

Jukskei Rejuvenation Project Plant Sensitivity Audit

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SUMMARY ASSESSMENT

I surveyed the vegetation along the Jukskei River from the park in Queen Street to Long Street (500 metres) on the 4 April 2018. I identified plants to determine the degree of infestation by problem plants along the canal and took photographs of the vegetation. I also noted factors impacting on the growth of the vegetation.

Degree of infestation

The Queen Street park and both canal banks and canal walls of the Jukskei River from Queen Street to Long Street are heavily infested with alien invasive plant species (24) and indigenous and exotic weed species (35). Of the sixty-one (61) species identified, almost half (42%) are listed as invasive according to the National Environmental Management Biodiversity Act (NEMBA) and Conservation of Agricultural Resources Act (CARA) and need to be removed or controlled. The rest are weeds of disturbed areas and should be removed as well. All the species to be removed are listed at the end of the report.

Only two of the sixty-two species found are indigenous (see table of indigenous species). The White stinkwood tree (*Celtis africana*) and the Bushman's poison tree (*Acokanthera oppositifolia*) grow along the canal on the Nandos Central Kitchen bank section. Only a handful of White stinkwood trees are growing at the Queen and Viljoen Street ends. These trees should remain, except for the tree growing at the Queen Street end which may have to be removed to make way for the sieve tank, water wheel and wetlands.

Factors affecting the growth of Jukskei River vegetation

Human impact

There is evidence of use of the canal banks by the public. Human faeces and kitchen refuse litter the entrance to the canal of the bank bordering the Nandos Central Kitchen property, and stripped cables lie further along. A vagrant has erected a shack in the open plot next to a building of flats on the opposite bank. The open plot has many invasive plants growing in it which need to be removed. Builders have left rubble on much of the bank bordering the Nandos Central Kitchen property. The canal banks and area around the canal access points will need to be cleared of rubbish and fertilised before planting to riverine and wetland plant species along the whole canal from Queen to Long Street. Access to the canal needs to be controlled and additional fencing put up at the open lot and over the Queen Street bridge.

Inappropriate weed control was used on the bank of the canal bordering the Victoria Yards property. The vegetation was removed using a bulldozer about seven months ago. No follow-up programme has been implemented with the result that the vegetation is now dense with weeds and alien plants. It is important that once the plants have been removed that a continuous weeding and alien plant control plan is followed.

A vegetable garden has been established on the southern bank of the canal near Long Street by employees of the business operating there. This will have to be removed together with the new drain channel that has been placed on top of the bank to drain into the canal.

Physical environmental factors

Temperature and moisture affect the height and type of plant growth occurring on the banks and walls of the canal.

Both banks of the canal are bordered by fences and buildings from Queen Street to Long Street. I walked the banks late morning into early afternoon and noticed that the high brick and concrete fences on the Nandos Kitchen and Victoria Yards properties shade a part of the banks which are only about 2 metres wide. On the Nandos Kitchen section, plant growth is dense and tall. The Tree of Heaven (*Ailanthus altissima*), Japanese Privet (*Ligustrum japonicum*), Black mulberry (*Morus nigra*), White stinkwood (*Celtis africana*) and Bug weed (*Solanum mauritianum*) reach heights of 5 metres. There is a greater diversity of climbers, herbs and shrubs growing under these trees, especially where the Crofton weed (*Ageratina adenophora*) is not dense enough to exclude other plant species. Larger more dense growth occurs on the Victoria Yard bank than on the opposite bank. The opposite bank is about 4 metres wide. Here the vegetation is in full sun for most of the day and are exposed to heat reflecting off the building and fences. The plant growth reaches about 1 metre in height in most places along the canal. Plant growth may be slower here due to the drier soil as a result of the higher air temperature.

Plants grow in the canal wall on both sides of the canal where temperatures are lower and there is more moisture in the air close to the water than on the banks. The Crofton weed is the most common species. A fern (*Nephrolepis exaltata*) is growing in the canal wall of the Nandos Central Kitchen section. Vegetable plants are growing on the opposite bank of the Nandos and Victoria Yard sections.

Future invasion potential

Plants from surrounding property gardens, including the Nandos Central Kitchen and Victoria Yards gardens, and streets will continue to invade the canal if not replaced with non-invasive species. Many of the species found are dispersed by birds, water and wind and will establish further along the canal downstream as well if left.

Reinvasion by weeds after clearing the vegetation during the developmental phases of the project will also occur. Many of the weed species have a large seed bank, such as Black Jack. When plants are removed seeds of these weed species will germinate if a control plan is not implemented.

