructure, building rubble, all imported materials and waste shall be removed from the site as directed by the ECO.
- The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint and fuels, etc. and these must be cleaned up.
- Waste material of any description, including receptacles, scrap, rubble and tyres, shall be removed entirely from contractor's camp and disposed of at a recognised landfill facility.
- The contractor's camp site shall be rehabilitated to its pre-establishment condition or agreed alternative. Where applicable, all hardened surfaces within the construction camp area must be ripped, and the area shall be top-soiled and re-vegetated using locally occurring indigenous grass and tree species.
- The Contractor is to check that all drainage systems are free of building rubble, spoil and waste materials and are functioning according to their design.
- All trimmed and / or compacted areas must be left rough to facilitate binding of topsoil and vegetation.
- Final rehabilitation of contractor sites shall be completed within a period specified by the Applicant.
- *Duty of Care and Remediation of Damage*, as per Section 28 of the National Environmental Management Act (Act no 107 of 1998) must be honoured.

### 3.1.3 Operational Phase

The following rehabilitation specific conditions are applicable during the Operational Phase.

- Alien plant growth must be controlled constantly. Hand pulling is the preferred technique, but herbicides may be used in cases where infestation is dense or cut stumps need treatment.
- Rehabilitated areas must be monitored on a regular basis through a monitoring programme (**See Section 5**). Degrading areas must receive immediate attention, in line with the above conditions.
- Rehabilitation measures must be implemented following peak visitor periods.
- Fertilisation of park areas and rehabilitated dunes must be limited, and where possible organic fertilisers should be used.
- Litter and other waste (e.g. illegal dumping) must be regularly cleared as part of ongoing rehabilitation and environmental management.

## 4 INVASIVE ALIEN VEGETATION CONTROL PLAN

Invasive alien plants (IAPs) are species non-indigenous to South Africa, which have become established in natural habitats, where they cause significant change and threaten the natural biodiversity through their infestations. Certain human activities, such as poor land management and the disturbance of natural vegetation, facilitate alien plant invasions. Alien plant encroachment is particularly damaging to natural habitats and is often associated with disturbance to the soil during construction activities. Care must be taken to conserve existing plant and animal life on, and in areas surrounding the site.

## 4.1 General environmental principles

All contractors are to ensure that their activities do not promote the spread of IAPS and all disturbed areas must be continually cleared of IAPs throughout the construction phase. Control of IAPs must continue throughout operation and life span of the Umgababa development node.

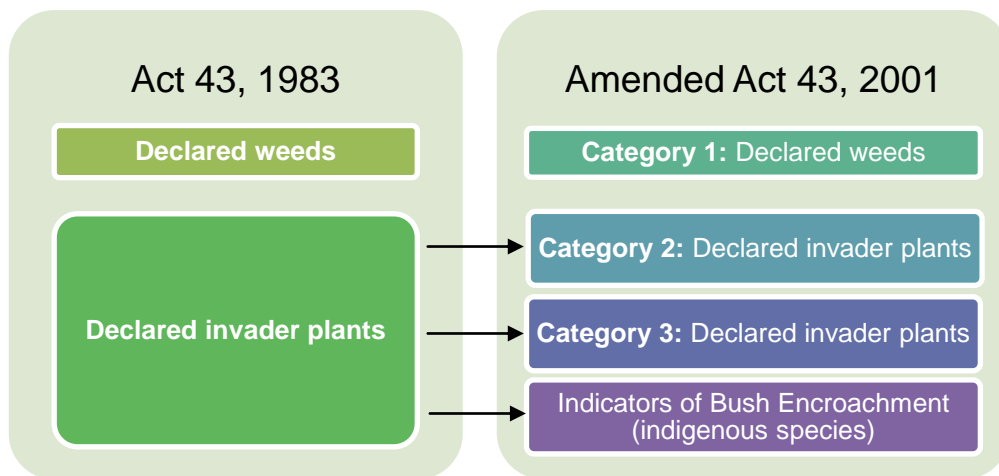
The objectives of this IAP control plan are as follows:

- To protect the indigenous vegetation of the development site;
- To prevent the spread of IAPs on site and to neighbouring properties;
- To provide effective methods of eradication that should be employed to reduce future maintenance and expenditure; and
- To establish a monitoring protocol to control the spread of IAPs (Section 5).

## 4.2 Declared weeds and invader plants

Weeds and invasive species must be controlled as per Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983, amended 2001). The Act identifies three specific groups of plants that **must not** be planted on the property purposefully under any circumstances. A full list of these species is provided in Annexure 2. Where these occur / grow up without intention, they should be removed as soon as possible.

### ABBREVIATED INTERPRETATION - Act 43, 2001



<b>Category 1: Declared weeds</b>	Prohibited plants
	Must be controlled, or eradicated where possible (except in bio-control reserves, which are areas designated for the breeding of bio-control agents)
<b>Category 2: Declared invader plants</b>	Mainly commercial plantation spp. but also plants for woodlots, animal fodder, soil stabilisation etc.
	Allowed only in demarcated areas under controlled conditions and in bio-control reserves Prohibited within 30 m of the 1:50 year floodline of watercourses or wetlands, or as directed by the executive officer
<b>Category 3: Declared invader plants</b>	Mainly ornamental species.
	No further planting allowed (except with special permission)
	No trade in propagative material

	Existing plants may remain but must be prevented from spreading
	Prohibited within 30 m of the 1:50 year floodline of watercourses or wetlands, or as directed by the executive officer

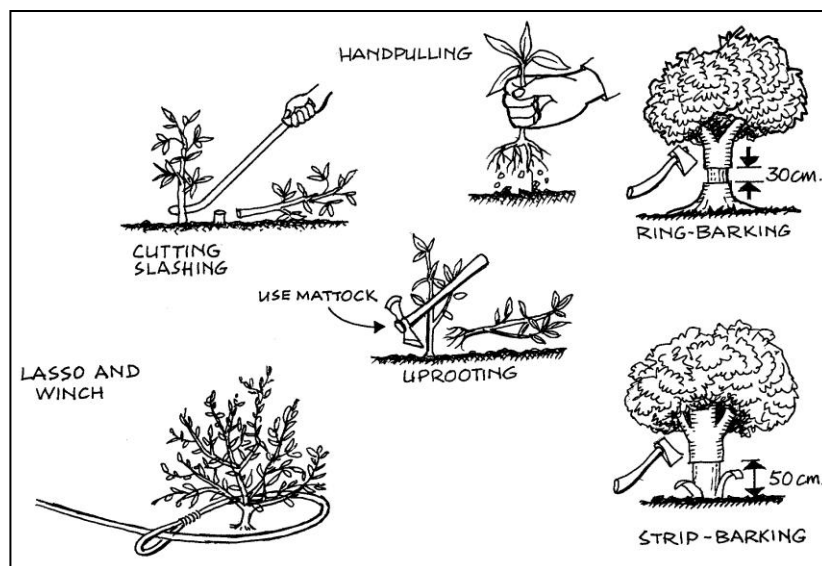
#### 4.2.1 Construction Phase

The following construction specific controls must be implemented for IAPs during the Construction Phase:

- Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported material).
- Immediate re-vegetation of stripped areas and removal of aliens by weeding must take place. This significantly reduces the amount of time and money that must be spent on alien plant management during rehabilitation.
- Alien vegetation encroachment onto the site as a result of construction activities must be controlled during construction.
- The alien plant removal and control method guidelines contained in **Section 4.3** and **Appendix 2** should be used when clearing invaded portions of the property.
- Cleared plant material must not be burnt on site.
- Potentially valuable alien plant material (wattle, gum) should be used productively rather than dumped.
- Pesticides may not be used on the property. Herbicides may be used to control listed alien weeds and invaders only.
- Only appropriate herbicides that break down on contact with the soil should be provided such that residual herbicides may not be used on the property.

#### 4.2.2 Operational Phase

During the operational phase and life span of the development, **alien plant growth must be controlled continuously**. Hand pulling is the preferred technique, but herbicides may be used in cases where infestation is dense or cut stumps need treatment.



Possible methods for the removal of invasive alien plants

### 4.3 Alien Invasive Plant Clearing

During the construction phase, the opportunity for alien vegetation to begin to establish itself is good due to the disturbance of soil and increase in both human and vehicular traffic. Prior to re-vegetation of the site, alien vegetation needs to be controlled. The main problem plants in the eThekweni municipality are listed below:

1. Lantana – *Lantana camara*;
2. Triffid Weed – *Chromolaena odorata*;
3. Bugweed – *Solanum mauritianum*;
4. Mexican Daisy – *Tithonia diversifolia*; and
5. Balloon Vine – *Cardiospermum grandiflorum*.

To ensure that these and other alien species do not take root in the disturbed soil, they should be hand pulled when the plants are still small and easily up-rooted. This operation of hand pulling will ensure that the grass and other natural vegetation has the best chance of becoming re-established.

#### 4.3.1 General Approach

A four step general approach is recommended:

1. Tackle areas of light infestation first;
2. Work in a downstream direction if in a drainage line or stream channel (i.e. work from the direction of the water source downwards);
3. Only tackle areas that can later be maintained; and
4. Follow-up is crucial to any alien clearing strategy.

For easy identification, the Contractor may contact the Environmental Management Branch of the eThekweni Municipality on Tel: 031 - 300 2517, Fax: 031 - 300 2225. The department provides free posters showing common invader plants clearly in colour photographs.

See **Annexure 2** for further details relating to alien plant removal.

### 4.4 Useful Contacts

<b>For advice and planning of control work:</b>		
The Plant Protection Institute, Cedara, runs a short course on “Alien Plant Control for Land Managers”	Tel: 033-355 9416 or 033-355 9413	Email: <a href="mailto:ntjg@natal1.agric.za">ntjg@natal1.agric.za</a>
The local District Conservation Officer, KZN Wildlife	Tel: 031-764 3515	Email: <a href="mailto:vermeul@kznwildlife.com">vermeul@kznwildlife.com</a>
The Ecological Advice Division, KZN Wildlife, Pietermaritzburg	Tel: 033-845 1999	
Alien Buster Campaign	Toll-free line: 0800 005 376	
<b>For information about the use of herbicides:</b>		
The Plant Protection Research Institute, Cedara (see above)		Also <a href="http://www.nda.agric.za">http://www.nda.agric.za</a>
<b>For Information about the use of bio-control:</b>		
The Plant Protection Research Institute, Pretoria	Tel: 012-329 3269 or 012-329 3770	Email: <a href="mailto:riethdb@plant2.agric.za">riethdb@plant2.agric.za</a>

<b>To find indigenous plants and professional Contractors who remove alien plants:</b>		
The Botanical Society – KZN Coastal Branch	Fax: 031-201 9958	Email: <a href="mailto:plantnet@iafrica.com">plantnet@iafrica.com</a>
The Wildlife and Environment Society of SA (WESSA) – KZN Region	Tel: 031-201 3126	Email: <a href="mailto:wlskzn@saol.com">wlskzn@saol.com</a>
Natural Areas Section, Durban Parks Department	Tel: 031-312 4466	Email: <a href="mailto:KateE@prscu.durban.gov.za">KateE@prscu.durban.gov.za</a>

## 5 REHABILITATION MONITORING PROGRAMME

The growth of IAPs must be monitored through a basic site survey undertaken twice a year / every 6 months. Prior to construction, areas of alien infestation and dense growth should be marked on a diagrammatic sketch of the development site, photographed and be rated on a scale of 1-3, with 3 being gross infestation. Fixed point photography, (that is, a photograph taken from the same point in the same orientation at each subsequent inspection), must be used to document growth and the success of control measures. Areas identified with gross infestation of invasive plants must receive immediate attention, using appropriate control methods as provided in this Conservation Management and Rehabilitation Plan.

Similarly, site rehabilitation must be monitored through a basic site survey undertaken bimonthly. (i.e. Every 2 months). Prior to construction, key areas requiring rehabilitation should be agreed to with the Applicant and Project Manager and be marked on diagrammatic sketch of the development site. Fixed point photography, must be used to document rehabilitation actions and success of mitigation. These areas should be visited soon after extreme weather events (e.g. heavy rains and storms, abnormally high sea level rise) and peak visitor periods. Rehabilitation should be ongoing for the life-span of the development site and further.

## 6 ENVIRONMENTAL INCIDENTS

### 6.1 Spill Contingency Plan

It is the Contractor's responsibility to identify any sources or potential sources of pollution and to take appropriate measures to prevent any pollution of the environment. An emergency spill kit (e.g. Drizit kit), a designated hazardous waste bin and scoop/spade must be available and visible at the construction site camp.

No vehicles transporting dangerous or hazardous chemicals are to be washed on site. Where a chemical is spilt, clean-up and rehabilitation must be executed. All concrete or bitumen mixing that is to take place during construction must be undertaken in a controlled environment and on a suitable impervious surface to avoid the contamination of the soil surrounding the area where the material is to be used. Any spillage or concrete/bitumen that has leaked off the designated mixing areas needs to be collected and disposed of at a registered landfill site. Waybills from the registered landfill site will need to be provided on request to the ECO.

Construction phase chemicals (e.g. diesel, lubricating oils, paints and solvents) are to be stored in a temporary impervious bund which is capable of containing 110% of the liquids being stored. Absorbent material must be kept on site to clean any minor chemical spills into bund or surrounding areas. Spent absorbent material is to be regarded as a hazardous waste and disposed of accordingly. Rainwater in the temporary bund is to be regarded as potentially contaminated and must not be released to the environment unless it is established by chemical analysis (e.g. COD) that water is not contaminated. Portable construction equipment (e.g. generators, pumps, etc.) to be placed on impervious surfaces, alternatively drip trays need to be provided for portable construction equipment.

A list of important contact numbers for important on-site staff and their roles, chemical spill response teams, waste companies, and necessary authorities must be visible and available at the site offices. Any chemical

spills of fuels, oils, or any other hazardous materials are to be reported by the Contractor to PM and ECO and must be attended to immediately. PM and / or ECO to evaluate extent of spill and required to report spill to the KZN Department of Agriculture and Environmental Affairs (DAEA) and Department of Water Affairs (DWA) if the spill is regarded as significant. Monitoring and / or rehabilitation of the impacted soils and /or groundwater may be required depending on authority requirements. The Contractor will be responsible for the cost of monitoring and / or rehabilitation of any soils / groundwater impacted by chemical spills from construction activities. Safe disposal certificates must be retained by Contractor and / or Project Manager for any material associated with chemicals / chemical spills disposed to landfill, and be submitted to the DAEA.

The following actions need to be taken in the event of a spill:

1. Stop the source of the spill;
2. Contain the spill;
3. Immediately contact the site environmental officer / health and safety officer and ECO;
4. All significant spills which pose a serious threat to the local environment must be reported to the ECO and Project Manager, DWA, DAEA, eThekweni Municipality and local fire department;
5. If the spill is significant, appropriate hazardous materials clean-up agents must be contracted immediately eg. Drizit Environmental cc. , Abzorbit or SpillTech;
6. Remove the spilled product for treatment or authorised disposal;
7. Determine in conjunction with the ECO if there is any soil, groundwater or other environmental impact;
8. If deemed necessary by DWA or the ECO, remedial action must be taken; and
9. The incident must be documented and reported to DAEA.

**Drizit Environmental cc., Abzorbit and SpillTech** offer 24hr hazmat spill clean-up response services and specialised clean-up services such as asbestos removal, bioremediation, oil skimmers, oil absorbents, spill kits, separators and tank cleaning. They dispose of low hazardous waste to Shongweni Landfill (EnviroServ) and high hazardous waste to appropriate sites in Johannesburg or Cape Town. They also offer waste management services.

## 6.2 Sediment & Erosion Management

Soil/ sand erosion through contractor activities must be prevented. Suitable erosion control measures shall be implemented in areas sensitive to erosion i.e. stormwater discharge points and embankments. These measures could include:

1. The suitable use of sand bags, soil saver or Hessian sheets;
2. The prompt rehabilitation of exposed sand / embankment areas (with indigenous vegetation for example where appropriate) to ensure that soil is protected from the elements;
3. The removal of vegetation, only as it becomes necessary for work to proceed;
4. Preventing the unnecessary removal of vegetation especially on steep areas;
5. Stabilising of embankment prior to commencement of major earthworks; or
6. Taking necessary precautions in terms of design, construction and earthworks.

Incorrect and insufficient stormwater management commonly results in erosion of sediment and damage to natural environments and rehabilitated areas. To prevent stormwater damage, stormwater run-off must be monitored and the drainage system assessed accordingly. A stormwater management plan must be drawn up and implemented to ensure proper management of stormwater on site during and after construction.

During site establishment, existing stormwater culverts and drains are to be located and covered with metal grids where needed to prevent blockages. Temporary cut off drains and berms may be required to capture stormwater and promote infiltration. Appropriate drainage mechanisms also need to be constructed along the access servitudes to minimise damage to the servitudes and control stormwater flow from the access road. Stormwater pipelines shall be consolidated where possible to reduce the number of discharge points within an area. Stormwater outflows and infrastructure must extend beyond the dune rehabilitation.

