Willowfountain Walk Report

8th to 9th October 2014

WillowfountainRiver Walk
Undertaken 8th to 9th October 2014

Submitted by Sanele Vilakazi
Duzi uMngeni Conservation Trust (DUCT)

Background

Following the successes of the numerous river walks conducted since the start of the May Day for Rivers initiative, DUCT felt it necessary to further explore the state of some of our lesser emphasised tributaries that join up with the uMsunduzi, one would be dealing with an entirely different situation as during such a walk one is bound to be witnessed to rather depressing impacts from tributary streams and rivers that mainly traverse through your densely populated residential areas..

Thus, on the 8 October 2014, Siyabonga Ndlovu, Kholosa Magudu, Sithembiso Sangweni, Penny Rees and I set off from the source of the Willowfountain/Wilgerfontein River. We were accompanied for the second day of the walk by Khanyisani Dlomo (Witness Reporter).The Willowfountain "walk" proved to be quite pleasant in terms of navigation and terrain, walking along the relatively flat and wide river flood plain. Two days and approximately 14 kilometres later, we arrived at the confluence of the Willowfountain and uMsunduzi Rivers.

We attempted at all times to stay beside the river, and when that was not possible due to steep terrain or thick bush, we always kept the river in sight. All impacts were recorded by GPS, photograph, a Spectra mobile mapper (loaned to us by the Midlands Conservancies Forum) and Mini SASS river health assessment tests were done only at the upper reaches of the tributary. This report is the record of these observations.

Acknowledgements

Our thanks to:

- NT3C toll concession in partnership with the Midlands Conservancies Forum
- All the friendly landowners & passers-by along the river
- The greater Imbali community members

Sanele Vilakazi
October 2014

Contents

1 Area description

GPS Co-Ordinates

Start: -29.432439 30.182448
Finish: -29 375267 30.215045

Altitude drop

247.79 metres: 994.67m to 746.876m above sea level

General Description

The Willowfountain ends where it joins up with the uMsunduzi River and begins in the relatively untouched landscapes of Azalea; the river has a few rocks when the water is low. The upper stretch of the river is rather overgrown by vegetation.

The lower reaches of the tributary runs along the wide and quiet river terrain. The short and swift rapids comes 1 km before Slangspruit. The river stretch runs through the large townships of Imbali and Slangspruit. The river ends at the confluence, which is right after the low-level bridge near Camps Drift.

Top: Willowfountain lower floodplain
Lower Middle: Willowfountain sewage effluent contamination
Lower: Willowfountain weir

2 Wild Animals

Long crested eagle
Yellow billed kite
African goshawk
Fish eagle
Wooly necked stork
Cattle egret
Hadedah ibis
Sacred ibis
Bald ibis
Hamerkop
Yellowbill
River duck
Egyptian goose
Pied kingfisher
Giant kingfisher
Malachite kingfisher
African jacana
Boubou shrike
Fiscal shrike
Diedricks cuckoo
Klaas's cuckoo
Village weaver
Red faced cisticola
Cape white eye
House sparrow
Yellow eye canary
Streaky headed canary
Firefinch
Black sunbird
Cow
Domestic pig
River mongoose













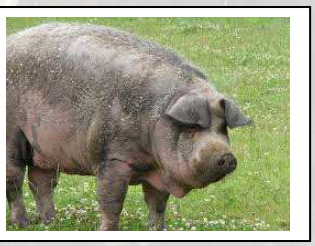

3 Terrestrial Vegetation / Least impacted riparian buffer areas

- The Willowfountain River is +/- 14 kilometres long, thus there are as many kilometres of river bank along the length of the river.
- Of the several kilometres comprising both banks there are only a few kilometres that are either intact or have a relatively un-impacted riparian buffer. These areas occur in separate locations.
- The single longest un-impacted / low impact stretch on the river measures 3.5 km (total of both banks)

The remaining kilometres (of both banks) comprise of relatively disturbed terrain places

Additionally, indigenous vegetation beyond the riparian buffer only occurs for approximately 2 kilometres of the rivers length

From confluence to source, river left and right of the Willowfountain comprises of vast alien vegetation and few indigenous and pristine stretches. There are few un-impacted areas consisting of natural vegetation along the river. From the confluence the river moves from an upper foothill environment being moderately steep and consisting of a cobble-bed or mixed bedrock-cobble bed channel, to an environment with a very steep gradient dominated by bedrock and boulders with cobble and coarse gravels in the river channel.