Recommendations for when creating the wetlands and building the community facilities and for future maintenance of the vegetation

1. An alien plant and weed control plan is necessary. This should be implemented at the start of the project and continue thereafter. A basic summary guideline on alien invasive control methods is provided at the end the report. Care must be taken when cutting the plants as many of the plant have parts (leaves, stem sap, fruits) are poisonous if consumed or may cause skin irritation of some people. Plants should be removed before they produce seed. Manual extraction should be done where possible. Herbicides may be needed where species resprout or cover a large area. Plants will continue to reappear and will need removing as they appear. Invasive and weeds growing in the Victoria Yards and Nandos Central Kitchen gardens need to be controlled as well.

2. Staff should be trained to recognise the problem plants and have the ability to deal with them. The staff should have training in the handling of herbicides and one member should have a PCO (Pesticide Control Operator) licence.
3. The plants in the Queen Street park and Chinese maple (*Acer buergerianum*) growing on the Queen and Viljoen Street pavements should be replaced with indigenous trees. All the plants, except the White stinkwood, which are growing along the canal and in the canal walls should be removed and replaced with riverine and wetland plants.
4. Creating large bare spaces should be avoided as weed growth will be encouraged by the light and space. I suggest that as plants are cleared, that a mulch or grass seed or plants are put down to control the emergence of weeds.
5. The fences along the canal need to be replaced with fencing that will provide less shade and medium to low temperature due to solar reflection. This is especially important in areas where the vertical and horizontal wetlands are placed. The fencing must also be able to control public access to the canal. A fence needs to be erected at the open plot next to the building of flats and on the bridge at Queen Street.
6. Any building rubble from construction of pathways and for structures such as the outdoor gym and stands should be disposed of correctly. Any cement patches should be broken up and planted with appropriate plants.

An overview of the vegetation of the Jukskei River rejuvenation project area

The following photographs show portions of the canal vegetation along the Nandos Central Kitchen Victoria Yards sections of the project area and factors affecting plant growth.

Nandos Central Kitchen section from Queen Street to Viljoen Street



Queen Street: Public access to the canal is possible on both sides of the canal. A White stinkwood tree is visible on the Nandos Central Kitchen bank (right).



Queen Street: About 2 metres from the entrance to the canal on the Nandos Central Kitchen side. Litter, building rubble and stripped cables are lying here. The shade line created by the brick wall is evident. The absence of large trees of the Tree-of-heaven may make this site viable for the sieve tank, water wheel and vertical and horizontal wetlands. A line of trees occur about 10 metres further along the canal down to Viljoen Street.



Mid section close to the gate of the Nandos Central Kitchen property as seen from the opposite bank: The trees are taller than on the opposite bank.



Mid section as seen from the Nandos Central Kitchen bank. Under the canopy of Tree-of-heaven and other species, in places where the Crofton weed is less dense, a variety of plants grow in the understory.

Victoria Yards section from Viljoen Street to Long Street



From Viljoen Street: The Victoria Yards bank (left) is heavily infested with Black Jack, Khaki bos and other weed species after the vegetation was removed and no follow up occurred. The soil has remnants of cement and is hard and dry though moss is growing on the building walls.



Long Street ahead: The vegetation is dense on the Victoria Yards bank (left). A vegetable garden has been made on the opposite bank (right). The vegetable garden should be removed.

A description of common alien invasive plant species of that need control along the canal



Tree-of-heaven (*Ailanthus altissima*)

A decorative deciduous tree that grows easily from seed and forms suckers from cut stems and roots. The roots tend to expand into water systems. The plants have separate sexes (unisexual) or are bisexual and produce many winged-seeds (samaras) in October-November. These can be dispersed by wind and water. The plant grows rapidly up to a height of 25m. It also produces a chemical which prevents the growth of other species (alleopathic). The plant

parts have medicinal uses. Other uses are as a wood fuel and for furniture making.

Small plants less than 2 metres should be dug out, taking care to remove the whole root system. Larger plants need a combination of cutting the stem and painting the stem with herbicide. There is no registered chemical for this species. A suggestion is to make many small cuts downwards all around the stem. Apply Garlon into the cuts. This should be followed with repeated cutting of the shoots as they appear to use up the energy stored in the roots. Then dig up the plant. The younger trees can be cut down and the shoots repeatedly cut thereafter as their roots are not large.