Detail regarding stormwater management is captured in the stand-alone Stormwater Management Plan.

Every effort must be made to reduce the impacts of construction and risk of erosion to the dune cordon and steep slopes. The following conditions apply if there are any disturbances/destruction caused to dune areas:

1. The extent of the damage must be minimised;
2. The dune areas must be rehabilitated immediately after any disturbances caused due to construction related activities;
3. The banks adjacent to the construction site must be stabilised to prevent collapse and erosion; and
4. All areas to be utilised by construction machinery must be clearly demarcated and rehabilitated accordingly.

### 6.2.1 Construction Phase

The following construction phase specific controls must be implemented for erosion management.

- The full length of the works shall not be stripped of vegetation prior to commencing other activities. The time that stripped areas are exposed shall be minimised wherever possible.
- Care should be taken to ensure that lead times are not excessive.
- Once an area has been cleared of vegetation, the top layer (nominally 150mm) of soil should be removed and stockpiled in a designated area.
- Topsoil stockpiles are to be located away from the main road and away from the property boundaries. They should be placed on flat land where possible and outside any natural water movement pathway.
- Stockpiles should not exceed 2m in height unless otherwise permitted by the Project Manager.
- If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or cloth, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases.
- All residual stockpiles must be removed to spoil or spread on site as directed by the ECO.
- Wind screening and stormwater control should be undertaken to prevent soil loss from the site.
- Top-soiling and re-vegetation shall commence immediately after the completion of an activity and at an agreed distance behind any particular work front.
- Cleared areas (particularly dune embankments) should be treated with organic soil conditioners such as filter press, bark chips, compost etc. Mass use of manure is not permitted.
- Should re-vegetation not be possible immediately, the cleared areas must be protected with packed brush, or appropriately battered with fascine work. Battering of all banks shall be such that cut and fill embankments are no steeper than previous natural slopes unless otherwise permitted by the Engineer.
- Side tipping of spoil and excavated materials shall not be permitted – all spoil material shall be disposed of as directed by the Engineer.
- The use of high velocity stormwater pipelines should be avoided in favour of open, high friction, semi-permeable channels wherever feasible.
- All embankments, unless otherwise directed by the Engineer, shall be protected by a cut off drain to prevent water from cascading down the face of the embankment and causing erosion.

### 6.2.2 Operational Phase

The following operational phase specific controls must be implemented for erosion management.

- Surface run-off must be managed such that all run-off from hard-surfaced areas is contained within the engineered run-off channel or designated areas.
- Open stormwater channels must be maintained in a well-vegetated state.
- Silt collected in the silt traps / retention ponds must be regularly cleared and disposed of either as top-dress for landscaped areas, or disposed of to a registered landfill site.
- Any soil erosion must be attended to immediately.
- Stormwater channel outfall points into watercourses or onto sandy beach must be stabilised at all times. Should soil erosion become evident, appropriate remediation must be undertaken immediately.

## 6.3 Fire Management

In its current state, the vegetation of the Umgababa Beach Node development site is largely disturbed and infested with alien invasive vegetation. Alien vegetation increases the risk of uncontrolled fires as dense areas represent abundant sources of fuel for burning. IAPS are also known to increase the intensity of fires, having an extreme impact on indigenous vegetation, and increasing the likelihood of extreme or catastrophic loss to infrastructure and/or human life. Furthermore, the disturbed grassland currently used for sports and recreational activities, including braai facilities, may also serve as a potential original and/or corridor for runaway fires.

### 6.3.1 Construction Phase

The following Construction Phase specific controls must be implemented for fire prevention.

- No fires are allowed on site except for the burning of firebreaks by a designated service provider/authority.
- Fire prevention facilities must be present at all storage facilities.
- Fires shall only be allowed in facilities or equipment specially constructed for this purpose at the construction camp(s).
- No open fires or uncontrolled fires shall be permitted on site. Open fires for cooking/ heating purposes shall be strictly prohibited.
- The contractor shall ensure that adequate fire-fighting equipment is present on the site all times and in good working order as per the Occupational Health and Safety Act (OHSA).
- The workforce must be made aware of fire prevention and fire fighting measures.
- Any flammable material shall be stored in areas where it does not present a fire hazard to surrounding vegetation and people. This includes bitumen, thinning agents, petrol, LPG containers, fuels and oils.

### 6.3.2 Operational Phase

In conjunction with the removal and continued controlled of alien vegetation, a sufficient number and type of fully functional fire fighting equipment must be available at the refurbished beach node facilities at all times, including extinguishers and fire hoses, as per the OHSA.

A controlled burning plan is not deemed necessary as the area in concern is proposed as an active recreation space.



## 7 ENVIRONMENTAL COMPLIANCE MONITORING

Royal HaskoningDHV has been appointed as the independent Environmental Control Officer to undertake regular inspections and reporting, in accordance with the EA obtained from DAEA, the project-specific Environmental Management Plan (EMP) including this conservation management and rehabilitation plan, and the general environmental requirements as stipulated by the eThekweni Municipality Generic EMP for construction contracts.. The scope of monitoring will include the following:

- Fort-nightly monitoring (once every two weeks) of construction activities to ensure compliance with the EMP and auxiliary plans (e.g. Waste Management Plan, Conservation Plan);
- Liaison and ongoing communication with the site Environmental Officer;
- Ensuring environmental awareness among members of the workforce;
- Ensuring that the Contractor/s and members of the construction workforce are aware of the requirements of the EMP;
- Implementing preventative and corrective actions in accordance with the requirements of the EMP and outcomes of environmental monitoring;
- Reporting of environmental incidents that may occur on site in accordance with the requirements of the EMP and environmental legislation; and
- Monitoring and reporting on compliance with the EMP to the KZN Department of Agriculture and Environmental Affairs (DAEA) and eThekweni Municipality.

## 8 ANNEXURE 1: PLANTING & REHABILITATION GUIDELINE

The following list should serve as a guideline only. The ECO and landscaper may wish to include other species. The key principle is to plant species that are locally indigenous rather than indigenous in the broadest sense.

### 8.1 SCOPE

If undertaken timeously, re-vegetation or replanting is the most cost effective action to reduce erosion, stability and alien infestation problems. This must take place immediately after the disturbance has taken place to be effective.

The function of replanting is to:

1. Catch and retain material to prevent erosion;
2. Armour the surface against erosion;
3. Support the slope by propping it from the base;
4. Reinforce the soil profile by increasing the shear resistance of the soil;
5. Drain the soil by drawing out water through the roots; and
6. Promote the infiltration of water into aquifers hence reducing the flow of water over the soil surface.

#### 8.1.1 Definitions

Contractor -	for the purposes of this specification, the Contractor refers to the party responsible for the re-vegetation of the site.
Endemic species –	those that occur naturally in a specific area.
Exotic –	In this context, a plant that is introduced to southern Africa from another continent.
Indigenous –	In this context, a plant that is native to southern Africa.
Invasive plants –	Those that are able to establish themselves in a natural or semi-natural habitat. They are generally habitat transformers.
Maintenance Period -	the period following planting and that includes those activities that are required to ensure the survival of all plant material until such time as a level of cover satisfactory to the Engineer has been achieved.

### 8.2 MATERIALS

Note that any lists of persons or suppliers in this specification are not exhaustive and serve only as a guideline. Contractors are free to source materials or expertise from sources other than those listed here.

#### 8.2.1 Plant Palette

The attached plant palette (at the back of the re-vegetation specification) has been selected for the Durban region and encompasses a range of different plant types. All plants in this specification are indigenous, except those marked with \*. Wherever possible, the Contractor should use species which occur naturally in the area of the site. Material should be sourced locally if possible, e.g. from the site during clearing.

#### 8.2.2 General Guidelines

Upon receipt of any plants, the Contractor is to ensure the following:

1. That the plants are in a good condition;
2. That they are free from pests and diseases. (Should this not be the case, the plants are to be removed from the site);
3. The plants are well formed and well rooted;
4. Potting materials are weed-free;

5. The plants are surrounded by sufficient topsoil to prevent the roots from drying out;
6. The plants are kept from being exposed to drying winds and sun for prolonged periods. Water logging should be avoided; and
7. Guiding Principles for the Landscaping of the Durban Inner City and KZN Coastal Belt is a useful publication and can be obtained from the City Environmental Department.

### 8.2.3 Specialist Nurseries

Afro Flora Nursery	Nyala Rd, Drummond	(031) 783 4512
Geoff's Jungle	Box 207, Pinetown 3600	(031) 702 9097
Gwahumbe Nursery	Box 54, Mid-Illovo 3750	(031) 781 1919
High Birnham Protea Nursery	Box 910, Pietermaritzburg 3200	(033) 330 2354
Indigiflora	Box 338, Munster 4278	(039) 319 1627
Jenny Dean Wildflowers	Box 1267, Hillcrest, 3650	(082) 469 4686
Mwali Tree Sales	Box 364, Umhlali 4390	(032) 525 8787
P.L.A.N.T. Depots	100 Brand Rd, Durban 4001	(031) 201 3126
Robyndale Nature Centre	10 Msenga Rd, Kloof 3610	(031) 764 6328
Silverglen Nursery	P O Box 3740, Durban 4000	(031) 404 5628
Tropical Nursery	830 Jan Smuts Highway, Dbn4091	(031) 208 4925
Twinstreams Nursery	Box 575, Mtunzini 3867	(035) 340 2530
Wildlife Nursery Dbn North	Box 546, Durban 4001	(031) 573 1056
Wildlife Nursery Glenwood	3 Frere Road, Durban 4001	(031) 465 6179

### 8.2.4 Landscaping Contractors

Acacia Landscapes	Dee Voigts, 16 Lancaster Grove, Dbn North 4051	(083) 995 6820
Design a Garden	Bruce Millican, Box 11, Kearsney 4453	(083) 638 8918
Eco Landscapes	Leanne O'Connor, Box 21605, Bluff 4036	(031) 266 1366
Emerald Landscapes	Brendon Fox, Box 704, Gillitts 3603	(031) 767 3774
Enviropools	Phil Page, Box 2190, Hillcrest 3650	(031) 767 3156
Garden Focus	Paula Summerfield, Box 13829, Cascades 3202	(082) 376 5604
Garden Line	Mary-Anne Paxton, 16 Park Lane, Kloof 3610	(031) 764 3692
Indiflora	Johan Bodenstein, Box 41845, Rosburgh 4072	(082) 577 0898
Kerry Jordan	Box 112 Umhlali, 4390	(083) 655 9470
Robyndale Landscapes	Rob Sandy, 10 Msenga Rd, Kloof 3610	(031) 764 6328

### 8.2.5 Gardening Consultants

Lyn Page	Box 2190, Hillcrest 3650	(031) 767 3156
Frank Edwards	122 Julia Rd, Overport, Durban 4001	(031) 209 4146

Geoff Nichols	8 Larch Rd, Durban 4001	(031) 312 3578
Jean Senogles	Box 40, Westville 3630	(031) 266 5240
Jenny Dean	Box 1267, Hillcrest 3650	(082) 469 4686
Gill Theunissen	Box 645, Umhlali 4390	(082) 560 7794
Wally Menne	Box 30577, Mayville 4058	(082) 444 2083
Susan Petsch	Box 365, Hillcrest 3650	(031) 767 1296

### **8.2.6 Nurseries Stocking Some Indigenous Plants**

Burgess Garden Pavilion	Box 83, Pavilion 3611	(031) 266 4366
Dieters Nursery	Box 255 Hillcrest 3650	(031) 7653173
Driefontein Garden Pavilion	Box 751, Umhlali 4390	(032) 525 8453
Dunrobin Nursery	Box 9, Botha's Hill 3660	(031) 777 1855
Follyfields Nursery	Box 27, Umzumbe 4225	(039) 684 6277
Grabow Nursery	Box 636, Hillcrest 3650	(031) 765 6003
Illovo Nursery	Box 144, Amanzimtoti 4125	(031) 916 2491
Kloof SPCA Nursery	C/o Box 406, Kloof 3610	(031) 763 1534
Maywood Nursery	Box 158, Mtubatuba 3935	(035) 550 1719
McDonalds Garden Centre	Box 238, Pietermaritzburg 3200	(033) 342 2191
Natal Sub-Tropical Nursery	Box 245, Ballito 4420	(032) 944 3622
Pick a Plant	Box 615, Kwa-Dlangezwa 3886	(082) 935 9757
Plants-a-plenty	35 Maryvale Rd, Westville 3630	(031) 266 7455
South Coast Garden Pavilion	Box 1636, Manaba Beach 4276	(039) 312 1108
Suregro Nursery	56 Caversham Rd, Pinetown 3601	(031) 701 2668
Top Crop Nursery	Box 32, Cramond 3220	(033) 569 1333
Zululand Nurseries	Box 360, Eshowe 3815	(035) 474 2666

**For further details or information, contact:**

Botanical Society  
P O Box 30544  
Mayville, 4058  
Fax: 031 2019958  
e-mail: [plantnet@iafrica.com](mailto:plantnet@iafrica.com)

### **8.2.7 Vetiver Grass\* Suppliers**

For information on Vetiver suppliers and costs contact the Institute of Natural Resources in Pietermaritzburg:

Jon McCosh  
Tel: 033-3460796  
Fax: 033-3460895  
email: [mccosh@nu.ac.za](mailto:mccosh@nu.ac.za)

### 8.2.8 Grass Seed

A summer and winter grass seed mix is set out in the table below. This is suitable to all areas within the eThekweni Municipality, although notes are included for specific scenarios.

McDonalds Seeds Pietermaritzburg (Bruce/Brian McDonald) Tel: 033-3460121  
Agricol Camperdown Tel: 031-7851181

#### RV2.8.1 Summer & Winter Grass Mix

Grass Type	Qty
Tef Grass* - <i>Eragrostis tef</i> (Ethiopoa)	5kg
Weeping Love Grass - <i>Eragrostis curvula</i>	5kg
Bermuda Grass - <i>Cynodon dactylon</i>	10kg
Common Finger Grass - <i>Digitaria eriantha</i> or <i>D. smutsii</i>	10kg
Rhodes Grass - <i>Chloris gayana</i>	6kg
<b>Total kg/ha:</b>	<b>36kg</b>

1. In wet areas add 5kg of a lawn grass seed. (e.g. *Paspalum Notatum*).
2. In shale areas add 5kg of Hairy Vetch\* (*Vicia villosa*) seed.
3. For winter greening add Italian Rye Grass seed (variety "Midmar" – *Lolium multiflorum*) in a quantity of 10kg/ha, or Fescue seed (variety "Alta" – *Festuca arundinacea*) also in a quantity of 10kg/ha.

For further questions on grass seed contact Clive Goble - Cynodon Specialist, Cell: 082 458 8856, Tel: 031-767 3057.

### 8.2.9 Mulch

Mulch is important for retaining moisture in the soil and for protecting plants from harsh wind, sun, and rain during the time that they take to become established. It may also be used to slow the growth of weeds. There are a range of materials that can be used successfully as mulch, and can be sourced from whatever is easily available on a particular site.

No mulch material may be harvested from areas outside of those that are to be disturbed by construction activities.

#### 8.2.9.1 Brush Cut Material

1. This is made up of small branches and twigs and can be harvested from areas of the site that need to be cleared for construction.
2. The Contractor should try to leave as much seed as possible on mulch material that is made up of indigenous vegetation.
3. Should it be necessary to harvest brush-cut material for mulch from areas other than those that need to be cleared for construction, the Engineer's approval must be obtained beforehand.

#### 8.2.9.2 Straw / Hay

1. Straw or hay makes excellent mulching material. Buy or harvest locally occurring wheat straw or thatch grass. (e.g. Weeping love grass).
2. The straw or hay must be checked for alien plant material as well as pests and diseases before it is brought onto the site.
3. Should it be necessary to harvest straw or thatch grass for mulch from areas other than those that need to be cleared for construction, the Engineer's approval must be obtained beforehand.

#### 8.2.9.3 Wood Chips

1. Wood chips can be obtained from wood or paper mills and make good mulching material.

2. Manager: Verge and Arboriculture of the eThekweni Parks Department can be contacted to obtain tree-chipping material which is accumulated from felling operations within the municipality. Tel: 031-205 1403, Fax: 031-205 1368.
3. Pine bark is a good mulching material and can be obtained from National Plant Foods. Contact Sonny Singh on Tel: 031-782 3105.
4. Wood chippings and pine bark can also be obtained from Mondi, contact Rafik Gafoor on Tel: 031-451 2319 or from Gromed Organics, contact Roddy Howard Tel: 033-569 1631 or Cell: 082 601 5416.

#### 8.2.9.4 Compost

A good source of compost is the organic matter that is generated by garden refuse. Durban Solid Waste has a list of garden refuse sites within the municipality and can be contacted on Tel: 031 - 2631371, Fax: 031 – 2631310. (See also Section D of the accompanying Generic Environmental Management Plan).

#### 8.2.10 General Fertilizer

The following fertilisers (or similar) can be used in most soil conditions and are suitable in the eThekweni area:

1. 2:3:2(22%);
2. 4:15(37%); or
3. Limestone Ammonium Nitrate - LAN (28%)

#### 8.2.11 Organic Fertilisers

Horse / chicken / cattle manure as well as products such as “Bounce Back” (Neutrog Organic Fertiliser) can be used.