Surrounding land use within the river is predominantly for residential purposes as the river itself flows through mostly the urban suburban area of Pietermaritzburg. In the lower reaches of the Willowfountain this gradually changes as industrial activities start to take centre stage. Both of these land uses have heavy impacts on the river due to the numerous activities that the river is witness/exposed to. What was clearly apparent from this walk is that the majority of the river is choked with alien invasives.The river constantly showed signs of nitrification as the river waters were very murky whilst passing through residential areas. Large patches of bramble and lantana plantations were observed within the final stretches of the Willowfountain-nearing the confluence.

4 Wetlands

Wetlands are fascinating and dynamic ecosystems that provide Indispensable ecosystem services. Commonly referred to as marshes, swamps, bogs or vleis, they constitute about 7% of South Africa's surface area. They support a range of specialised plant, insect, bird and mammal life and also supply wild food, grazing, building and craft materials to people. They absorb flood waters, improve water quality and regulate streamflow, helping to maintain ecosystem functioning downstream.

Because wetlands are transitional between aquatic and terrestrial (water and land) ecosystems, they are vulnerable to impacts on both. In addition to direct impacts, such as draining for pastures and crops, or the construction of infrastructure such as roads that impede and concentrate water flows, there were also severe ongoing impacts from pollution and erosion in the catchment as well as from excessive water abstraction, loss of vegetation cover, climate change and land use change within the area. The case is the same for some of the wetlands found along the Willowfountain River and its neighbouring tributaries.

5 Negative Impacts

Riparian Buffer Zone

The riparian buffer comprises 32 metres of the river bank extending outwards from the edge of the river (both banks). Rivers and the land beside them do not function as single entities, and impacts on one have a direct effect on the other. Thus if the buffer zone, is in good condition, this will have

positive impacts on the health of the adjacent river. It is for this reason that disturbance in the buffer zone is illegal

The river stretch site has had previous alien invasive clearing activities. The river consists of disturbed riverine habitat. For this the reason much of the vegetation on the site is secondary as most of it was disturbed. These disturbances have therefore led to a loss of genetic plant diversity along the river most especially the flood plain close to the river.
Here the predominant species were typically wetland Piennisetum clandestinum and a number of alien invasive weeds.
Only one area on this channel is where the original vegetation found on this site could be found. As previously mentioned the area is a disturbed riverine habitat which contained dumped refuse. No plants of any consequence were found around this site.

Many residential areas/establishments neighbouring the Willowfountain do not respect/obey the 32 metres buffer, either by constructing buildings, erecting fences/walls, informal settlements, gardens, lawns and uncontrolled invasive plants. From our observations the river water was found to have great excess nutrients from various types of urban/industrial effluent. This was clearly evident from the change in water colour of the river itself. Some stretches of the river were found to be algae green robbing the waters of the Willowfountain of oxygen.However,it is not all doom and gloom for the Willowfountain.With implementing the correct evasive/control action, large stretches of the Willowfountain can be healed.

Whilst safeguarding our infrastructure on the one hand we must remember that a natural water course is a living entity in continual development that should be protected as far as possible.

In-stream Impacts

Extraction / Water Demand

There were a couple of instances/situations where there was direct abstraction of water from the river for a certain housing developments nearby.

Nutrification

The river at certain stretches showed signs of acquiring a high concentration of nutrients,most especially phosphates and nitrates. This then typically promoted excessive growth of algae.These high levels of organic matter and the decomposing organisms have greatly depleted the river waters of available oxygen, causing the death of other organisms, such as fish.The nitrification process is a natural, slow-aging process has been greatly accelerated by human activity.

Dams / Weirs

No dams & weir were identified during the course of this river walk.

Litter / dumping

Unfortunately a most frequent siting throughout the entire river walk.River litter and debris constantly enter this aquatic environment from a variety of sources. In short, the locals misplace their waste and trash. It is a highly pervasive and visible form of pollution that has harmful impacts on wildlife and human health of the those found to be near this water source.