Bugweed (*Solanum mauritianum*)

A perennial evergreen shrub or small tree of 5m. It grows quickly and shades out other vegetation. It produces poisonous berries which attract fruit flies and birds which disperse the seeds. It is easy to control by cutting down and painting the stem with herbicides. Care must be taken with the fine hairs released from the stems which can cause breathing problems.



Crofton weed (*Ageratina adenophora*)

A multi-stemmed dark green evergreen soft woody shrub, it grows up to 2 metres high and produces wind dispersed achenes from December. It is poisonous to livestock. It competes and replaces other plant species forming monocultures and has no uses. The plants need to be cut back and then pulled out.



Four –o'clock plant (*Mirabilis jalapa*)

A perennial shrub that grows up to 2 metres. The flowers open in the afternoon and close the next morning. It reproduces from seed and grows during the rainy season. The plant and seeds (one seeded capsule) are poisonous. The plant replaces other plants. It is controlled only by mechanical removal.

Other species which occur only in a few places in the project area, but which should be monitored once removed are Bramble, Verbena, Jacaranda, Red eye, Moth catcher, Inkberry, Cat's claw creeper, Lantana and Syringa.

SPECIES LIST

A list of all the species of indigenous and exotic plants found along Jukskei River in the Nandos Central Kitchen and Victoria Yards project area are presented in the tables according to growth form. The species highlighted in bold are fruits and vegetables. The alien invasive plants are listed in a separate table in the next section. All these species except the indigenous White stinkwood should be removed from the project area. Refer to the next section for methods of control and to the species descriptions given above.

a) Grasses and sedges – exotic and indigenous weeds

Scientific name	Common name
<i>Cynodon dactylon</i>	Bermuda grass
<i>Mariscus congestus</i>	Dense flat sedge
<i>Eleusine coracana</i> subsp. <i>Africana</i>	Goose grass
<i>Eragrostis tenuifolia</i>	Elastic love grass
<i>Panicum maximum</i>	Common buffalo grass
<i>Pennisetum clandestinum</i>	Kikuyu
<i>Setaria megaphylla</i>	Ribbon bristle grass
<i>Setaria verticillata</i>	Sticky bristle grass
<i>Urochloa panicoides</i>	Garden signal grass
TOTAL	9

b) Herbs (including climbers), shrubs and ferns – exotic and indigenous weeds

Scientific name	Common name
<i>Amaranthus hybridus</i>	Pigweed
<i>Bidens pilosa</i>	Black jack
<i>Cannabis sativa</i>	Dagga
<i>Convolvulus</i> sp	Bindweed
<i>Conyza canadensis</i>	Horseweed fleabane
<i>Cucurbita pepo</i>	Pumpkin
<i>Galinsoga parviflora</i>	Gallant soldier
<i>Hypochoeris radicata</i>	Hairy wild lettuce
<i>Ipomoea purpurea</i>	Morning glory
<i>Malva parviflorum</i>	Small mallow
<i>Polygonum capitatum</i>	Knotweed
<i>Rumex crispus</i>	Curly dock
<i>Sida cordifolia</i>	Flannel weed
<i>Solanum lycopersicum</i>	Tomato plant
<i>Solanum nigrum</i>	Black nightshade
<i>Sonchus oleraceus</i>	Sow thistle
<i>Sonchus wilmsii</i>	Milk thistle
<i>Tagetes minuta</i>	Khaki bos
<i>Taraxacum officinale</i>	Dandelion
TOTAL	19

c) **Trees**

Scientific name	Common name
<i>Acer buergerianum</i>	Chinese maple
<i>Cassia</i> sp	
<i>Ficus cairica</i>	Common fig
<i>Morus nigra</i>	Black mulberry
<i>Phoenix canariensis</i>	Canary palm
<i>Ulmus parviflora</i>	Chinese ulm
TOTAL	6

Indigenous species

Scientific name	Common name	Growth form
<i>Acokanthera oppositifolia</i>	Bushman's poison	Tree
<i>Celtis Africana</i>	White stinkwood	Tree
TOTAL	5	

Alien Invasive Plant species list

Alien and invasive plants (AIP) may harm the environment by reducing the natural biodiversity of an area through use of resources and by altering the environment. The alien and invasive species found in this survey are listed according to the Alien and Invasive Species Regulation (2014) of the National Environmental Management Biodiversity Act (NEMBA, Act number 10 of 2004) and the Conservation of Agricultural Resources Act (CARA, Act number 43 of 1983) in the categories described as follows:

NEMBA Category 1b: Invasive species which must be controlled and wherever possible, removed and destroyed. Any form of trade or planting is strictly prohibited.