#### 8.2.12 Topsoil and Subsoil

This will either have been stockpiled from the site during site establishment and construction, or will have been imported. Wherever possible, existing soil on the site should be enriched with organic matter instead of importing topsoil. (The removal of topsoil from other areas could itself be causing environmental damage and is not a sustainable practice).

Should soils be imported, they should be checked for quality, i.e.: that the consistency is suitable for the function it is required for; that it is free of alien plants / seedlings; that it has not been contaminated by any chemicals etc.

#### 8.2.13 “Benchmark” Physical and Chemical properties of Topsoil

Texture:	Sand (0.05-200mm) Max 70% Min 50%	Silt (0.002 – 0.05mm) Max 20% Min 10%	Clay (less than 0.002mm) Max 30% Min 20%
Soil Reaction:	6.0 - 7.0 pH		
Stone Content:	2mm-50mm 35%max dry weight, of which the fraction of 2mm-5mm must not exceed 20% by dry weight		
Max stone size:	50mm, any dimension		
Electrical Conductivity:	100-1500 micromgo per cm on a 1:2:5 (w/v) soil-water extract		
Extractable Nitrogen (N):	Not less than 0.2%		
Extractable Phosphorous (P):	Not less than 35ppm		
Extractable Potassium (K):	Not less than 100ppm		

Extractable Magnesium (Mg):	Not less than 80ppm
Extractable Sodium:	Not less than 80ppm
Organic Matter:	<ol style="list-style-type: none"> <li>1. Not less than 4% by dry weight in any circumstances.</li> <li>2. Where the textural clay of soil offered contains more than 27% clay and less than 45% sand then the organic matter of the soil must be raised to 5% by dry weight.</li> <li>3. Where the soil contains more than 60% sand the organic matter of the soil is required to be raised to 6% by dry weight.</li> <li>4. Where organic matter is required to be incorporated into the topsoil the type of material must be agreed with the Engineer and the incorporation be carried out at the Contractor's expense.</li> </ol>

### 8.2.14 Recommended Soil Testing Facilities

- a) **Cedara Agricultural College** – Soil Sciences Department (samples can be dropped at the DAEA's Extension Office Arbour House, Crompton Street, Pinetown).  
Contact: Ruby Punwasi (Tel: 033-3559455) or Zandra Smeda (Tel: 033-3559450), Fax: 033-3559454, Email: [zandra.smeda@dae.kzntl.org.za](mailto:zandra.smeda@dae.kzntl.org.za)
- b) **Fertiliser Advisory Service** (SA Sugar) – Mount Edgecombe Sugar Experiment Station (samples to be taken to the SASEX experiment station at Mount Edgecombe), Contact: Christy Moonsamy (Tel: 031-5393205), Fax: 031-5391328, Email: [christy@sugar.org.za](mailto:christy@sugar.org.za)

Should the Contractor wish to utilise soil-testing facilities other than these, permission should first be obtained from the Engineer.

### 8.2.15 Boulders and Rocks

Boulders and rocks used in rehabilitation should come from comparable geomorphological units to those that they are being used to rehabilitate.

## 8.3 PLANT

### 8.3.1 Hydro Seeder

The Contractor shall specify who the Hydro Seeding Contractor is and a test section is to be undertaken to ensure that all plant is in order prior to the hydro seeding phase taking place.

### 8.3.2 Irrigation System

Should the project be of a sufficient size a temporary or permanent irrigation system may be specified in the Project Specification.

## 8.4 CONSTRUCTION (RE-VEGETATION METHOD)

### 8.4.1 Land Preparation

#### 8.4.1.1 Alien Plant Clearing

During the construction phase, the opportunity for alien vegetation to begin to establish itself is good due to the disturbance of soil and increase in both human and vehicular traffic. Prior to re-vegetation of a site, alien vegetation needs to be controlled. The main problem plants in the eThekweni municipality are listed below:

1. Lantana – *Lantana camara*;

2. Triffid Weed – *Chromolaena odorata*;
3. Bugweed – *Solanum mauritianum*;
4. Mexican Daisy – *Tithonia diversifolia*; and
5. Balloon Vine – *Cardiospermum grandiflorum*.

To ensure that these and other alien species do not take root in the disturbed soil, they should be hand pulled when the plants are still small and easily up-rooted. This operation of hand pulling will ensure that the grass and other natural vegetation has the best chance of becoming established.

Some General Principles:

1. Tackle areas of light infestation first.
2. Work in a downstream direction if in a drainage line or stream channel (ie: work from the direction of the water source downwards).
3. Only tackle areas that can later be maintained.
4. Follow-up is crucial to any alien clearing strategy.

For easy identification, the Contractor may contact the Environmental Management Branch of the eThekweni Municipality on Tel: 031 - 300 2517, Fax: 031 - 300 2225. The department provides free posters showing common invader plants clearly in colour photographs.

For advice and planning of control work:

1. The Plant Protection Institute, Cedara, runs a short course on “Alien Plant Control for Land Managers”  
Tel: 033-355 9416 or 033-355 9413  
Email: [ntjq@natal1.agric.za](mailto:ntjq@natal1.agric.za)
2. Your local District Conservation Officer, KZN Wildlife  
Tel: 031-764 3515  
Email: [vermeul@kznwildlife.com](mailto:vermeul@kznwildlife.com)
3. The Ecological Advice Division, KZN Wildlife, Pietermaritzburg  
Tel: 033-845 1999
4. Alien Buster Campaign,  
Toll-free line: 0800 005 376

For information about the use of herbicides:

The Plant Protection Research Institute, Cedara (see above) Also <http://www.nda.agric.za>

For Information about the use of bio-control contact:

The Plant Protection Research Institute, Pretoria  
Tel: 012-329 3269 or 012-329 3770  
Email: [riethdb@plant2.agric.za](mailto:riethdb@plant2.agric.za)

To find indigenous plants and professional Contractors who remove alien plants:

1. The Botanical Society – KZN Coastal Branch  
Fax: 031-201 9958  
Email: [plantnet@iafrica.com](mailto:plantnet@iafrica.com)
2. The Wildlife and Environment Society of SA (WESSA) – KZN Region  
Tel: 031-201 3126  
Email: [wlskzn@saol.com](mailto:wlskzn@saol.com)
3. Natural Areas Section, Durban Parks Department  
Tel: 031-312 4466  
Email: [KateE@prscu.durban.gov.za](mailto:KateE@prscu.durban.gov.za)



### 8.4.1.2 Preparation of Ground Surfaces

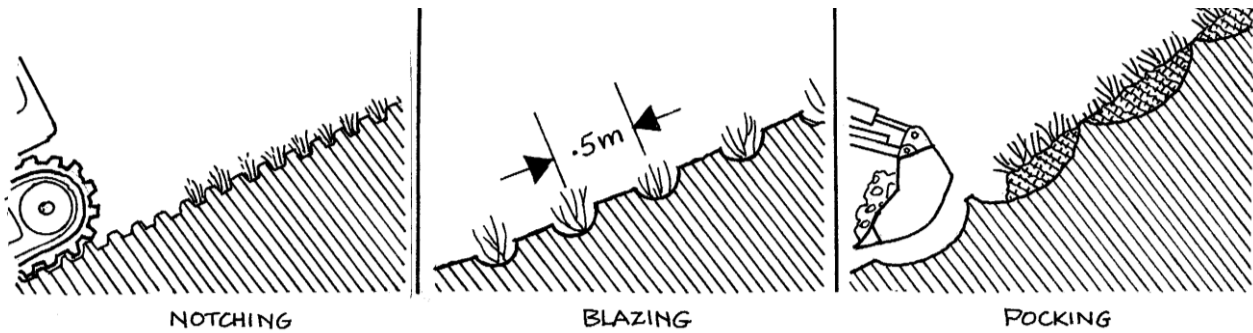


Figure A: Simple techniques for improving the success of seeding on moderate slopes

1. Surfaces that are to be planted should first be tilled or ripped (by hand or machinery depending on the size of the area). These should be ripped to a depth of 150mm, unless the surface has been severely compacted. In this case the soil should be ripped to a depth of 250mm.
2. Tilled / ripped subsoil should be covered with a 75mm – 150mm deep layer of topsoil.
3. The Engineer / Environmental Control Officer should be satisfied that the soil composition is adequate in terms of clod size and soil mixture, before planting may begin.
4. The final surface should not be smooth but furrowed to follow the natural contours of the land. (If sods are going to be used, the prepared surface should be roughened slightly for better binding of the sods to the surface).
5. The prepared soil must be uniformly moist to a depth of 150mm before planting or seeding begins. If this condition is not met by rainfall, the party responsible for re-vegetating the area should carry out the necessary irrigation.

### 8.4.1.3 Soil Stabilisation

Wherever possible, the site should be restored to resemble its original composition as closely as possible. In sandy berea red soil and dune sand, do not import loam or clay topsoil. This can lead to slope failure or slippages due to the different weights and textures of different soil types when saturated. For large or especially steep exposed areas, the Engineer should be consulted before using imported soil or re-vegetating.

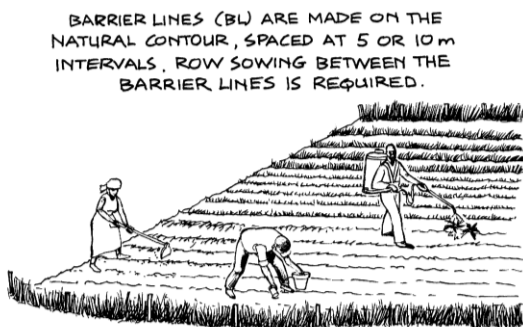


Figure C: Protection of the slope by planting along contours

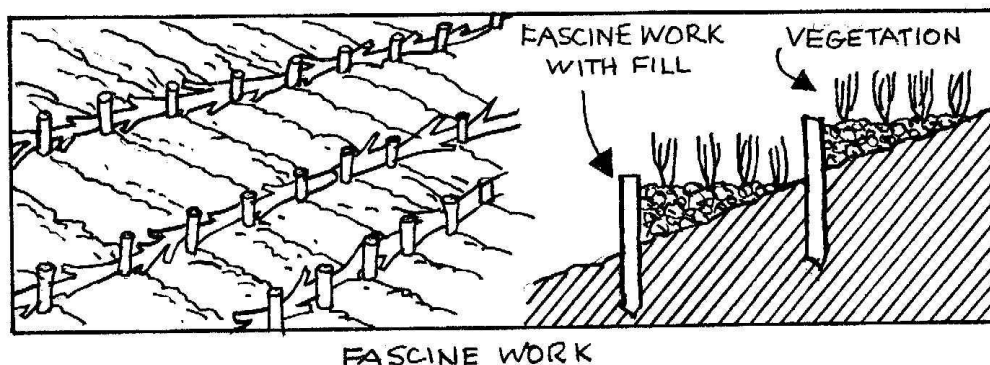


Figure D: Further slope stabilisation techniques

For small areas or more gentle slopes, the following materials can be placed along the contours of a slope to achieve erosion control and slope stability until such time as the vegetation becomes established:

1. Netting or matting;
2. Rocks / logs;
3. Brush cut material;
4. Straw / hay;
5. Mulch;
6. Compost; or
7. Gravel.

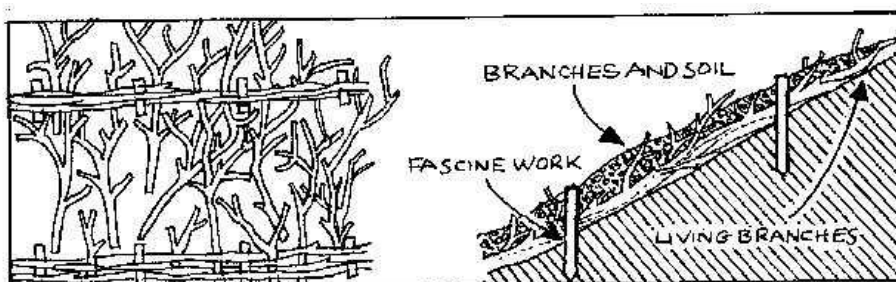


Figure E: Vegetative cover used to prevent erosion and stabilise slopes.

## 8.5 PLANTING GUIDELINES

### 8.5.1 Fertiliser

Add fertilizer and compost pre mixed at the rate of 1 cubic metre of compost mixed with 20 kilograms of 2:3:2 (22) or similar. This mixture should be applied in the quantity of ½ kilogram to every linear metre of furrow. Note that these are “rule of thumb” quantities for the eThekweni area and certain soils may require more or less fertiliser. For certainty in such scenarios, soil testing will be required.

In highly leached areas, 1kg of Dolomitic lime for every 2 square metres of soil should be added to the compost / fertiliser mixture.

For tree and shrub planting, one third of the fertilizer should be scattered in the bottom of the hole. One third dug into the topsoil which will be placed back in the hole, and the remainder to be watered into the soil at surface level.

### 8.5.2 Timing of Planting

Planting should be carried out as soon as possible after the construction in order to prevent soil erosion and the invasion of alien plant species onto the site.

### 8.5.3 General Planting Principles

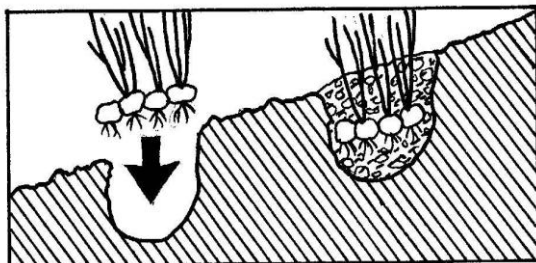


Figure F: Isolated cuttings

1. The potting soil that the plant has been growing in must be retained around its roots wherever possible when planting.
2. The size of the holes should be sufficient that the plant's roots are well covered with topsoil, without being packed tightly together. Square holes are better than rounded holes because the risk of root strangulation of the plant is reduced.
3. Trees should be planted every 20 m<sup>2</sup>.
4. Shrubs should be planted at one plant every 5 m<sup>2</sup>.
5. Holes should be well watered prior to the trees or shrubs being planted in them.
6. Plant holes should be filled with well-mixed soil that contains organic matter and fertiliser if required. (see fertiliser section above of this specification)
7. Bark chippings or hay should be placed around the base of trees or saplings to a depth of 75mm after planting.
8. Plants should be watered immediately after transplanting to ensure that the soil around the plants is wet.

### 8.5.4 Use of Grasses

#### 8.5.4.1 Lawn Mat-Forming Grasses

Note: All of these grasses need to be watered every day for the first 2 weeks and then 3 times a week until established.

Grass Type	Gradient	Best Form	Spacing for Planting on Slope	Spacing for Planting Along Contour
Annual Panicum - <i>Panicum laticomum</i> This is an annual species that is only suited to shade. Not good for high traffic areas.	<25°	runners/seed	300mm between rows	150 mm between runners in the rows.
Berea Grass - <i>Dactyloctenium australe</i> Will take some shade	<25°	sods	1m between rows	Continuous sod along the contour line
	>25°	runners	0.5 m between rows	150 mm between runners in the rows.

Bermuda Grass - <i>Cynodon dactylon</i> likes full sun	<25°	sods	1m between rows	Continuous sod along the contour line
	>25°	runners	0.5 m between rows	150 mm between runners in the rows.
Buffalo Turf Grass – <i>Stenotaphrum secundatum</i> likes full sun	<25°	sods	1m between rows	Continuous sod along the contour line
	>25°	runners	0.5 m between rows	150 mm between runners in the rows.
Creeping Setaria - <i>Setaria lindenberiana</i> This is an annual species that is only suited to shade. Not good for high traffic areas.	<25°	runners/seed	300mm between rows	150 mm between runners in the rows.
Forest Grass - <i>Oplismenus hirtellus</i> This species is only suited to shade. Not good for high traffic areas.	<25°	runners	300mm between rows	150 mm between runners in the rows.
Star Grass* - <i>Cynodon nlemfuensis</i> This an introduced grass from Kenya	All	runners	300mm between rows	300mm between runners in the rows.
Wild Rice - <i>Leersia hexandra</i> Suited to wetlands	<5°	clumps or seed	N/A	150mm-300mm between runners in the rows

#### 8.5.4.2 Clump-Forming Grasses

Note: Clump-forming grasses can be grown from seed or planted as individual clumps (which are sometimes referred to as “plugs”). Clump-forming grass should be grown from seed for best results. If clumps or plugs are used, they should be planted in a quantity of at least 7 clumps per square metre.