The Willowfountain is under considerable pressure from human activities, including incorrect disposal of trash. While the world's oceans are vast, they do not have an infinite ability to safely absorb our wastes. Preserving and restoring the quality of freshwater and marine environments

requires that we understand how much trash we create, what we do with that trash, and how we can prevent it from entering our waterways.

Sand Mining

No activities of sand mining were spotted within the surrounding environment of the waterway.

6 River Health

One needs to keep in mind the difference between water quality and river health. Water quality is defined as "*to describe the physical, chemical, biological and aesthetic properties of water that determines its fitness for a variety of uses and for the protection of the health and integrity of aquatic systems"* (SA Water Quality Guidelines)

River health on the other hand, comprises a far broader range taking in the entire ecological system of the river and interconnected land; of not only the water, but also the physical river (river bed and river banks) as well as flora and fauna communities in the river and occurring on the banks.

During the walk, all impacts were recorded and photographed, and regular Mini SASS, Methylene Blue &Turbidity tests were undertaken. Mini SASS is a general indicator of river health, Meth Blue indicates levels of bacterial & oxygen (the higher the level of bacteria the lower the amount of oxygen in the water), turbidity indicates levels of suspended solids in the water.

Mini SASS

Mini SASS is a very simple and enjoyable way of determining the health of the river, and the results give an overall picture of river health that is often missed by laboratory tests, for the pure and simple reason that a lab test, if taken say a week after a chemical contamination, may not reveal any chemicals whilst the Mini SASS gives an overall picture of the rivers health at any time. With Mini SASS, aquatic insects are caught, identified and classed according to tolerance levels of pollution and a simple scoring method results in an accurate picture of river health.

Mini SASS scores are broken down as follows:
Under 5.1 = Seriously / critically modified, very poor condition
5.1 – 6.1 = Largely modified / poor condition
6.1 – 6.8 = Moderately modified / fair condition
6.8 – 7.9 = Largely Natural / few modification GOOD condition
+7.9 = Unmodified / Natural condition

We were thus able to carry out Mini SASS tests at the starting point & ending point of the river, the results of which are as follows:

- Critically modified/ *poor condition:* Confluence of Willowfountain/Msunduzi (scoring 4.5)
- *Moderately modified / fair condition:* Willowfountain *source* (scoring 6.7)

Of the two Mini SASS tests conducted on the river, none scored Natural or Good condition. The highest score location was only 6.7 (fair condition) whilst the lowest score of 4.5(critically modified) was found at the confluence.

Site 1: Mini SASS

Site description: Approximately 0.4km from source, the region of this river stretch is where the river flows from mountains and into the valley, a sharp reduction in river gradients occur here which has resulted in the deposition of the larger material. The river bed is generally unstable
Surrounding Land use: housing developments (scattered) & domestic agricultural activities
Surrounding Vegetation: Right bank: grasslands. Left bank: grasslands
Turbidity: Water 40% clear
Siltation on river bed and submerged rocks: River bed and some rocks not visible
Mini SASS score: 4.5 Seriously / critically modified, VERY POOR condition
River Health negatively impacted due to:

- Lack of intact riparian buffer - pastures to within 5 metres of the river's edge and alien invasives intruding into buffer
- Elevated levels of nutrients indicated by algae & Oxygen Weed in the river

Site 2: Mini SASS

- *Site description*: Approximately 0.5 km from confluence, a shallow part of the channel is found in this region which forms a sinuous shape which can assume various patterns: Straight and sinuous beds/Meandering beds

Surrounding Land use: Small industrial activities
Surrounding Vegetation: Right bank: Grassland left bank: Giant Reed
Turbidity: Water 25% clear
Siltation on river bed and submerged rocks: River bed and some rocks not visible
Mini SASS score: 4.6 seriously / critically modified, VERY POOR condition
River Health negatively impacted due to: Rubbish dumping

Summary of River Health Tests

Site	Distance From source	Upstream Land Use	Adjacent Land Use	Buffer vegetation	Invasive Vegetation in buffer	Turbidity (Visibility)	Silt on bed	Mini SASS
1	0.5km	Forestry	Residential	Pastures	15% Indigenous Grasses	40%	Bed and some rocks not visible	4.5 Seriously / critically modified, VERY POOR condition
2	13.4km	Residential/Industrial	Industrial	Pastures	Giant Reed	25%	Bed and some rocks not visible.	6 Moderately Modified/FAIR condition

Reasons for poor river health

As a result of the impacts described in above, the health of the Willowfountain River varies between very poor to fair condition. Aside from certain areas near the source, there are no sections of the river that are in Natural or good condition

Turbidity:

The water was extremely turbid at all times apart from a few of the shallow rocky areas. From the source until the Willowfountain / Slangspruit confluence, the water was 100% turbid.