CARA Category 1: Invader plants must be removed and destroyed immediately. No trade permitted.

NEMBA Category 2: Invasive species, or species deemed to be potentially invasive, in that a permit is required to carry out a restricted activity. These include commercially important species such as pine, wattle and gum trees. Plants in riparian areas are category 1b.

CARA Category 2: Invader plants may be grown under controlled conditions in permitted zones. No trade permitted.

NEMBA Category 3: Invasive species which may remain in prescribed areas or provinces. Further planting, propagation or trade, is however prohibited. Plants in riparian areas are category 1b.

CARA Category 3: Invader plants may no longer be propagated or sold. Existing plants do not need to be removed.

Scientific name	Common name	Growth form	NEMBA	CARA
<i>Acacia cyclops</i>	Red Eye	Tree	1	2
<i>Ageratina adenophora</i>	Crofton weed	Shrub	1	1
<i>Ailanthus altissima</i>	Tree-of-heaven	Tree	1	3
<i>Anredera cordifolia</i>	Madeira vine	Climber	1	1
<i>Araujia sericifera</i>	Moth catcher	Climber	1	1
<i>Argemone mexicana</i>	Yellow flowered Mexican poppy	Herb	1	1
<i>Canna indica</i>	Indian shot	Shrub	1	1
<i>Cestrum laevigatum</i>	Inkberry	Shrub	1	1
<i>Cirsium vulgare</i>	Scotch thistle	Herb	1	1
<i>Datura stamonium</i>	Common thorn apple	Herb	1	1
<i>Dolichandra unguis-cati</i>	Cat's claw creeper	Climber	1	1
<i>Ipomoea purpurea</i>	Morning glory	Climber	3	3

<i>Lantana camara</i>	Lantana	Shrub	1	1
<i>Lepidium bonariense</i>	Pepperweed	Herb		1
<i>Ligustrum japonicum</i>	Japanese wax leaved privet	Tree	3	3
<i>Jacaranda mimosifolia</i>	Jacaranda	Tree		3
<i>Melia azedarach</i>	Syringa	Tree	3	3
<i>Mirabilis jalapa</i>	Four- o' clock plant	Shrub	1	
<i>Pinus sp</i>	Pine	Tree	1	2
<i>Ricinus communis</i>	Castor-oil plant	Shrub	2	2
<i>Rubus sp</i>	Bramble	Shrub	1	2
<i>Rubus cuneifolious</i>	American bramble	Shrub	1	1
<i>Solanum mauritianum</i>	Bugweed	Tree	1	1
<i>Tecoma stans</i>	Yellow bells	Shrub	1	1
<i>Tipuana tipu</i>	Tipu	Tree	3	3
<i>Verbena bonariensis</i>	Verbena	Herb	1	
	TOTAL		24	24

General comments about alien and invasive plant control

I have made a few suggestions. Smaller plants are easier to deal with than larger plants. Large plants may need a combination of physical and chemical treatment. Monitoring and follow up is essential to ensure control of the species.

Physical/Mechanical methods

This method is preferable where it is easy to pull out seedlings and herbaceous weeds, especially when the ground is damp. If the plants are large shrubs or trees greater than 2 metres, then strip the bark (girdling) of the trees and cut the stems of the shrubs at 20 cm height. This is only effective with species that do not respond to damage (including burning) by forming root and shoot suckers. Control preferably before they seed.

Chemical methods

Some herbaceous species, if covering a large area, can be sprayed with a broad leaf herbicide such as RoundUp. This herbicide degrades in the soil and in water. Some tree species and large shrubs that produce regrowth should be treated with herbicides within half an hour of the stems being cut at 20 cm. The stem is painted with the herbicide using a paint brush. The herbicide should be mixed with a coloured dye, usually blue, to show that the stem has been treated. The herbicide must cover the whole cut surface to ensure that the herbicide penetrates into the cambial tissue. Herbicides are generally applied in November and again in March. It is important that the registered chemical is used for the species and that the instructions on the bottle are followed. Garlon 4 and Garlon 480 mixed with Diesel can be used on Red eye, Inkberry, Syringa, Bramble and Bugweed.

Monitoring

Plants that have been treated with chemical or mechanical methods must be monitored for regrowth. Respraying may be necessary several times a year or over several years. New growth and new seedlings need to be found and removed as soon as possible. Keep records of the date, kind of treatment, effectiveness of the treatment and abundance or density of plants before and after treatment.

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