Grass Type	Best Form
Common Thatching Grass - <i>Hyparrhenia hirta</i>	clumps or seed
Giant Setaria - <i>Setaria megaphylla</i> (Can tolerate shade)	clumps or seed
Giant Turpentine Grass - <i>Cymbopogon validus</i>	clumps or seed
Gongoni Three-awn - <i>Aristida junciformis</i>	clumps or seed
Guinea or Babi Grass - <i>Panicum maximum</i>	seed
Jobb's Tears - <i>Coix lacryma-jobi</i> (Suitable for wetlands)	clumps or seed
Natal Red Top - <i>Melinis repens</i>	seed
Rhodes Grass - <i>Chloris gayana</i>	seed
Weeping Love Grass - <i>Eragrostis curvula</i>	clumps or seed

#### 8.5.4.3 Sedges

Sedges are good for use in extremely wet areas, in waterways and seepage lines. All these species are to be used in wetlands or areas where there is a constant supply of water. All need to be in full sun for best results.

Sedge Type	Best Form
Basket Sedge - <i>Cyperus textilis</i>	clumps
Broad-leaved Sedge - <i>Cyperus latifolius</i>	clumps or seed

Bulrush - <i>Typha capensis</i>	clumps or seed
Common Reed - <i>Phragmites australis</i>	clumps or seed
Dwarf Papyrus - <i>Cyperus prolifer</i>	clumps or seed
Giant Sedge - <i>Cyperus immensus</i>	clumps or seed
Matting Rush - <i>Juncus kraussii</i>	clumps or seed
Papyrus - <i>Cyperus papyrus</i>	clumps
Six angled Sedge - <i>Cyperus sexangularis</i>	clumps

**8.5.4.4 Vetiver Grass\***

A hedge-forming, sterile grass that:

- a) Prefers full sun;
- b) Is tolerant to sandy and/or dry conditions;
- c) Is good for erosion control as the roots penetrate up to 3m in depth;
- d) Has a high transpiration rate so can help with waterlogged soil;
- e) Thrives in waterways or wet conditions; and
- f) Is tolerant to grazing, fire and poor soil conditions.

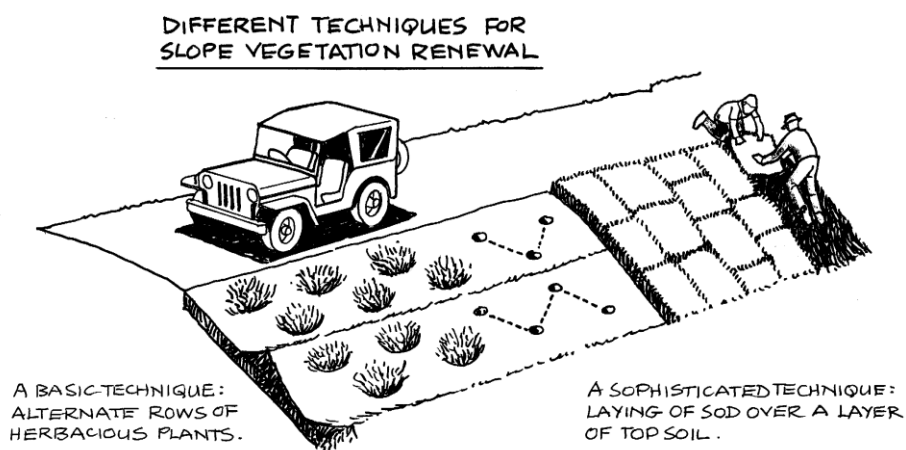


Figure G: Planting techniques for grasses and shrubs

**8.5.5 Use of Groundcovers**

Groundcovers should be used when a uniform look is not required by the project specification. A mixture of grass and groundcover is better than just one of these, as higher biodiversity levels are achieved and the combination makes for better binding of the soil. Reservoirs are an example of a scenario where grass alone is probably the best solution due to ease of maintenance (mowing).

The following groundcovers have been chosen as vigorous growing and easily propagated plants that can be used on disturbed habitats within the eThekweni municipality. They are suitable for slopes of any gradient and should be watered every day for the first 2 weeks after planting. Thereafter, they should be watered every 3 days until they become established. For these groundcovers, use at 7 -15 plants per square metre. The steeper the slope, the greater the number of plants / square metre.

Groundcover	Suitable for North / South Facing	Notes
Creeping Foxglove - <i>Asystasia gangetica</i>	N&S	sun or shade
Bush Violet - <i>Barleria obtusa</i>	N&S	sun or shade
Creeping Red Barleria - <i>Barleria repens</i>	N&S	sun or shade
Ice Plant - <i>Carpobrotus dimidiatus</i>	N (suitable for beach habitats)	sun
Forest Celosia - <i>Celosia trigyna</i>	S	sun or shade
Forest Acanth - <i>Dicliptera heterostegia</i>	N&S	shade
Large-flowered Dietes - <i>Dietes grandiflora</i>	N&S	semi-shade
Butterfly Heaven - <i>Dyschoriste depressa</i>	N&S	sun
Gazania - <i>Gazania rigens</i>	N&S (suitable for beach habitats)	sun
Gold Carpet - <i>Helichrysum cymosum</i>	N&S (suitable for beach habitats)	sun
White Hypoestes - <i>Hypoestes forskoolii</i>	N&S	sun or shade
Dune Morning Glory - <i>Ipomoea pes-capre</i>	N&S (suitable for beach habitats)	sun
Outcrop Justicia - <i>Justicia protracta</i>	N&S	semi-shade
Purple Acanth - <i>Peristrophe cernua</i>	N&S	sun or shade
Sticky Acanth - <i>Phaulopsis imbricata</i>	N&S	sun or shade
Purple Burweed - <i>Pupalia lappacea</i>	N&S	shade

### 8.5.6 Guideline for Specific Scenarios

#### 8.5.6.1 Steep Slopes Planting Guide

Steep slopes should be planted along the contour, with rows being closer together the steeper the slope is. Mat-forming grasses and groundcovers are best for slope stabilisation. Shrubs and / or trees can be planted in between contours at random intervals if required from an aesthetic point of view. Vetiver grass, Buffalo grass and Bermuda grass are good vegetative solutions to bank stabilisation.

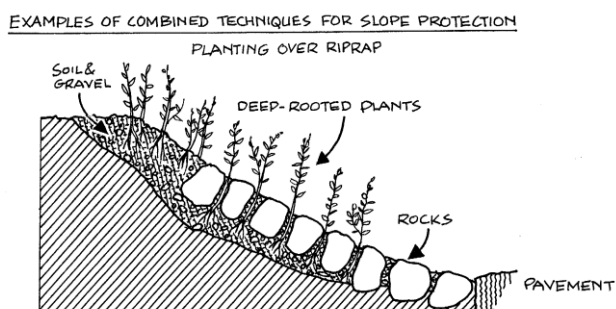


Figure G: Bio-engineering solutions to slope stabilisation.

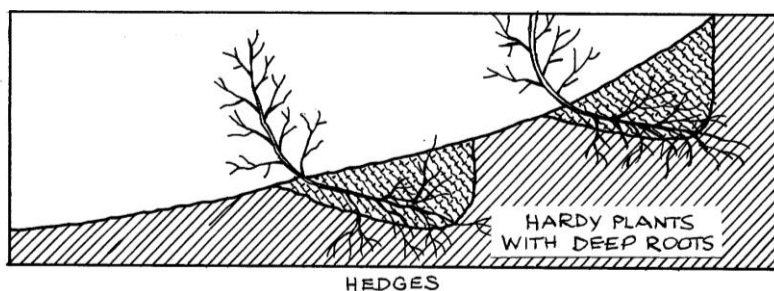


Figure H: The use of plants with substantial roots for slope stabilisation.

## 8.6 MAINTENANCE

### 8.6.1 Traffic on Vegetated Areas

Leave designated tracks for both pedestrian and vehicular traffic. Newly-planted areas are to be left undisturbed wherever possible.

### 8.6.2 Irrigation

1. The Contractor shall be responsible for maintaining the desired level of moisture necessary for vigorous and healthy growth.
2. Water used for irrigation should be free of pollutants that would harm the plants.
3. All seeded, planted or sodded grass areas and all shrubs or trees planted shall be irrigated at regular intervals. This should be monitored by the Engineer / ECO for the duration of the maintenance period.
4. All grassed areas shall receive irrigation coverage of 100%.
5. The Contractor shall irrigate the planted areas as necessary, taking care not to damage the soil structure by using an excessive force of water.
6. Watering shall mean that the Contractor shall ensure that the planted area receives 25mm of irrigation water (including rain) per week applied uniformly over the whole area.

### 8.6.3 Use of Fertilisers

1. Care must be exercised when using fertiliser products near sensitive areas in order that contamination of these areas is avoided. Examples of these areas are dune areas.
2. Fertiliser that is applied after planting should be done so in a uniform fashion in order that all plants receive the same amount of fertiliser.
3. Climatic conditions such as strong wind or rain should be considered prior to the application of fertiliser.
4. Fertiliser containers should be properly sealed and stored in a safe place in between uses.

### 8.6.4 Weeding and Mowing

1. The Contractor is responsible for controlling all woody / alien / invasive species on the site (including kikuyu grass) for the duration of the maintenance period.
2. The Alien Plant Clearing section of this specification and the information links therein should be consulted when deciding on the best methods of clearing alien plants.
3. The Contractor shall mow the grass in specified grassed areas or on road verges at intervals ordered by the Engineer.

### 8.6.5 Disease and Pest Control

1. The Contractor is to inspect all plant material at least once a month to locate any diseased plants or any insects that are in the process infesting plants.

2. The Contractor shall inform the Engineer of his planned method of eradicating the pests or disease, and obtain his approval, prior to doing so.

#### **8.6.6 Erosion Control (Remedial Measures)**

1. In the case of surface wash away or wind erosion, the Contractor shall implement remedial measures, as approved by the Engineer, as soon as possible.
2. Appropriate erosion control / soil stabilisation measures shall be implemented.



## 9 RECOMMENDED PLANTING LIST:

HABITAT ZONE: 1=Beach; 2=Back of Beach; 3=General Coast; 4=Grassland; 5=Dry Valley Thicket; 6=Wetland

**COMMON NAME - SCIENTIFIC NAME – HABIT – HABITAT ZONE - DECIDUOUS/EVERGREEN**

Blue Waterlily <i>Nymphaea nouchali</i> AQUATIC 6 DECIDUOUS	Dragon Dracaena <i>Dracaena aletriformis</i> FORM PLANT 3 EVERGREEN
Bulrush <i>Typha capensis</i> AQUATIC 6 EVERGREEN	Dune Aloe <i>Aloe thraskii</i> FORM PLANT 1; 2 EVERGREEN
Common Reed <i>Phragmites australis</i> AQUATIC 6 EVERGREEN	Forest Cabbage Tree <i>Cussonia sphaerocephala</i> FORM PLANT 3 EVERGREEN
Crisp Pondweed <i>Potamogeton crispus</i> AQUATIC 6 EVERGREEN	French Aloe <i>Aloe pluridens</i> FORM PLANT 3; 5 EVERGREEN
Large-leaved Pondweed <i>Potamogeton schweinfurthii</i> AQUATIC 6 EVERGREEN	Ivory Nut Palm <i>Hyphaene coriacea</i> FORM PLANT 2; 3; 5 EVERGREEN
Spoon-leaved Pondweed <i>Potamogeton thunbergii</i> AQUATIC 6 EVERGREEN	Natal Coast Cabbage Tree <i>Cussonia nicholsonii</i> FORM PLANT 3;5 EVERGREEN
Yellow Gentian <i>Nymphoides indica</i> AQUATIC 6 EVERGREEN	River Euphorbia <i>Euphorbia triangularis</i> FORM PLANT 3; 5 EVERGREEN
Baboon Grape <i>Rhoicissus digitata</i> CREEPER 2; 3; 5 EVERGREEN	Wild Banana <i>Strelitzia nicolai</i> FORM PLANT 2; 3; 5 EVERGREEN
Black-eyed Susan <i>Thunbergia alata</i> CREEPER 3; 5 EVERGREEN	Zulu Cabbage Tree <i>Cussonia zuluensis</i> FORM PLANT 3; 5 EVERGREEN
Canary Creeper <i>Senecio tamoides</i> CREEPER 3 EVERGREEN	Annual Panicum <i>Panicum laticomum</i> GROUND COVER 3 EVERGREEN
Climbing Fat-bean <i>Dalbergia obovata</i> CREEPER 2; 3; 5 DECIDUOUS	Babi Grass <i>Panicum maximum</i> GROUND COVER 2; 3; 4; 5 EVERGREEN
Climbing Fish Poison <i>Tinospora caffra</i> CREEPER 2; 3; 5 DECIDUOUS	Broad-leaved Bulbine <i>Bulbine natalensis</i> GROUND COVER 2; 3; 4; 5 EVERGREEN
Climbing Raisin <i>Grewia caffra</i> CREEPER 2; 3; 5 EVERGREEN	Bulbine <i>Bulbine frutescens</i> GROUND COVER 2; 3; 5 EVERGREEN
Climbing Turkey-berry <i>Keetia gueinzii</i> CREEPER 3; 5 EVERGREEN	Burs <i>Triumfetta pilosa</i> GROUND COVER 3; 5 EVERGREEN
Common Forest Grape <i>Rhoicissus tomentosa</i> CREEPER 3; 5 EVERGREEN	Butterfly Heaven <i>Dyschoriste depressa</i> GROUND COVER 2; 3; 4; 5 EVERGREEN
Crossberry <i>Grewia occidentalis</i> CREEPER 3; 5 EVERGREEN	Chabaud's Aloe <i>Aloe chabaudii</i> GROUND COVER 2; 3; 5 EVERGREEN
Doublestemmed Grape <i>Cyphostemma hypoleucum</i> CREEPER 2; 3; 5 EVERGREEN	Common Agapanthus <i>Agapanthus praecox</i> GROUND COVER 2; 3; 5 EVERGREEN
Dune Bean <i>Canavalia rosea</i> CREEPER 1 EVERGREEN	Common Finger Grass <i>Digitaria eriantha</i> GROUND COVER 4; 5 EVERGREEN
Dune Canary Creeper <i>Senecio deltoideus</i> CREEPER 2; 3; 5 EVERGREEN	Common Thatching Grass <i>Hyparrhenia hirta</i> GROUND COVER 4; 5 EVERGREEN
Dune Grape <i>Cyphostemma flaviflorum</i> CREEPER 2; 3 EVERGREEN	Crassula <i>Crassula multicava</i> GROUND COVER 2; 3; 5 EVERGREEN
Fine-leaved Asparagus <i>Asparagus plumosus</i> CREEPER 2; 3; 5 EVERGREEN	Creeping Foxglove <i>Asystasia gangetica</i> GROUND COVER 1; 2; 3; 5 EVERGREEN
Forest Raisin <i>Grewia lasiocarpa</i> CREEPER 3; 5 EVERGREEN	Creeping Red Barleria <i>Barleria repens</i> GROUND COVER 2; 3; 5 EVERGREEN
Fragile Grape <i>Cissus fragilis</i> CREEPER 2; 3; 5 EVERGREEN	Creeping Setaria <i>Setaria lindenbergiana</i> GROUND COVER 3 EVERGREEN
Glossy Forest Grape <i>Rhoicissus rhomboidea</i> CREEPER 3; 5 EVERGREEN	Creeping Spur flower <i>Plectranthus madagascariensis</i> GROUND COVER 3 EVERGREEN
Jasmine <i>Jasminum multipartitum</i> CREEPER 3 EVERGREEN	Dune Asparagus <i>Asparagus densiflorus</i> GROUND COVER 1; 2; 3; 5 EVERGREEN
Succulent Canary Creeper <i>Senecio brachypodus</i> CREEPER 2; 3; 5 EVERGREEN	Dune Blue Barleria <i>Barleria obtusa</i> GROUND COVER 1; 2; 3; 5 EVERGREEN
Thorny Rope <i>Dalbergia armata</i> CREEPER 2; 3; 5 DECIDUOUS	Dune Morning Glory <i>Ipomoea pes-capre</i> GROUND COVER 1 EVERGREEN
Trailing Vernonia <i>Vernonia angulifolia</i> CREEPER 2; 3; 4; 5 EVERGREEN	Dune Spurflower <i>Plectranthus verticillatus</i> GROUND COVER 3 EVERGREEN
Wild Cucumber <i>Coccinia palmata</i> CREEPER 2; 3; 5 EVERGREEN	Dwarf Agapanthus <i>Agapanthus nana</i> GROUND COVER 2; 3; 5 EVERGREEN
Woolly Caper Bush <i>Capparis tomentosus</i> CREEPER 2; 3; 5 EVERGREEN	Dwarf Forest Grass <i>Pseudechinolaena polystach</i> GROUND COVER 3 EVERGREEN
Bitter Aloe <i>Aloe ferox</i> FORM PLANT 2; 3; 4; 5 EVERGREEN	Early Blue Barleria <i>Barleria gueinzii</i> GROUND COVER 2; 3; 5 EVERGREEN
Common Cabbage Tree <i>Cussonia spicata</i> FORM PLANT 3; 5 EVERGREEN	Falling Stars <i>Crocosmia aurea</i> GROUND COVER 2; 3; 5 DECIDUOUS