Some turbidity is caused by silt from “natural” erosion (a direct result of low water levels in the river caused by drained wetlands and heavy extraction) however there were areas where we witnessed effluent causing turbidity (from effluent being disposed of directly into the river; from surcharging sewers spilling over into the river). Turbidity from erosion was soil coloured, whilst the effluent turbidity was a milky grey colour.

Nutrients:

Nutrient loads in the river seem high. This is indicated by

- by numerous sewerage spillages along certain intervals of the river
- by the build-up of algae in long stretches of the river

Nutrient loads in the Willowfountain River seem to originate from the following:

- *Effluent/Sewerage*
  - Surcharging manholes are a common site along the entire length of the river channel resulting in effluent/sewerage flowing directly into the river
  - Cattle access to the river cause additional nutrients from faeces

- The Imbali Valley has a high density of small holdings, all on a municipal sewer line/network which may be contaminating the river
- There are also a number of pit toilets only which are a couple of metres from the river bank.

E. coli contamination of the river waters to the extent that it is not fit for human consumption is the norm across the entire Willowfountain.

7 Green Corridor

Potential Stewardship / Conservancy Sites

A total of 0 areas along the river have the potential for protection via either Stewardship or the lower Conservancy status, as follows:

River hiking way potential

The terrain along the Willowfountain River is conducive to a hiking path due to their being a sharp reduction in river gradients which are as a result of the deposition of the larger material in the lower parts of the valley.

8 Interesting information / history

IMBALI

Imbali is a township in Kwazulu Natal, South Africa. It is 15 km from Pietermaritzburg, the capital city of KwaZulu Natal. Imbali was founded in the early 1960s when people were moving away from the rural areas to look for employment in the city.

Situated between Edendale and Mason's Mill/Bisley, to the south of Pietermaritzburg, Imbali is a well-structured subdivision of the former township (as opposed to the more informal sprawl of greater Edendale). Its core consists mainly of modest brick homes built by the City Council and the previous government. "Imbali" is Zulu for flower, and in recent years the suburb has enjoyed substantial growth with the development of new homes along its periphery; it is still the preferred suburb of Pietermaritzburg's Zulu community. Imbali is well served by sports fields, schools, shopping centres and boasts its own soccer stadium. Imbali also enjoys direct access to the city centre along Edendale Road.

Findings and Recommendations

Findings

Impacts

The cumulative impacts on the Willowfountain River are extensive and cause the river to be in an unhealthy state. Impacts range from riparian and wetland habitat destruction to various types of contamination of the river itself all of which are exacerbated by the reduced flows.

The Water of the Willowfountain is a stream system which has been extensively modified. Most modifications have occurred in the lower reaches and protect those areas which are of most monetary value. Increased residential buildings (houses), which brings with it heavy runoff from paved surfaces and storm water drains, have dramatically amplified the inputs to the stream. This has influenced the type of modifications we see today and also future modifications.

Water Quality - Mini SASS

Mini SASS tests are an effective means of monitoring river health and can be carried out by almost anyone if they have had training. Systematic collection of and reporting on data is needed for the management of aquatic ecosystems such as the Willowfountain. Information obtained from biological indices is used to assess the health of river systems. When the present ecological health does not meet the desired state, as is the case with the Willowfountain, management actions must be taken to improve the ecosystem components. Healthy rivers sustain ongoing use of the rivers.

Catchment Management

Lack of adequate catchment management has meant that terrestrial invasive plants have become rampant near the river. These plants utilise ground water which would otherwise enter the river system, and in many cases block the sunlight from the river, changing the whole ecology of the river and damaging bio diversity. Fortunately, role players are becoming increasingly aware of the importance of maintaining a healthy river catchment and the Willowfountain River is no exception.