Forest Acanth *Dicliptera heterostegia* GROUND COVER 3; 5 EVERGREEN  
 Forest Celosia *Celosia trigyna* GROUND COVER 2; 3; 5 EVERGREEN  
 Forest Dietes *Dietes iridioides* GROUND COVER 2 EVERGREEN  
 Forest Grass *Oplismenus hirtellus* GROUND COVER 3 EVERGREEN  
 Forest Lily *Crinum moorei* GROUND COVER 3 DECIDUOUS  
 Fortnight Lily *Dietes bicolor* GROUND COVER 3; 5; 6 EVERGREEN  
 Gazania *Gazania rigens* GROUND COVER 1; 2; 3; 5 EVERGREEN  
 Giant Setaria *Setaria megaphylla* GROUND COVER 3; 5 EVERGREEN  
 Giant Turpentine Grass *Cymbopogon validus* GROUND COVER 4; 5 EVERGREEN  
 Gold Carpet *Helichrysum cymosum* GROUND COVER 1; 2; 3; 5 EVERGREEN  
 Gongoni Three-awn *Aristida junciformis* GROUND COVER 4 EVERGREEN  
 Hairy Spur flower *Plectranthus hadiensis* var. to GROUND COVER 3 EVERGREEN  
 Ice Plant *Carpobrotus dimidiatus* GROUND COVER 1; 2 EVERGREEN  
 Large-flowered Dietes *Dietes grandiflora* GROUND COVER 2 EVERGREEN  
 Long flowered Blue Spur flower *Plectranthus saccatus* var. lo GROUND COVER 3 EVERGREEN  
 Marsh Lily *Crinum macowanii* GROUND COVER 2; 3; 5 DECIDUOUS  
 Natal Red Top *Melinis repens* GROUND COVER 3; 4; 5 EVERGREEN  
 Outcrop *Justicia* *Justicia protracta* GROUND COVER 3; 5 EVERGREEN  
 Pink Hypoestes *Hypoestes aristata* GROUND COVER 3; 5 EVERGREEN  
 Purple Acanth *Peristrophe cernua* GROUND COVER 2; 3; 5 EVERGREEN  
 Purple Burweed *Pupalia lappacea* GROUND COVER 2; 3; 5 EVERGREEN  
 Ratstail Dropseed *Sporobolus africanus* GROUND COVER 4 EVERGREEN  
 Rhodes Grass *Chloris gayana* GROUND COVER 3; 4; 5 EVERGREEN  
 Richman's Plant *Justicia capensis* GROUND COVER 3 EVERGREEN  
 Short Flowered Blue Spur flower *Plectranthus saccatus* var. sa GROUND COVER 3 EVERGREEN  
 Soap Aloe *Aloe maculata* GROUND COVER 2; 3; 4; 5 EVERGREEN  
 Sticky Acanth *Phaulopsis imbricata* GROUND COVER 2; 3; 5 EVERGREEN  
 Swamp Spur flower *Plectranthus ciliatus* GROUND COVER 3 EVERGREEN  
 Sweet Garlic *Tulbaghia simmleri* GROUND COVER 2; 3; 5 EVERGREEN  
 Wasp Fodder *Justicia betonica* GROUND COVER 2; 3; 5 EVERGREEN  
 Weeping Love Grass *Eragrostis curvula* GROUND COVER 4; 5 EVERGREEN  
 White Hypoestes *Hypoestes forskalii* GROUND COVER 3; 5 EVERGREEN  
 Wild Aspilia *Aspilia natalensis* GROUND COVER 4; 6 EVERGREEN  
 Wild Foxglove *Ceratotheca triloba* GROUND COVER 3; 4; 5 EVERGREEN  
 Wild Pentas *Pentas wyliei* GROUND COVER 3 EVERGREEN  
 Yellow *Justicia* *Justicia flava* GROUND COVER 3; 4; 5 EVERGREEN  
 Zulu Spur flower *Plectranthus zuluensis* GROUND COVER 3 EVERGREEN  
 Hen & Chicken *Chlorophytum comosum* GROUND COVER 3 EVERGREEN  
 Berea Grass *Dactyloctenium australe* LAWN 2; 3 EVERGREEN

Bermuda Grass *Cynodon dactylon* LAWN 1; 2; 3; 4; 5 EVERGREEN  
 St Augustine Grass *Stenotaphrum secundatum* LAWN 1; 2; 3; 5 EVERGREEN  
 Cat-thorn *Scutia myrtina* SCRAMBLER 2; 3; 5 EVERGREEN  
 Dune Creeping Thorn *Acacia kraussiana* SCRAMBLER 2; 3; 5 EVERGREEN  
 Plumbago *Plumbago auriculata* SCRAMBLER 3; 5 EVERGREEN  
 Wild Honeysuckle *Tecomaria capensis* SCRAMBLER 2; 3; 5 EVERGREEN  
 Amatungulu Dune Num-num *Carissa macrocarpa* SHRUB 2; 3 EVERGREEN  
 Bitter-tea *Vernonia myriantha* SHRUB 3 DECIDUOUS  
 Black Bird Seed *Psychotria capensis* SHRUB 3; 5 EVERGREEN  
 Blue Bonnets *Polygala myrtifolia* SHRUB 3; 5 EVERGREEN  
 Blue Marsh Mint *Pycnostachys reticulata* SHRUB 3; 6 EVERGREEN  
 Buckwheat *Isoglossa woodii* SHRUB 3; 5 EVERGREEN  
 Bush Neat's Foot *Bauhinia tomentosa* SHRUB 2; 3; 5 EVERGREEN  
 Cape Rattle Pod *Crotalaria capensis* SHRUB 3; 5 EVERGREEN  
 Cape Sand Olive *Dodonaea angustifolia* SHRUB 2; 3 EVERGREEN  
 Cape-coffee *Tricalysia capensis* SHRUB 3 EVERGREEN  
 Coastal Canthium *Canthium spinosa* SHRUB 3; 5 EVERGREEN  
 Coast-coffee *Tricalysia sonderana* SHRUB 2; 3 EVERGREEN  
 Common Crow-berry *Rhus pentheri* SHRUB EVERGREEN  
 Common Sourberry *Dovyalis rhamnoides* SHRUB 3; 5 EVERGREEN  
 Dune Bride's Bush *Pavetta revoluta* SHRUB 2; 3 EVERGREEN  
 Dune Currant *Rhus nebulosa* SHRUB 2; 3 EVERGREEN  
 Dune koko Tree *Maytenus procumbens* SHRUB 2; 3; 5 EVERGREEN  
 Dune Poison Bush *Acokanthera oblongifolia* SHRUB 2; 3; 5 EVERGREEN  
 Dune Soap Berry *Deinbollia oblongifolia* SHRUB 2; 3; 5 EVERGREEN  
 Dwaba berry *Monanthes caffra* SHRUB 3; 5 EVERGREEN  
 Edge Hibiscus *Hibiscus calyphyllus* SHRUB 3; 5 EVERGREEN  
 False Assegai *Maesa lanceolata* SHRUB 3; 6 EVERGREEN  
 False Forest Spike-thorn *Putterlickia verrucosa* SHRUB 3; 5 EVERGREEN  
 Forest Hibiscus *Hibiscus peduncularis* SHRUB 3; 5 EVERGREEN  
 Forest Toad Tree *Tabernaemontana ventricosa* SHRUB 3 EVERGREEN  
 Forest Wild Dagga *Leonotis intermedia* SHRUB 3; 4; 5 EVERGREEN  
 Forest Wild Pear *Dombeya tiliacea* SHRUB 3; 5 EVERGREEN  
 Giant Purple Pea *Tephrosia grandiflora* SHRUB 3; 4; 5 EVERGREEN  
 Herero Spur Flower *Plectranthus hereroensis* SHRUB 3 EVERGREEN  
 Horsewood *Clausena anisata* SHRUB 3; 5 EVERGREEN  
 Jackal-coffee *Tricalysia lanceolata* SHRUB 3; 5 EVERGREEN  
 Jute Hibiscus *Hibiscus cannabinus* SHRUB 3; 5 EVERGREEN  
 Kei Apple *Dovyalis caffra* SHRUB 3; 5 EVERGREEN  
 Milkweed *Gomphocarpus physocarpus* SHRUB 3; 4; 5 EVERGREEN  
 Nana-berry *Rhus dentata* SHRUB 3; 5 EVERGREEN

Natal Karree *Rhus natalensis* SHRUB 2; 3; 5 EVERGREEN  
 Natal Laburnum *Calpurnia aurea* SHRUB 3; 5 EVERGREEN  
 Natal Medlar *Lagynias lasiantha* SHRUB 3; 5 DECIDUOUS  
 OrangeBird Lantern *Hoslundia opposita* SHRUB 3; 4; 5 EVERGREEN  
 Pink Spurs *Orthosiphon labiatus* SHRUB 3; 5 EVERGREEN  
 Pink Wild Pear *Dombeya burgessiae* SHRUB 2; 3; 5 EVERGREEN  
 Pistol Bush *Duvernoia adhatodoides* SHRUB 3; 5 EVERGREEN  
 Poison Olive *Peddiea africana* SHRUB 3; 5 EVERGREEN  
 Pride of de Kaap *Bauhinia galpini* SHRUB 3; 5 EVERGREEN  
 Purple Broom *Polygala virgata* SHRUB 3; 4; 5 EVERGREEN  
 Purple Pea *Tephrosia shiluanensis* SHRUB 3; 4; 5 EVERGREEN  
 Puzzle Bush *Ehretia rigida* SHRUB 3; 5 DECIDUOUS  
 Rhino-coffee *Kraussia floribunda* SHRUB 3; 5 EVERGREEN  
 River Bells *Mackaya bella* SHRUB 3; 5 EVERGREEN  
 River Indigo *Indigofera jucunda* SHRUB 3; 5 EVERGREEN  
 River Mint *Tetradenia riparia* SHRUB 2; 3; 5 DECIDUOUS  
 September Bells *Rothmannia globosa* SHRUB 3 EVERGREEN  
 Shrub Spur flower *Plectranthus ecklonii* SHRUB 3 EVERGREEN  
 Sickie Bush *Dichrostachys cinerea* SHRUB 3; 5 DECIDUOUS  
 Small Bone-apple *Coddia rudis* SHRUB 2; 3; 5 DECIDUOUS  
 Small Cluster-pear *Uvaria caffra* SHRUB 3; 5 EVERGREEN  
 Tick-berry *Chrysanthemoides monilifera* SHRUB 1; 2; 3; 5 EVERGREEN  
 Veld Fig *Ficus burtt-davyi* SHRUB 2; 3; 5 EVERGREEN  
 Weeping Bride's Bush *Pavetta lanceolata* SHRUB 3; 5 EVERGREEN  
 White Forest Spike Thorn *Gymnosporia arenicola* SHRUB 2; 3; 5 EVERGREEN  
 White Honeysuckle *Turraea obtusifolia* SHRUB 3; 5 EVERGREEN  
 Wild Dagga *Leonotis leonurus* SHRUB 3; 4; 5 EVERGREEN  
 Wild Lippia *Lippia javanica* SHRUB 3; 5 EVERGREEN  
 Wild Loquat *Oxyanthus pyriformis* SHRUB 3 EVERGREEN  
 Wild Medlar *Vangueria infausta* SHRUB 3; 4; 5 DECIDUOUS  
 Wild Pomegranate *Burchellia bubalina* SHRUB 3; 5 EVERGREEN  
 Krantz Aloe *Aloe arborescens* SHRUB HEDGE 1; 2; 3; 5 EVERGREEN  
 Sandpaper Fig *Ficus capreifolia* SHRUB WETLAND 6 EVERGREEN  
 African Dog-rose *Xylothea kraussiana* TREE 3; 5 EVERGREEN  
 Broad-leaved Coral Tree *Erythrina latissima* TREE 3; 5 DECIDUOUS  
 Broad-leaved Laurel *Cryptocarya latifolia* TREE 3,6 EVERGREEN  
 Broad-leaved Quince *Cryptocarya latifolia* TREE 3 EVERGREEN  
 Broom Cluster Fig *Ficus sur* TREE 3; 5; 6 EVERGREEN  
 Buffalo Thorn *Ziziphus mucronata* TREE 3; 5 DECIDUOUS  
 Cape Ash *Ekebergia capensis* TREE 3; 5 DECIDUOUS  
 Cape Blackwood *Maytenus peduncularis* TREE 3; 5 EVERGREEN

Cape Quince *Cryptocarya woodii* TREE 3; 5 EVERGREEN  
 Cat's Whiskers *Clerodendrum glabrum* TREE 2; 3; 5 EVERGREEN  
 Coast Coral Tree *Erythrina caffra* TREE 3; 5 DECIDUOUS  
 Coastal Gold Leaf *Bridelia micrantha* TREE 3; 5 DECIDUOUS  
 Coastal Silver Oak *Brachylaena discolor* TREE 2; 3 EVERGREEN  
 Common Coral Tree *Erythrina lysistemon* TREE 3;5 DECIDUOUS  
 Common Spike Thorn *Gymnosporia glaucophylla* TREE 3; 4; 5 EVERGREEN  
 Common Turkey-berry *Canthium inerme* TREE 3; 5 EVERGREEN  
 Common White Pear *Dombeya rotundifolia* TREE 3; 5 DECIDUOUS  
 Common Wild Fig *Ficus thonningii* TREE 3; 5 EVERGREEN  
 Coshwood *Cola natalensis* TREE 2; 3 EVERGREEN  
 Dune False Currant *Allophylus natalensis* TREE 2; 3 EVERGREEN  
 False Cabbage Tree *Schefflera umbellifera* TREE 3 EVERGREEN  
 False Olive *Buddleja saligna* TREE 2; 3; 5 EVERGREEN  
 Flat-crown *Albizia adianthifolia* TREE 3; 4; 5 DECIDUOUS  
 Forest Bushwillow *Combretum kraussii* TREE 3; 5 EVERGREEN  
 Forest Corkwood *Commiphora woodii* TREE 3; 5 DECIDUOUS  
 Forest Elder *Nuxia floribunda* TREE 3; 5 EVERGREEN  
 Forest Fever-berry *Croton sylvaticus* TREE 3; 5 DECIDUOUS  
 Forest Honeysuckle *Turraea floribunda* TREE 3; 5 DECIDUOUS  
 Forest Mahogany *Trichilia dregeana* TREE 3 EVERGREEN  
 Forest Olive *Olea woodiana* TREE 3; 5 EVERGREEN  
 Giant Pock Ironwood *Chionanthus peglerae* TREE 3; 5 EVERGREEN  
 Glossy Ash *Bersama lucens* TREE 3; 5 EVERGREEN  
 Gulugula *Strychnos gerrardii* TREE 3; 5 EVERGREEN  
 Knob-wood *Zanthoxylum capense* TREE 2; 3; 5 DECIDUOUS  
 Krantz Quar *Canthium locuples* TREE 5 EVERGREEN  
 Lagoon Hibiscus *Hibiscus tiliaceus* TREE 2; 3; 5; 6 EVERGREEN  
 Marula *Sclerocarya birrea* subsp. ca TREE 3; 5 DECIDUOUS  
 Milkberry *Manilkara discolor* TREE 3; 5 EVERGREEN  
 Natal Apricot *Dovyalis longispina* TREE 2; 3; 5 EVERGREEN  
 Natal Camwood *Baphia racemosa* TREE 3; 5 EVERGREEN  
 Natal Fig *Ficus natalensis* TREE 3; 5 EVERGREEN  
 Natal Guarri *Euclea natalensis* TREE 2; 3; 5 EVERGREEN  
 Natal Ironplum *Drypetes natalensis* TREE 3 EVERGREEN  
 Natal Mahogany *Trichilia emetica* TREE 3; 5 EVERGREEN  
 Natal Plane *Ochna natalitia* TREE 3; 5 EVERGREEN  
 Natal Plum *Harpephyllum caffrum* TREE 3; 5 EVERGREEN  
 Outeniqua Yellowwood *Podocarpus falcatus* TREE 3 EVERGREEN  
 Paperbark Thorn *Acacia sieberana* TREE 3; 5 DECIDUOUS  
 Pigeonwood *Trema orientalis* TREE 3; 5 EVERGREEN

Powder Puff Tree *Barringtonia racemosa* TREE 3; 6 EVERGREEN  
 Real Yellowwood *Podocarpus latifolius* TREE 3 EVERGREEN  
 Red Beech *Protorhus longifolia* TREE 3; 5 EVERGREEN  
 Red Coast Milkwood *Mimusops caffra* TREE 2; 3 EVERGREEN  
 Red Currant *Rhus chirindensis* TREE 3; 5 EVERGREEN  
 Red Milkwood *Mimusops obovata* TREE 3; 5 EVERGREEN  
 Red-stem Corkwood *Commiphora harveyii* TREE 3; 5 DECIDUOUS  
 Scented Thorn *Acacia nilotica* TREE 3; 5; DECIDUOUS  
 Septee *Cordia caffra* TREE 2; 3; 5 DECIDUOUS  
 Splendid Thorn *Acacia robusta* TREE 2; 3; 5; DECIDUOUS  
 Sweet Thorn *Acacia karroo* TREE 2; 3; 5 DECIDUOUS  
 Tassel Berry *Antidesma venosum* TREE 3; 5 DECIDUOUS  
 Thorny Elm *Chaetacme aristata* TREE 3; 5 EVERGREEN  
 Tree Euphorbia *Euphorbia ingens* TREE 2; 3; 5 EVERGREEN  
 Tree Fuchsia *Halleria lucida* TREE 3 EVERGREEN  
 Tree Fuchsia *Schotia brachypetala* TREE 3; 5 DECIDUOUS  
 Umbrella Thorn *Acacia tortilis* TREE 3; 5 DECIDUOUS  
 Umzimbeet *Millettia grandis* TREE 3; 5 DECIDUOUS  
 Water Pear *Syzygium guineense* TREE 3; 5 EVERGREEN  
 Water-berry *Syzygium cordatum* TREE 3; 6 EVERGREEN  
 White Ironwood *Vepris lanceolata* TREE 3; 5 EVERGREEN  
 White Pear *Apodytes dimidiata* TREE 3; 5 EVERGREEN  
 White Stinkwood *Celtis africana* TREE 3; 5 DECIDUOUS  
 Wild Date Palm *Phoenix reclinata* TREE 3; 5 EVERGREEN  
 Wild Mulberry *Trimeria grandifolia* TREE 3 EVERGREEN  
 Wild Rubber Fig *Ficus polita* TREE 3; 5 EVERGREEN  
 Arum Lily *Zantedeschia aethiopica* WETLAND 3; 6 DECIDUOUS  
 Basket Sedge *Cyperus textilis* WETLAND 6 EVERGREEN  
 Broad-leaved Sedge *Cyperus latifolius* WETLAND 6 EVERGREEN  
 Creeping Ludwigia *Ludwigia stolonifera* WETLAND 6 EVERGREEN  
 Dwarf Papyrus *Cyperus prolifer* WETLAND 6 EVERGREEN

Elephants Dilemma *Hygrophila auriculata* WETLAND 6 EVERGREEN  
 Giant Hot Poker *Kniphofia tysonii* WETLAND 6 EVERGREEN  
 Giant Sedge *Cyperus immensus* WETLAND 6 EVERGREEN  
 Jobb's Tears *Coix lacryma-jobi* WETLAND 6 EVERGREEN  
 Large-leaved Dissotis *Dissotis princeps* WETLAND 6 EVERGREEN  
 Matting Rush *Juncus kraussii* WETLAND 6 EVERGREEN  
 Papyrus *Cyperus papyrus* WETLAND 6 EVERGREEN  
 Pink Pondweed *Persicaria serrulata* WETLAND 6 EVERGREEN  
 Purple Fines *Nesaea radicans* WETLAND 6 EVERGREEN  
 River Pumpkin *Gunnera perpense* WETLAND 6 DECIDUOUS  
 Sedge *Cyperus fastigiatus* WETLAND 6 EVERGREEN  
 Shrub Ludwigia *Ludwigia octovalvis* WETLAND 6 EVERGREEN  
 Silver Pondweed *Persicaria senegalensis* WETLAND 6 EVERGREEN  
 Six angled Sedge *Cyperus sexangularis* WETLAND 6 EVERGREEN  
 Small-leaved Dissotis *Dissotis canescens* WETLAND 6 EVERGREEN  
 Water Button *Matricaria nigellifolia* WETLAND 6 EVERGREEN  
 Wild Rice *Leersia hexandra* WETLAND 6 EVERGREEN  
 Yellow Ranunculus *Ranunculus multifidus* WETLAND 6 EVERGREEN  
 Afican Holly *Ilex Mitis* WETLAND TREE 6 DECIDUOUS  
 Kosi Palm *Raphia australis* WETLAND TREE 6 EVERGREEN  
 Quinine Tree *Rauvolfia caffra* WETLAND TREE 6 DECIDUOUS  
 River Bush Willow *Combretum erythrophyllum* WETLAND TREE 6 DECIDUOUS  
 Swamp Fig *Ficus trichopoda* WETLAND TREE 3; 6 EVERGREEN  
 Swamp Poplar *Macaranga capensis* WETLAND TREE 3; 6 EVERGREEN  
 Sycamore Fig *Ficus sycamorus* WETLAND TREE 6 EVERGREEN  
 Wild Frangipani *Voacanga thouarsii* WETLAND TREE 6 EVERGREEN

Geoff Nichols June 2002

## 10 ANNEXURE 2: DECLARED WEEDS AND INVADER PLANTS

Kind of plant		Type	Category	Special conditions
<i>Botanical name</i>	<i>Common name</i>			
<i>Acacia baileyana</i> F. Muell.	Bailey-se-wattel / Bailey's wattle	Indringer / Invader	3	Kyk / See subreg. 15.C(7)(c)
<i>Acacia cyclops</i> A. Cunn. ex G. Don	Rooikrans / Red eye	Indringer / Invader	2	Kyk / See subreg. 15.C(7)(c)
<i>Acacia dealbata</i> Link	Silwerwattel / Silver wattle	Indringer / Invader	2	Kategorie 1 plant in Wes-Kaap/ Category 1 plant in Western Cape Kyk / See subreg. 15.C(7)(c)
<i>Acacia decurrens</i> (J.C. Wendl.) Willd.	Groenwattel / Green wattle	Indringer / Invader	2	Kyk / See subreg. 15.C(7)(c)
<i>Acacia elata</i> A. Cunn. ex Benth. ( <i>A. terminalis</i> misapplied in S.A.)	Peperboomwattel / Pepper tree wattle	Indringer / Invader	3	
<i>Acacia implexa</i> Benth.	Screw-pod wattle	Onkruid / Weed	1	
<i>Acacia longifolia</i> (Andr.) Willd.	Langblaarwattel / Long-leaved wattle	Onkruid / Weed	1	
<i>Acacia mearnsii</i> De Wild.	Swartwattel / Black wattle	Indringer / Invader	2	Kategorie 1 plant in Suid Afrika, behalwe KwaZulu-Natal en Mpumalanga waar dit kommersieël verbou word / Category 1 plant South Africa, except in KwaZulu-Natal and Mpumalanga where it is used commercially
<i>Acacia melanoxylon</i> R. Br.	Australiese swarthout / Australian blackwood	Indringer / Invader	2	Kyk / See subreg. 15.C(7)(c)
<i>Acacia paradoxa</i> DC. (= <i>A. armata</i> R. Br.)	Kangaroo wattle	Onkruid / Weed	1	
<i>Acacia podalyriifolia</i> A Cunn.	Vaalmimosa / Pearl acacia	Indringer / Invader	3	
<i>Acacia pycnantha</i> Benth.	Gouewattel / Golden wattle	Onkruid / Weeds	1	
<i>Acacia saligna</i> (Labill.) H.L. Wendl.	Port Jackson	Onkruid /	1	

	Port Jackson willow	Weeds		
<i>Agave sisalana</i> Perrine	Garingboom / Sisal hemp, Sisal	Indringer / Invader	2	
<i>Alhagi maurorum</i> Medik. (= <i>A. camelorum</i> Fisch.)	Kameeldoringbos / Camel thorn bush	Onkruid / Weed	1	
<i>Anredera cordifolia</i> (Tenore) Steen. { <i>A. baselloides</i> (H.B.K.) Baill. Misapplied in South Africa}	Madeira vine, Bridal wreath	Onkruid / Weed	1	
<i>Araujia sericifera</i> Brot.	Motvanger / Moth catcher	Onkruid / Weed	1	
<i>Argemone ochroleuca</i> Sweet subsp. <i>ochroleuca</i>	Witblom bloudissel / White flowered Mexican poppy	Onkruid / Weed	1	
<i>Arundo donax</i> L.	Spaanse riet / Giant reed, Spanish reed	Indringer / Invader	3	
<i>Atriplex lindleyi</i> Moq. subsp. <i>inflata</i> Wilson (Muell.)	Blasiesoutbos / Sponge-fruit saltbush	Indringer / Invader	3	
<i>Atriplex nummularia</i> Lindley subsp. <i>Nummularia</i>	Oumansoutbos / Old man saltbush	Indringer / Invader	2	
<i>Azolla filiculoides</i> Lam.	Rooiwatervaring / Azolla, Red water fern	Onkruid / Weeds	1	Kyk / See subreg. 15.C(7)(c)
<i>Caesalpinia decapetala</i> (Roth) Alston (= <i>C. sepiaria</i> Roxb.)	Kraaldoring / Mauritius thorn	Onkruid / Weed	1	
<i>Campuloclinium macrocephalum</i> (Less.) DC. (= <i>Eupatorium macrocephalum</i> Less.)		Onkruid / Weed	1	
<i>Cannabis sativa</i> L.	Slegs hemp, nie dagga nie / Hemp only, not dagga	Indringer./ Invader	2	Beheerde aanplanting/ Controlled cultivation
<i>Cardaria draba</i> (L.) Desv.	Peperbos / Pepper-cress, Hoary cardaria, White top	Onkruid / Weed	1	
<i>Cardiospermum grandiflorum</i> Swartz	Blaasklimop / Balloon vine	Onkruid / Weed	1	
<i>Casuarina cunninghamiana</i> Miq.	Kasuarisboom / Beefwood	Indringer / Invader	2	Slegs vir gebruik as windbrekers en nie vir duin stabilisasie nie/ Only for use as windbreakers, not for dune stabilisation
<i>Casuarina equisetifolia</i> L.	Perdestertboom / Horsetail tree	Indringer / Invader	2	Slegs vir gebruik as windbrekers en nie vir duin stabilisasie nie / Only for use as windbreakers, not for dune

					stabilisation
<i>Cereus jamacaru</i> DC. ( <i>C. peruvianus</i> misapplied in S.A)	Nagblom / Queen of the Night	Onkruid Weed	/	1	
<i>Cestrum aurantiacum</i> Lindl.	Oranjesestrum / Yellow or Orange cestrum	Onkruid Weed	/	1	
<i>Cestrum laevigatum</i> Schlecht.	Inkbessie / Inkberry	Onkruid Weed	/	1	
<i>Cestrum parqui</i> L'Hérit	Inkbessie / Chilean cestrum	Onkruid Weed	/	1	
<i>Chromolaena odorata</i> (L.) R.M. King & H. Robinson (= <i>Eupatorium odoratum</i> L.)	Paraffienbos, Chromolaena / Triffid weed, Chromolaena	Onkruid Weed	/	1	
<i>Cirsium vulgare</i> (Savi) Ten. (= <i>C. lanceolatum</i> Scop.)	Skotse dissel, Speerdissel / Scotch thistle, Spear thistle	Onkruid Weed	/	1	
<i>Convolvulus arvensis</i> L.	Akkerwinde, Klimop / Field bindweed, Wild morning-glory	Onkruid Weed	/	1	
<i>Cortaderia jubata</i> (Lem.) Stapf	Pampasgras / Pampas grass	Onkruid Weed	/	1	
<i>Cortaderia selloana</i> (Schult.) Aschers. & Graebn.	Pampasgras, Silwergras / Pampas grass	Onkruid Weed	/	1	
<i>Cotoneaster franchetii</i> Bois.	Dwergmispel / Cotoneasters	Indringer Invader	/	3	
<i>Cotoneaster pannosus</i> Franch.	Silwerdwergmispel / Silver-leaf cotoneaster	Indringer Invader	/	3	
<i>Cuscuta campestris</i> Yunck.	Gewone dodder / Common dodder	Onkruid Weed	/	1	
<i>Cuscuta suaveolens</i> Ser.	Luserndodder / Lucerne dodder	Onkruid Weed	/	1	
<i>Cytisus monspessulanus</i> L. (= <i>C. candicans</i> (L.)DC., <i>Genista</i> <i>monspessulana</i> (L.) L. Johnson)	Montpellier broom	Onkruid Weed	/	1	
<i>Datura ferox</i> L.	Grootstinkblaar / Large thorn apple	Onkruid Weed	/	1	
<i>Datura innoxia</i> Mill.	Harige stinkblaar / Downy thorn apple	Onkruid Weed	/	1	
<i>Datura stramonium</i> L.	Gewone stinkblaar / Common thorn apple	Onkruid Weed	/	1	
<i>Echinopsis spachiana</i> (Lem.) Fiedr. & Rowley {= <i>Trichocereus spachianus</i>	Orrelkaktus / Torch cactus	Onkruid	/	1	

(Lem.) Riccob.}		Weed			
<i>Echium plantagineum</i> L. (= <i>E lycopsis</i> L.)	Pers echium / Patterson's curse	Onkruid Weed	/	1	
<i>Echium vulgare</i> L.	Blou – echium / Blue echium	Onkruid Weed	/	1	
<i>Egeria densa</i> Planch. (= <i>Elodea densa</i> (Planch.) Casp.	Waterpes / Ditch moss, Water thyme	Onkruid Weed	/	1	
<i>Eichhornia crassipes</i> (Mart.) Solms-Laub.	Waterhiasint / Water Hyacinth	Onkruid Weed	/	1	
<i>Elodea canadensis</i> Michaux	Canadian water weed	Onkruid Weed	/	1	
<i>Eucalyptus camaldulensis</i> Dehnh.	Rooibloekom / Red river gum	Indringer Invader	/	2	Kyk / See subreg. 15.C(7)(c)
<i>Eucalyptus cladocalyx</i> F. Muell.	Suikerbloekom / Sugar gum	Indringer Invader	/	2	Kyk / See subreg. 15.C(7)(c)
<i>Eucalyptus grandis</i> Hill ex Maid ( <i>E. saligna</i> Sm. (p.p.))	Salignabloekom / Saligna gum, Rose gum	Indringer Invader	/	2	Kyk / See subreg. 15.C(7)(c)
<i>Eucalyptus lehmannii</i> (Schauer) Benth.	Spinnekopbloekom / Spider gum	Indringer Invader	/	3	
<i>Eucalyptus paniculata</i> Sm.	Grysysterbasbloekom / Grey ironbark	Indringer Invader	/	2	Kyk / See subreg. 15.C(7)(c)
<i>Eucalyptus sideroxylon</i> A. Cunn. ex Woolfs	Swartysterbasbloekom / Black ironbark, Red ronbark	Indringer Invader	/	2	Kyk / See subreg. 15.C(7)(c)
<i>Gleditsia triacanthos</i> L.	Amerikaanse dieldoring, Soetpeulboom / Honey locust, Sweet locust	Indringer Invader	/	2	
<i>Hakea drupacea</i> (Gaertn.f) Roemer & Schultes (= <i>H. suaveolens</i> R. Br.)	Soethakea / Sweet hakea	Onkruid Weed	/	1	
<i>Hakea gibbosa</i> (Sm.) Cav.	Harige hakea / Rock hakea	Onkruid Weed	/	1	
<i>Hakea sericea</i> Schrad.	Syerige hakea / Silky hakea	Onkruid Weed	/	1	
<i>Harrisia martinii</i> (Lab.) Britton	Toukaktus, <i>Harrisia</i> kaktus / Moon cactus, <i>Harrisia</i> cactus	Onkruid Weed	/	1	
<i>Hypericum perforatum</i> L.	Johanneskruid / St. John's wort, Tipton weed	Indringer Invader	/	2	Beheerde aanplanting/ Controlled cultivation
<i>Ipomoea indica</i> (Burm.f.) Merr. (= <i>I.</i> <i>Congesta</i> R. Br.)	Purperwinde / Morning glory	Indringer Invader	/	3	