Recommendations

Buffer lengths (as opposed to buffer widths)

As noted time and again, given enough space, the health of the river will improve if there is enough length without impact. Some may argue that then contamination is not a problem, but it should be kept in mind that a tipping point could be reached whereby there is so much contamination that the river will be unable to heal.

Pietermaritzburg City is at the downstream end of all the contamination of the uMsunduzi River catchment, with many riverine users and landowners between the source and Pietermaritzburg.

Recommendation 1:
In order to increase the resilience and health of the Willowfountain River it would thus make sense to implement buffer lengths (in addition to the current 32 metre buffer width) in all planning programs - municipal and other, in order to ensure that the river water is able to rejuvenate. Areas identified as being potential contamination sources, no matter how much of an effort is made to avoid such contamination, could then have a sufficient buffer length downstream that should be guaranteed/ protected.

Large Invasive Trees

Over enthusiastic felling of all large invasive trees down the river needs to be approached with caution. Due to development, be it urban or for agricultural purposes, suitable nesting sites are disappearing or have already disappeared, particularly for raptors, and in some cases the large invasive along the river are the only suitable nesting sites as they are the only large trees left in some areas. Thus the wholesale removal of all large trees could result in the disappearance of especially the raptor species.

Recommendation 2:
Teams who work the river clearing invasives should be trained to find and identify raptor nests, and a scientific guideline should be drawn up with criteria for the eradication choices concerning these large trees. For example, the Crowned Eagle will have a nest in one tree, but as a security measure will often alight on a nearby large tree prior to approaching the nest. Thus if all trees other than that which holds the nest are felled, this will also impact these birds ability to nest and raise their young. Many of the Fish Eagle nests seen during the walk were placed in large gum trees, and many of the raptor sightings were of these birds perched in the large trees.

Aspects of good Willowfountain river management should include:

- maintaining vegetation
- clearing obstructions and preventing plants and other objects, such as logs, from blocking waterways
- gravel management in some areas
- erosion control
- pest control.

River banks must be protected from erosion by:

- stock management – for example, fencing to keep stock out of rivers and other waterways
- planting the riverbank – for example, with natives.

You can help look after the health of our Willowfountain River by:

- managing stock to keep them out of rivers and other waterways
- planting vegetation to protect and stabilise river banks
- maintaining vegetation to prevent waterway obstruction
- managing animal and plant pests.
- Where appropriate, reduce the impact of stock on the riparian zone by fencing and providing an alternative

- revegetate/encourage regeneration of eroded riverbanks with native indigenous trees, shrubs and grasses.

Limitations

- This was not a scientific data collecting expedition, and thus our records, although accurate, are not complete. There were occasions where we would have to detour away from the river due to either heavy bramble infestations or terrain challenges, which restricted our ability to keep records.

- It is impossible to physically record and photograph every single negative impact seen, although the majority of impacts were recorded.

- We have attempted to compile this report for ease of reference for both laymen and those with environmental backgrounds.

- We hope that our efforts assist in not only raising awareness regarding the plight of the Willowfountain River, but also inspire rehabilitation and care of this precious resource for the benefit of all those “downstream”

Conclusion

Rivers also hold cultural, recreational and aesthetic value. They are a source of water and are home to a variety of aquatic animals and plants.

By managing rivers and streams we help protect our quality of life.

Watercourses such as the Willowfountain are integral to the entire river/water management system, are an important component of the City’s biodiversity network, and represent an essential element in restoring the urban fabric of the City by providing both recreational and economic opportunities. A well managed watercourse is a valuable resource for improving the quality of life and aesthetic nature of an urban area and provides benefits for public health, recreation and economic growth. This is particularly important in the context of changing weather patterns and the associated local, national and international strategies targeting sustainability issues.