<i>Ipomoea purpurea</i> (L.) Roth	Purperwinde / Morning glory	Indringer Invader	/	3	?
<i>Jacaranda mimosifolia</i> D. Don	Jakaranda / Jacaranda	Indringer Invader	/	3	Kyk / See subreg. 15.C(7)(c)
<i>Lantana camara</i> L. en enige entiteit wat deels of geheel ontstaan het uit die <i>Lantana camara</i> kompleks deur verbastering of seleksie op natuurlike of kunsmatige wyse / and any entity which has partly or wholly been derived from the <i>Lantana camara</i> complex by means of hybridisation or selection under natural or artificial conditions	Lantana / Lantana, Tickberry	Onkruid Weed	/	1	
<i>Leptospermum laevigatum</i> (Gaertn.) F. Muell.	Australiese mirt / Australian myrtle	Onkruid Weed	/	1	
<i>Leucaena leucocephala</i> (Lam.) De Wit	Reuse wattel / Leucaena	Indringer Invader	/	2	Kyk / See subreg. 15.C(7)(c)
<i>Ligustrum japonicum</i> Thunb.	Japanese liguster / Japanese wax – leaved privet	Indringer Invader	/	3	
<i>Ligustrum lucidum</i> Ait.	Chinese liguster / Chinese wax – leaved privet	Indringer Invader	/	3	
<i>Ligustrum ovalifolium</i> Hassk.	Kaliforniese liguster / Californian privet	Indringer Invader	/	3	
<i>Ligustrum sinense</i> Lour.	Chinese liguster / Chinese privet	Indringer Invader	/	3	
<i>Ligustrum vulgare</i> L.	Gewone liguster / Common privet	Indringer Invader	/	3	
<i>Litsea glutinosa</i> (Lour.) C.B. Robinson (= <i>L. sebifera</i> Pers.)	Indiese lourier / Indian laurel	Onkruid Weed	/	1	
<i>Lythrum salicaria</i> L.	Purple loosestrife	Onkruid Weed	/	1	
<i>Macfadyena unguis-cati</i> (L.) A. Gentry	Katteklouranker / Cat's claw creeper	Onkruid Weed	/	1	
<i>Melia azedarach</i> L.	Maksering, Bessieboom / "Syringa", Persian lilac	Indringer Invader	/	3	Kyk / See subreg. 15.C(7)(c)
<i>Metrosideros excelsa</i> Soland. Ex. Gaertn. (= <i>M. tomentosa</i> A. Rich.)	Nieu-Seelandse perdestert / New Zealand bottle brush	Indringer Invader	/	3	
<i>Mimosa pigra</i> L.	Giant sensitive plant	Onkruid Weed	/	1	
<i>Morus alba</i> L.	Witmoerbeï, Gewone moerbeï / White mulberry, Common	Indringer	/	3	Kyk / See subreg. 15.C(7)(c)

	mulberry	Invader			
<i>Myoporum tenuifolium</i> Forst. F. ( <i>M. acuminatum</i> misapplied in S.A.)	Manatoka	Indringer Invader	/	2	
<i>Myriophyllum aquaticum</i> (Vell.) Verdc.	Waterduisendblaar / Parrot's feather	Onkruid Weed	/	1	
<i>Myriophyllum spicatum</i> L.	Spiked water-milfoil	Onkruid Weed	/	1	
<i>Nassella tenuissima</i> (Trin.) Barkworth (= <i>Stipa tenuissima</i> Trin.)	Witpolgras / White tussock	Onkruid Weed	/	1	
<i>Nassella trichotoma</i> (Nees) Hack. ex Arech. (= <i>Stipa trichotoma</i> Nees)	Nassella polgras / Nassella tussock	Onkruid Weed	/	1	
<i>Nerium oleander</i> L.	Selonsroos / Oleander	Onkruid Weed	/	1	Steriele kultivars uitgesluit / Excluding sterile, double- flowered cultivars
<i>Nicotiana glauca</i> R.C. Grah.	Wildetabak / Wild tobacco	Onkruid Weed	/	1	
<i>Opuntia aurantiaca</i> Lindl.	Litjieskaktus / Jointed cactus	Onkruid Weed	/	1	
<i>Opuntia exaltata</i> Berger	Langdoringkaktus / Long spine cactus	Onkruid Weed	/	1	
<i>Opuntia ficus-indica</i> (L.) Mill.	Boereturksvy, Grootdoringturksvy / Mission prickly pear, Sweet prickly pear	Onkruid Weed	/	1	Uitgesonderd alle doringlose cultivars en seleksies / Excluding all spineless cultivars and selections
<i>Opuntia humifusa</i> (Raf.) Raf. (= <i>O. compressa</i> (Salisb.) (Macbride)	Large flowered prickly pear, Creeping prickly pear	Onkruid Weed	/	1	
<i>Opuntia imbricata</i> (Haw.) DC. {= <i>Cylindropuntia imbricata</i> (Haw.) Knuth}	Imbrikaatkaktus, Kabelturksvy / Imbricate cactus, Imbricate prickly pear	Onkruid Weed	/	1	
<i>Opuntia lindheimeri</i> Engelm.	Klein rondeblaarturksvy / Small round-leaved prickly pear	Onkruid Weed	/	1	
<i>Opuntia monacantha</i> Haw. (= <i>O. vulgaris</i> Mill.)	Suurturksvy, Luisiesturksvy / Cochineal prickly pear, Drooping prickly pear	Onkruid Weed	/	1	
<i>Opuntia rosea</i> DC.	Roseakaktus / Rosea cactus	Onkruid Weed	/	1	
<i>Opuntia spinulifera</i> Salm-Dyck	Blouturksvy, Groot rondeblaar turksvy / Saucepan cactus, Large roundleaved prickly pear	Onkruid Weed	/	1	

<i>Opuntia stricta</i> (Haw.) Haw.	Suurturksvy / Pest pear of Australia	Onkruid Weed	/	1	
<i>Orobanche minor</i> Sutton	Klawerbesemraap, Bremraap / Lesser broomrape, Clover broomrape	Onkruid Weed	/	1	
<i>Paraserianthes lophantha</i> (Willd.) Nielsen (= <i>Albizia lophantha</i> (Willd.) Benth.)	Australiese Albizia, stinkboon / Australian Albizia, Stink bean	Onkruid Weed	/	1	
<i>Parthenium hysterophorus</i> L.	Parthenium	Onkruid Weed	/	1	
<i>Passiflora coerulea</i> L.	Siergrenadella / Blue passion flower	Onkruid Weed	/	1	
<i>Passiflora edulis</i> Sims	Grenadella / Purple granadilla, Passion fruit	Indringer Invader	/	2	
<i>Pennisetum setaceum</i> (Forssk.) Chiov.	Pronkgras / Fountain grass	Onkruid Weed	/	1	
<i>Pennisetum villosum</i> R. Br. ex Fresen.	Veergras / Feathertop	Onkruid Weed	/	1	
<i>Pereskia aculeata</i> Mill.	Pereskia / Barbados gooseberry	Onkruid Weed	/	1	
<i>Pinus elliotti</i> Engelm.	Basden / Slash pine	Indringer Invader	/	2	Kyk / See subreg. 15.C(7)(c)
<i>Pinus halepensis</i> Mill.	Aleppoden / Aleppo pine	Indringer Invader	/	3	Kyk / See subreg. 15.C(7)(c)
<i>Pinus patula</i> Schlechtd. & Cham.	Treurden / Patula pine	Indringer Invader	/	2	Kyk / See subreg. 15.C(7)(c)
<i>Pinus pinaster</i> Ait.	Trosden / Cluster pine	Indringer Invader	/	2	Kyk / See subreg. 15.C(7)(c)
<i>Pinus radiata</i> D. Don	Radiataden / Radiata pine	Indringer Invader	/	2	Kyk / See subreg. 15.C(7)(c)
<i>Pinus taeda</i> L.	Loblollyden / Loblolly pine	Indringer Invader	/	2	Kyk / See subreg. 15.C(7)(c)
<i>Pistia stratiotes</i> L.	Waterslaai / Water lettuce	Onkruid Weed	/	1	
<i>Pittosporum undulatum</i> Vent.	Australiese kasuur, Soet Pittosporum / Australian cheesewood, Sweet pittosporum	Onkruid Weed	/	1	
<i>Pontederia cordata</i> L.	Pickerel weed	Indringer	/	3	Kategorie 1 in landelike gebiede / Category 1 in non-

		Invader		urban areas
<i>Populus alba</i> L.	Witpopulier / White poplar	Indringer Invader	/ 3	Kyk / See subreg. 15.C(7)(c)
<i>Populus deltoides</i> Bart. ex. Marsh	Vuurhoutjiepopulier / Match poplar	Indringer Invader	/ 2	
<i>Populus x canescens</i> (Ait.) J. E. Sm.	Vaalpopulier / Grey poplar	Indringer Invader	/ 3	Kyk / See subreg. 15.C(7)(c)
<i>Prosopis glandulosa</i> Torr. var <i>torreyana</i> (Benson) Johnston and hybrids / en hibriedes	Heuningprosopis / Honey mesquite	Indringer Invader	/ 2	
<i>Prosopis velutina</i> Wootton and hybrids / en hibriedes	Fluweelprosopis / Velvet mesquite	Indringer Invader	/ 2	
<i>Psidium guajava</i> L. and hybrids / en hibriedes	Koejawel / Guava	Indringer Invader	/ 2	
<i>Psidium guineense</i> Swartz	Brasiliaanse koejawel / Brazilian guava	Indringer Invader	/ 3	
<i>Psidium littorale</i> Raddi var <i>longipes</i> (O. Berg) Fosb. (= <i>P. cattleianum</i> Sab.)	Aarbeikoejawel / Strawberry guava	Indringer Invader	/ 3	
<i>Pueraria lobata</i> (Willd.) Ohwi	Kudzuranker / Kudzu vine	Onkruid Weed	/ 1	
<i>Pyracantha angustifolia</i> (Franch.) C.K. Schneid.	Geelbranddoring / Yellow firethorn	Indringer Invader	/ 3	
<i>Pyracantha crenulata</i> (D. Don) M.J. Roem.	Rooivurdoring / Himalayan firethorn	Indringer Invader	/ 3	
<i>Ricinus communis</i> L.	Kasterolieboom / Castor-oil plant	Indringer Invader	/ 2	
<i>Robinia pseudoacacia</i> L.	Witakasia / Black locust	Indringer Invader	/ 3	Kyk / See subreg. 15.C(7)(c)
<i>Rorippa nasturtium – aquaticum</i> (L.) Hayek (= <i>Nasturtium officinale</i> R. Br.)	Bronkors / Watercress	Indringer Invader	/ 3	
<i>Rosa rubiginosa</i> L. (= <i>R. eglantheria</i> L.)	Wilderoos / Eglantine, Sweetbriar	Indringer Invader	/ 3	
<i>Rubus cuneifolius</i> Pursh. and hybrid <i>R x proteus</i> C.H. Stirton	Amerikaanse braam, / American bramble	Onkruid Weed	/ 1	
<i>Rubus fruticosus</i> L agg.	Braam / European blackberry	Indringer Invader	/ 2	
<i>Salix babylonica</i> L.	Treuwilger / Weeping willow	Indringer Invader	/ 3	

<i>Salix fragilis</i> L.	Crack or brittle willow	Onkruid Weed	/	1	
<i>Salvinia molesta</i> D. S. Mitchell and other species of the Family Salviniaceae	Watervaring / Kariba weed	Onkruid Weed	/	1	
<i>Schinus terebinthifolius</i> Raddi	Brasiliaanse peperboom / Brazilian pepper tree	Indringer Invader	/	3	Kyk / See subreg. 15.C(7)(c)
<i>Sesbania punicea</i> (Cav.) Benth.	Rooi sesbania / Red sesbania	Onkruid Weed	/	1	
<i>Solanum elaeagnifolium</i> Cav.	Satansbos / Silver-leaf bitter apple	Onkruid Weed	/	1	
<i>Solanum mauritianum</i> Scop.	Luisboom / Bugweed	Onkruid Weed	/	1	
<i>Solanum seforthianum</i> Andr.	Aartappelranker / Potato creeper	Onkruid Weed	/	1	
<i>Solanum sisymbriifolium</i> Lam.	Wildetamatie, Doringtamatie / Wild tomato, Dense-thorned bitter apple	Onkruid Weed	/	1	
<i>Spartium junceum</i> L.	Spaanse besem / Spanish broom	Onkruid Weed	/	1	
<i>Tamarix ramosissima</i> Ledeb.	Perstamarisk / Pink tamarisk	Indringer Invader	/	3	
<i>Tamarix chinensis</i> Lour.	Chinese tamarisk / Chinese tamarisk	Indringer Invader	/	3	
<i>Tecoma stans</i> (L.) H.B.K.	Geelklokkies / Yellow bells	Onkruid Weed	/	1	
<i>Tipuana tipa</i> (Benth.) Kuntze	Tipoeboom / Tipu tree	Indringer Invader	/	3	Kyk / See subreg. 15.C(7)(c)
<i>Tithonia diversifolia</i> (Hemsl.) A. Gray	Mexikaanse sonneblom / Mexican sunflower	Onkruid Weed	/	1	
<i>Tithonia rotundifolia</i> (Mill.) S.F. Blake	Rooisonneblom / Red sunflower	Onkruid Weed	/	1	
<i>Toona ciliata</i> M.J. Roem. (= <i>Cedrela toona</i> Roxb. ex Rottl. & Willd.)	Toonboom / Toon tree	Indringer Invader	/	3	Kyk / See subreg. 15.C(7)(c)
<i>Ulex europaeus</i> L.	Gaspeldoring / European gorse	Onkruid Weed	/	1	
<i>Xanthium spinosum</i> L.	Boetebos / Spiny cocklebur	Onkruid Weed	/	1	
<i>Xanthium strumarium</i> L.	Kankerroos / Large cocklebur	Onkruid	/	1	

	Weed		
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**B) Chemical Control:**  
 The plants are killed or suppressed through the action of chemicals (called herbicides) which are applied directly to the target plant or to the soil close to it. Herbicides are either **selective** (more toxic to some plants than others e.g. a selective broadleaf herbicide will kill broadleaf plants but not grasses), or **non-selective** (usually toxic to all plants). They are also either **contact** herbicides which cause localised injury to the leaves where they come in contact with the plant (usually used to kill small annual plants) or **translocated (systemic)** herbicides which move in the plant to where growth is taking place (usually used on invader plants because most are perennials). Herbicides can be used successfully in most situations, but the need for proper precautions can be limiting. **Herbicides registered for use on a problem plant (name of plant on label on container) should always be used, but there are many plants with no registered herbicides. Try Garlon 4 at an appropriate dose on a few of the plants in the first instance, but the agro-chemical company will not guarantee the result. The wetter Actipron should be added to Garlon 4 when it is sprayed on leaves and stems. Similarly, the herbicides containing glyphosate, e.g. Roundup, Mamba, Clearout, Tumbleweed "will control most annual and perennial weeds in non-crop areas" and can be tried on the softer/less woody plants mentioned in this booklet. If you find an effective treatment for a new weed tell WESSA Alien Plant Watch so they can pass the information on to the company concerned. (See page 9)**  
**Advantages include:** sometimes the only effective method; used correctly, can be the most cost-effective; quicker than mechanical control; if used according to label recommendations, herbicides pose little or no threat to the environment! *Disadvantages include:* specialised equipment and training of operators is essential; plants must be "healthy" and weather conditions suitable; aerial, foliar and soil application can all affect surrounding plants; misuse of herbicides is possible and environmental contamination, damage to desirable plants etc could result; mechanical preparation of the plants may be necessary; herbicides are expensive.

- Ways of Applying Herbicides**  
 (Please use common sense and follow instructions on the labels!)
- There are six ways of applying a herbicide:
- 1) Foliar application - to the leaves and stems.
  - 2) Basal Stem application - to stems of standing trees.
  - 3) Partial Frill/Stem Injection - to holes or cuts (frills) made in the stem.
  - 4) Stump application - to the cut surface of freshly-cut stumps.
  - 5) Stalk Immersion - the correctly mixed herbicide and water, in a suitable container, is attached to the cut stem or stems.
  - 6) Soil application - to the soil around the plant so the herbicide is absorbed through the roots - a very specialised method only recommended for use by "experts".

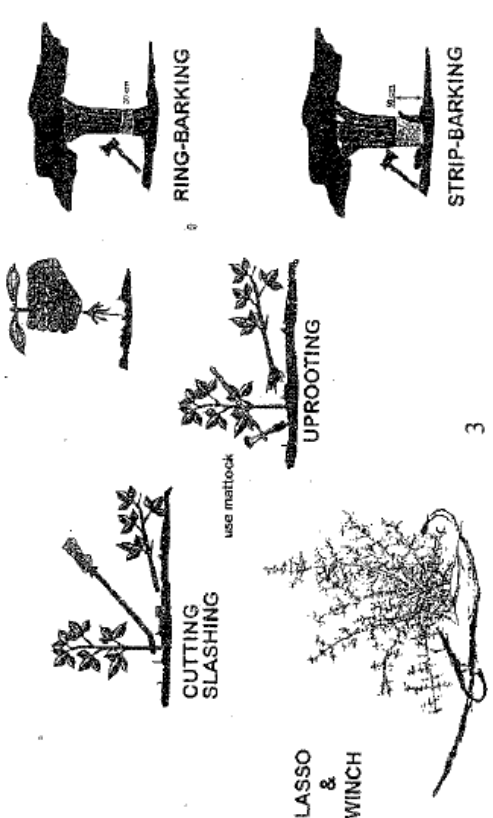
**1) Foliar Application:**  
 The correctly mixed herbicide is sprayed onto the rapidly growing leaves and stems (foliage) of the target plant, usually to the "point of run-off" i.e. when the herbicide mix is about to run off the leaves. Some herbicides, e.g. Garlon4® or Brush-Off® require the use of a "sticking agent" or "wetter" to ensure efficient results. Ideally, enough foliage must be present so that the plant "catches" sufficient herbicide to kill it. When spraying plants previously cut down, regrowth or coppice should generally have reached a height of between 50 and 100cm for effective control, but labels may specify requirements. A dye can be added to

**CAN RETAINING INVASIVE ALIEN PLANTS BE JUSTIFIED?**  
 Many fallacious reasons are given for retaining these "cancer plants" such as providing "food for the birds", "resting or roosting" sites, "screening", "wind breaks" etc., *but*, we must learn to "look at the big picture". There are numerous indigenous substitutes for most things. Replace with these whenever possible, and ensure a better environment for the future. Also ensure, particularly where our natural vegetation is an asset and the advancing "cancer" a liability, that **eradication takes precedence over control!**

**ERADICATING ALIEN PLANTS**

There are several methods of eradicating or effectively controlling alien plants, all of which have their advantages and disadvantages; situations where they are appropriate and situations where they are not. The main weed control methods are discussed below. In practice, a combination of methods (integrated control) is often used.