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October 2014
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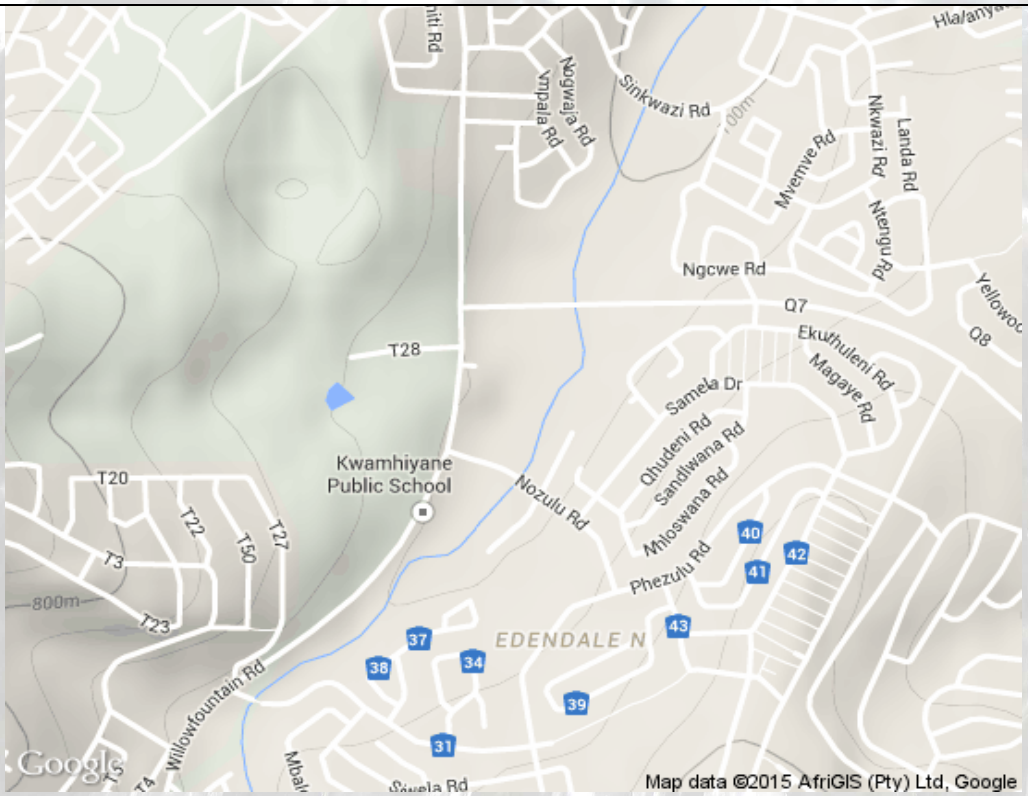
With these hands and with this heart
this water is now blessed
Removing and transmuting all impurities and
returning them to the light forever
Peace.
Kuan Yin Water Blessing

Appendices

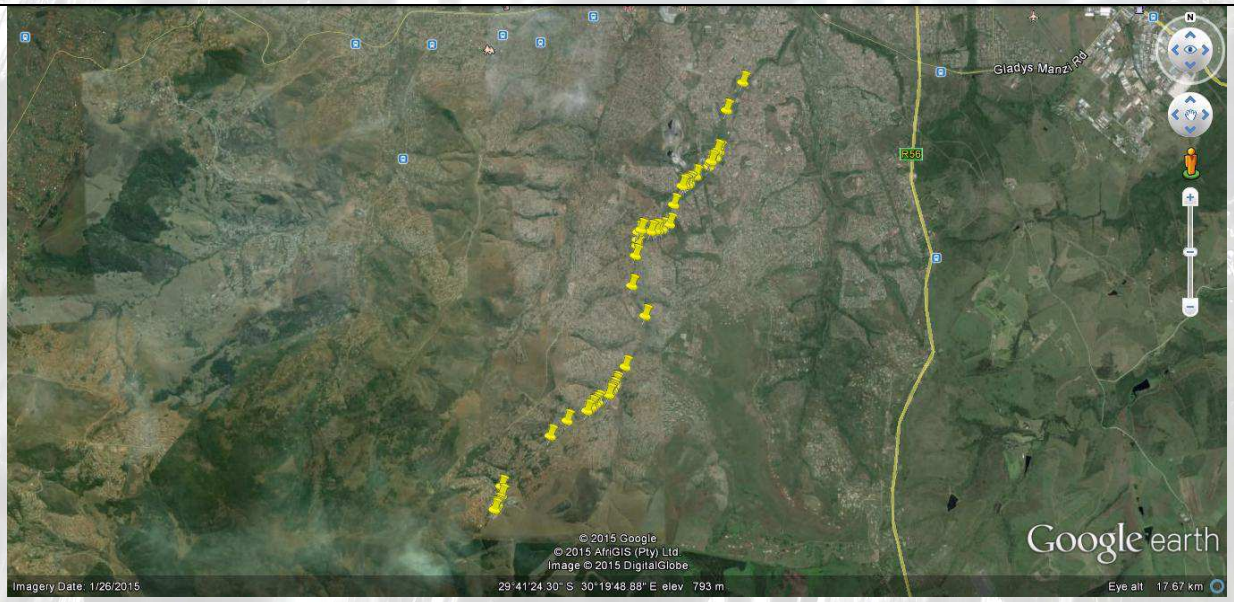
Appendix 1 – Google shots or the maps with waypoints