**A) Manual/Mechanical:**  
 Some form of force is used to control the target weeds e.g. uprooting (including hand-pulling), slashing, mowing or felling, ring-barking (removing every trace of bark and cambium in a 30cm wide band around the stem at a height of about 50 cm) or strip-barking (stripping off all the bark from about waist height to below the surface of the soil). A highly efficient method is to lasso the plant and uproot using a winch, car towbar or a tractor.  
**Advantages include:** little training/supervision needed; simple tools required and only target species treated; with care, (e.g. close holes, press down loose soil and spread grass/leaf litter over the exposed area) the environment is unharmed; ideal for gardens.  
**Disadvantages include:** physically demanding; slow and costly for large areas or dense infestations where it is seldom completely successful and requires repeated follow-up operations; any soil disturbance can promote germination of undesirable weed seeds and can lead to soil erosion on slopes; in dense infestations indigenous/desirable species are often mistakenly destroyed.



indicate sprayed areas.

*Advantages include:* an easy and versatile technique; can be used on small or large areas, where conditions are rough or where there are small obstacles; ideal for follow-up work e.g. use "spot-spraying". *Disadvantages include:* plants often require preparation making it a two-part operation; application rates are unlikely to be accurate as they are influenced by terrain, plant density, the weather (e.g. drift) and the operator (e.g. fatigue); environmental conditions (e.g. rain) and the state of the plant (e.g. stressed due to heat, drought etc, dusty, eaten by insects etc) affect herbicide efficacy; large amounts of clean water must be transported to the site; frequent refilling of apparatus slows rate of work (about 2 man-days per hectare!)

**TO LEAVES**



TO SEEDLINGS



TO REGGROWTH, COPPICE

**2) Basal Stem :**

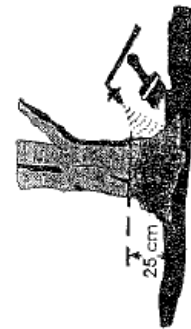
For plants with thin bark or stems up to 20cm diameter. Apply mixture of herbicide and diesel to **all** bark with a paint brush or sprayer from ground level to at least 0,25m. Spraying uses 3x more mixture but is less tiring and faster than painting. All bark pieces left in crevices after stripbarking should be killed by thorough spraying/painting. In multi-stemmed plants, each stem must be treated separately.

**3a) Partial/Total Frill:**

A ring of evenly-spaced downward cuts are made in the bark with a handaxe at a convenient height, (the lower the better). Herbicide mixed with water is applied to each cut with a suitable applicator, e.g. syringe or hand-held sprayer. Large cuts (5cm long) hold about 1ml initially if cut is level. Care is needed, so work is slow.

**3b) Stem Injection:**

Only for **Cactus family** at present. Make holes in the lower part of the stem with a pole (e.g. broomstick handle) with a spike on the end. About 2ml of water-soluble herbicide solution is put in each hole. (Approximately 4 holes for a <2m plant with a maximum of 12 holes for large plants).



**TO BASAL STEM**

3a) Partial/Total Frill:

*Advantages of the 3 types of stem application include:* a simple, target specific method which requires little preparation or training; ideal for tall trees that can remain standing (e.g. in a conservation area. Remember that a drifted-out tree is far more difficult to fell than a living one, so ensure correct initial planning decisions are made); not dependent on weather conditions or the status of the plant as the diesel is water repellent and work can continue in light rain, and although possibly less effective, work can be continued when plant is stressed e.g. in winter. *Disadvantages include:* the carrier, diesel, is usually more toxic to humans than the herbicide (wear rubber gloves); if dense infestations are to be treated the large quantities of diesel may cause soil contamination (no information at present); open containers used in paintbrush methods often fall over causing wastage; partial frill and stem injection are slow techniques.

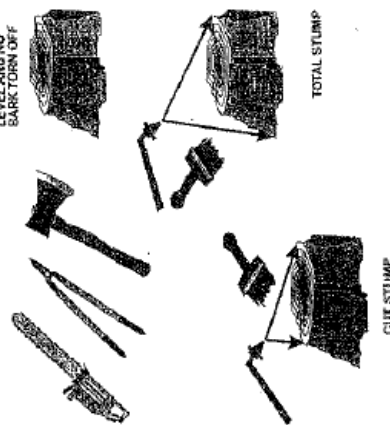
**4) Stump Application:**

Cut the plant as close to the ground as is practicable. Use a tool that will give a clean cut on the size of stem. Use a saw for diameters greater than 50mm. The ideal stump is short, with a level cut-surface, none of the bark torn away from the wood, and no exposed roots. Herbicide should be applied as soon as possible, *within 12 hours*. There are **two types of stump application:** cut-stump and total-stump.

For **cut-stump**, mix herbicide with diesel or water (see label) and apply to the outer ring of the freshly-cut surface, close to the bark. For small stumps with diameters less than 50mm, treat all cut surfaces. For **total-stump**, mix herbicide with diesel and apply to the cut surface, the sides of the stump and any exposed roots.

*Advantages include:* the most effective method which should be considered whenever practical, especially in sensitive areas, because herbicide is placed "into" the target plant; only a small amount of herbicide is used per plant; a one-pass operation, there is usually no need to return to the same plants. *Disadvantages include:* clearing/cutting down is tiring work; progress is slow because falling branches need to be avoided and cleared to one side; removal and disposal of large amounts of wood may be difficult; the probable use of diesel as a carrier for the herbicide makes it expensive; removal of the canopy will stimulate many seeds to germinate, some herbicides are long-acting (or have residual action - see pg 4 and the table on pages 11&12) and may be absorbed by non-target species planted later.

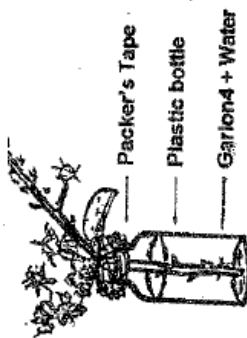
**TO STUMPS**



**5) Stalk Immersion:**

No herbicides registered for this method but worth trying on all climbing species where vegetative recolonisation is possible such as Madeira Vine and Barbados Gooseberry; also Mauritius Thorn and Balloon Vine. The main stem or stems of the plant or creeper are cut at a convenient height. The roots are dug out or treated with herbicide. **Garlon 4** in water in a plastic bottle is pushed over the base of the cut stems and tied in place with packers tape. A bucket can be used for large stems but would need to be checked and possibly refilled after a few days. *Tie a danger tape around the bottle or bucket.*

**Advantages include:** Very labour- and cost-effective; the herbicide is sucked up and transported throughout the entire plant, reaching stems and seeds high up in the canopy of trees, killing the stems and leaves and possibly affecting the germination of the seeds. **Disadvantages include:** Not always easy to locate main stems; the bottle must be retrieved.



**6) Soil Applied Herbicides (NOT recommended for general use):**

A very specialised method, particularly on sandy soils. There are a few herbicides that are applied to the soil at the base of the plant, but their use is restricted to where there is no chance of desirable trees nearby being affected e.g. reducing thorn bush encroachment. Are unlikely to be suitable for use in urban open spaces. **Leave this method to the expert!** **Advantages include:** herbicide is easily and rapidly applied and is broadly selective. **Disadvantages include:** only suitable for sandy soils; effects may be delayed for many months and the chemicals are fairly persistent in the soil; some desirable trees may be killed, so not suitable for selective weed control.

**C) Biological Control:**

Uses natural agents, particularly insects, mites and fungi or bacteria, to damage or suppress a target weed. Some are chosen for their ability to reduce existing infestations by attacking the leaves and stems of the weed, but will not be used if the target plant is useful at times (called a "conflict of interest" situation). Others do not kill plants or reduce the infestation, but prevent further spread of the weed by attacking the flower buds, flowers and seeds. These agents are used where a "conflict of interest" arises because the plant is also useful e.g. wattles are a timber crop and a weed. Successful bio-control is the ultimate in weed control as it is self-perpetuating, highly selective and has no undesirable effects on the environment, but for various reasons, complete control by biological means alone is seldom achieved. Potential bio-control agents are carefully selected and studied for their effects on target weeds in their native lands. The most suitable are imported to South African quarantine laboratories for culturing and screening for host specificity (meaning that the insect will die rather than feed on a plant other than the specific weed targeted). These tests are very stringent and can take up to 5 years to complete satisfactorily. Permission to release the organism will only be granted by Department of Environmental Affairs if tests are conclusive.

Once released, the biocontrol agent is carefully monitored and its effectiveness assessed. For a number of reasons success rates vary for survival of released agents and for their ability to control the target plants away from their native land. Insect agents have been most successful on plants growing in special situations e.g. in water - Kariba Weed, Water Lettuce; dry climates - Prickly Pear, Jointed Cactus. Agents are being tested by the Plant Protection Research Institute for many of our alien invader plants. (See contact address on Page 9)

**GETTING YOUR ALIEN-BUSTER TEAM STARTED**

Alien invasive plants are determined to stay! They will always be a nuisance in the landscape and will continue to threaten our environment. It is up to every one of us to help control this scourge before the battle is totally lost!

- 1) Start by assessing the extent of the problem. **The key questions are: where control should start and how to ensure all alien plants are killed? To achieve success, an integrated, on-going control programme must be carefully planned, because very few, if any, control operations succeed the first time.**
- 2) Start by removing weeds in the least affected areas and work towards the heavier weed infestations. By doing this, you can rapidly safeguard relatively large areas of indigenous vegetation. Next identify areas where vigorous indigenous bush meets weedy areas and carefully work outwards from "Goodies" to "Baddies". Always start at the highest point and work downwards.
- 3) Remove weeds carefully and try to cover exposed soil with cut vegetation or leaf litter that is free of weed seeds and that will not regrow if in contact with the soil. **Press any loosened soil down lightly taking care not to damage native plants, and mulch with plant material where possible.** This will help stop exotic weeds from filling the gaps left by weeding.
- 4) Try to prevent weeds from producing seeds or fruit by cutting back before they flower wherever possible. Carry seeds, fruit, bulbs, tubers, stems that root easily etc away from the area in plastic bags and dispose of them safely. With a plant like Pteris, it is advisable to burn the pieces "on site" if at all possible.
- 5) Often, the most time- and cost-effective way of dealing with heavy infestations is to arrange for the **correct use of herbicides**. Ideally, use a foliar spray carefully applied to target plants thus ensuring minimum soil disturbance and so reducing the chance of invader seeds germinating in the "seed bed" created by "weeding". Slash the plant down and return in a few months to foliar spray the regrowth. Paint/spray the cut stumps of the larger and more difficult invasives. Paint the lower stem without "disturbing" the plant of really difficult to kill species like leuceana.
- 6) **Follow-ups are absolutely essential!** Monitor cleared areas on a regular basis until the supply of viable invasive seeds is exhausted and indigenous plants are again re-establishing themselves. You might need to reintroduce and replant certain species to restore a well-balanced and healthy ecology that is once again able to support the host of creatures dependent on it to feed, breed, nest and rest!



**HELP LINES**

**AlienPlantWatch, a WESSA project:**

Jean Moore, ph: 031-2075905, fax: 031-2075909 e-mail: nkmarin@iafrica.com  
 Jean Lindsay, ph/fax:031-7055448 e-mail: lindsayjd@mweb.co.za  
 WESSA Conservation Div., ph: 031-2010909 fax: 031-2019525 e-mail: wiskzn@saoi.com

Wayne Lotter, ph: 033-347 3666 fax: 033-347 3217 e-mail: waynel@za.sappi.com  
 Ian Patrick, KZN Wildlife, Kloof. Tel.: 031-7643515

**For advice on planning of control work contact:**

- a) Your nearest District Conservation Officer,  
 KZN Nature Conservation Services, (old Natal Parks Board/KBNR) or  
 the Ecological Advice Division, KZN Wildlife, Durban, Telephone: 031-205 1271  
 Pietermaritzburg, Telephone: 033-845 1999 or
- b) Plant Protection Research Institute, Cedara. Tel.: 033-355 9413  
 This unit of the Agricultural Research Council also offers a two-day short course  
 "Alien Plant Control for Land Managers"
- c) Dept. Agric., Directorate Resource Conservation, Box 345, Pietermaritzburg, 3200  
 Tel.: 033-3453 557, Fax: 033-3428 522 (Pieter Botha Cell 082 4456439)  
 Eco-systems PO Box 338, Gingindlovu, 3800 Tel.: 035-3374818  
 e-mail: ecosystems@mweb.co.za Five day training course offered.

For information on control of Aquatic Plants contact: Dept of Water Affairs & Forestry -  
 Hugh Dixon-Paver Tel: 031- 3362700, Cell: 082 8089920

**For more information on biological control contact:**

Plant Protection Research Institute, Private Bag X134, Pretoria, 0001  
 Tel.: 012-329 3276, Fax: 012-329 3278, E-mail: rlethdb@plant2.agric.za or  
 Plant Protection Research Institute, Cedara. Tel.: 033-355 9413

**For information about the use of herbicides contact:**

- a) Your local supplier of agro-chemicals e.g.  
 Ecoguard, 25 Laurel Rd, Merrivale Industrial, Tel.: 033-330 6985  
 Grovida Horticultural Products CC, 400 Sydney Rd, Durban. Tel.: 031-205 2872  
 NCD, Victoria Rd, Pietermaritzburg. Tel.: 033-697 7300  
 or  
 Farmers Agri-Care (Pty) Ltd - Mike Butler Tel:0353-374805 Cell: 083 654 3010  
 or  
 SA Cyanamid - Richard Heathcote, Cell: 082 412 7412 Tel/Fax 033-343 1309  
 or  
 Sanachem agent, Mike Pace Tel: 033-3677 404, Cell 082 5528601  
 or  
 Jim Chedzey Cell: 083 326 0698 or Derek Worthington Cell: 083 264 4043  
 Consult the latest edition of "Guide to Use of Herbicides" by Vermeulen *et al*,  
 available from Agricultural Information, Private Bag X144, Pretoria, 0001.
- b)

**Visit WESSA KZN's web page :**  
<http://mzone.mweb.co.za/residents/csread/kznwildlife.htm>

**SOME USEFUL REFERENCES**

- Lesley HENDERSON, *Plant Invaders of Southern Africa. Plant Protection Research Institute Handbook No 5.* (Currently being reviewed/updated)
- P. CAMPBELL, *Wattle Control. PPRI Handbook No.3.*
- Clive BROMILOW, *Problem Plants of South Africa.* Briza Publications cc,  
 Charles & Julia BOWEN, *Bring Nature Back to your Garden.* Kohler Carlton & Print  
 (PineTown) All proceeds from the sale of this book go to WESSA.
- A Zulu version of "Bring Nature Back to your Garden" will soon be available.
- Guide to use of Herbicides** by Vermeulen *et al* available from Agricultural Information,  
 Private Bag X144, Pretoria, 0001
- Plant Protection Research Institute**, 1998. *Alien Plant Control for Land Managers.*  
 Pietermaritzburg (notes for short course 90pp)

**MAKING HERBARIUM SPECIMENS**

If you are doubtful about the identification of a plant, follow the instructions below to make a herbarium specimen.

1. Dry as much of the plant, with flowers and fruit if possible, by pressing it between sheets of newspaper. Change the paper regularly until the specimen is dry.
2. Record the date, where it was collected, the height of the plant, the colour of the flowers and whether it was common or rare.
3. For identification of herbarium specimens ask keen gardeners or members of outdoor clubs; societies e.g. the Wildlife Society or Botanical Society, KZN Herbarium, National Botanical Institute, Botanic Gardens Road, Durban, 4001; local staff of the Nature Conservation Services, the National Botanical Institute, Private Bag X101, Pretoria, 0001 or the Botany Department of a University. The Department of Agricultural Development (Tel. 03331-355 9100) will be able to put you in touch with their extension officers in many parts of KwaZulu-Natal who will gladly assist in helping to identify problem plants.

**Names and Features of some Herbicides**

Name	Active ingredient	Effect on plants	How it works
Access	picloram	selective	systemic
Brushoff/ Escort	metsulfuron	selective	systemic
Chopper	imazapyr	non-selective	systemic
Garlon4	triclopyr	selective	systemic
Midstream	diquat	non-selective	<b>contact only</b>
MSMA	msma	selective	contact/ systemic
# Roundup, etc	glyphosate	non-selective	systemic
Muster	glyphosate trimesium	non-selective	systemic
TordonSuper	triclopyr/picloram/	selective	systemic
Tordon 101	24D/picloram	selective	systemic
<b># Roundup, etc = Mamba, Clear Out, Tumble Weed</b>			

**that are Registered for Alien Plants:**

Residual effects?	Carrier	Target plants
NB - moderate	clean water	broadleaf
slight	clean water	broadleaf
NB - moderate	water, has a dye	all plants
nil	water or diesel	broadleaf but not Lantana
nil	clean water	water weeds
nil	clean water	Cactus spp, grasses
nil	clean water	all plants
nil	clean water	all plants
NB - moderate	diesel	broadleaf
NB - moderate	clean water	broadleaf
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