Willowfountain river stretch



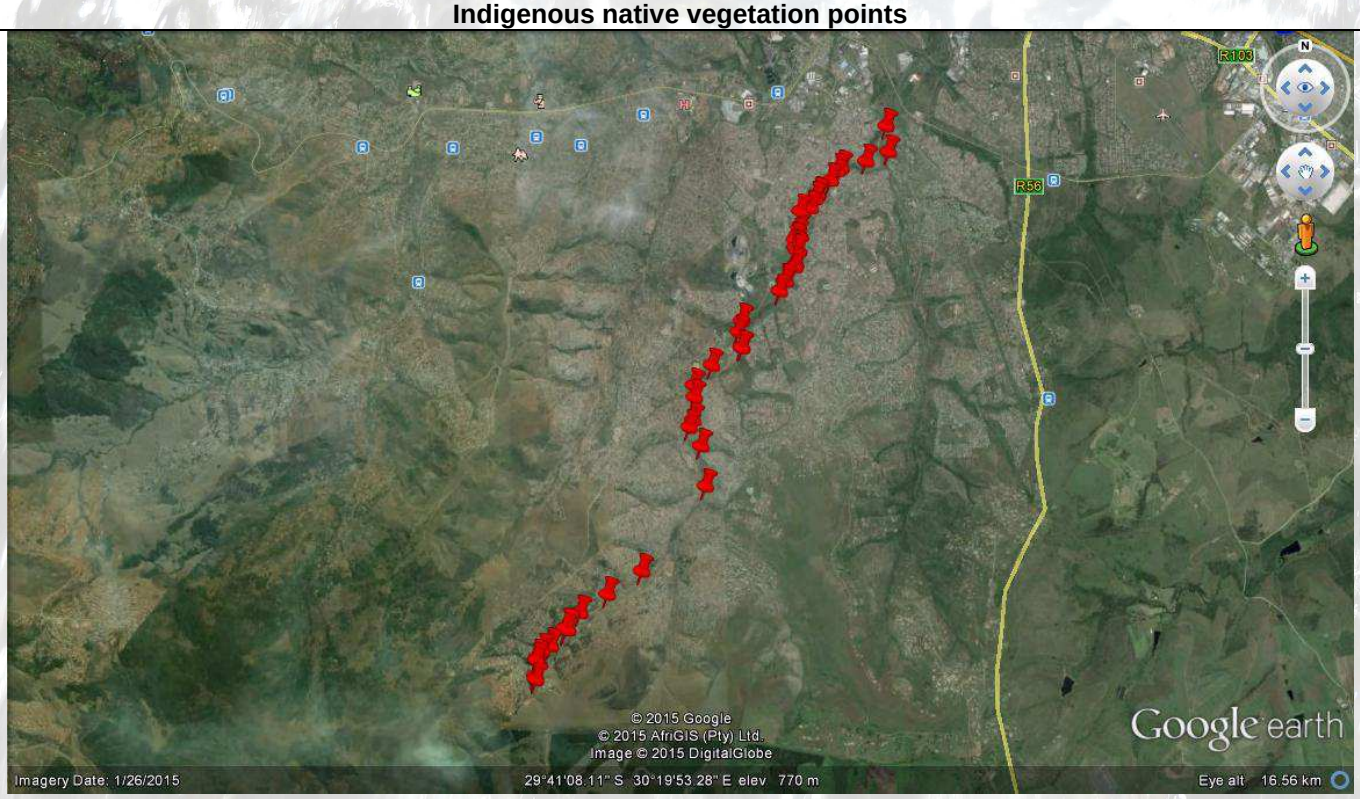
Willowfountain river stretch

Willowfountain River traversing through Imbali



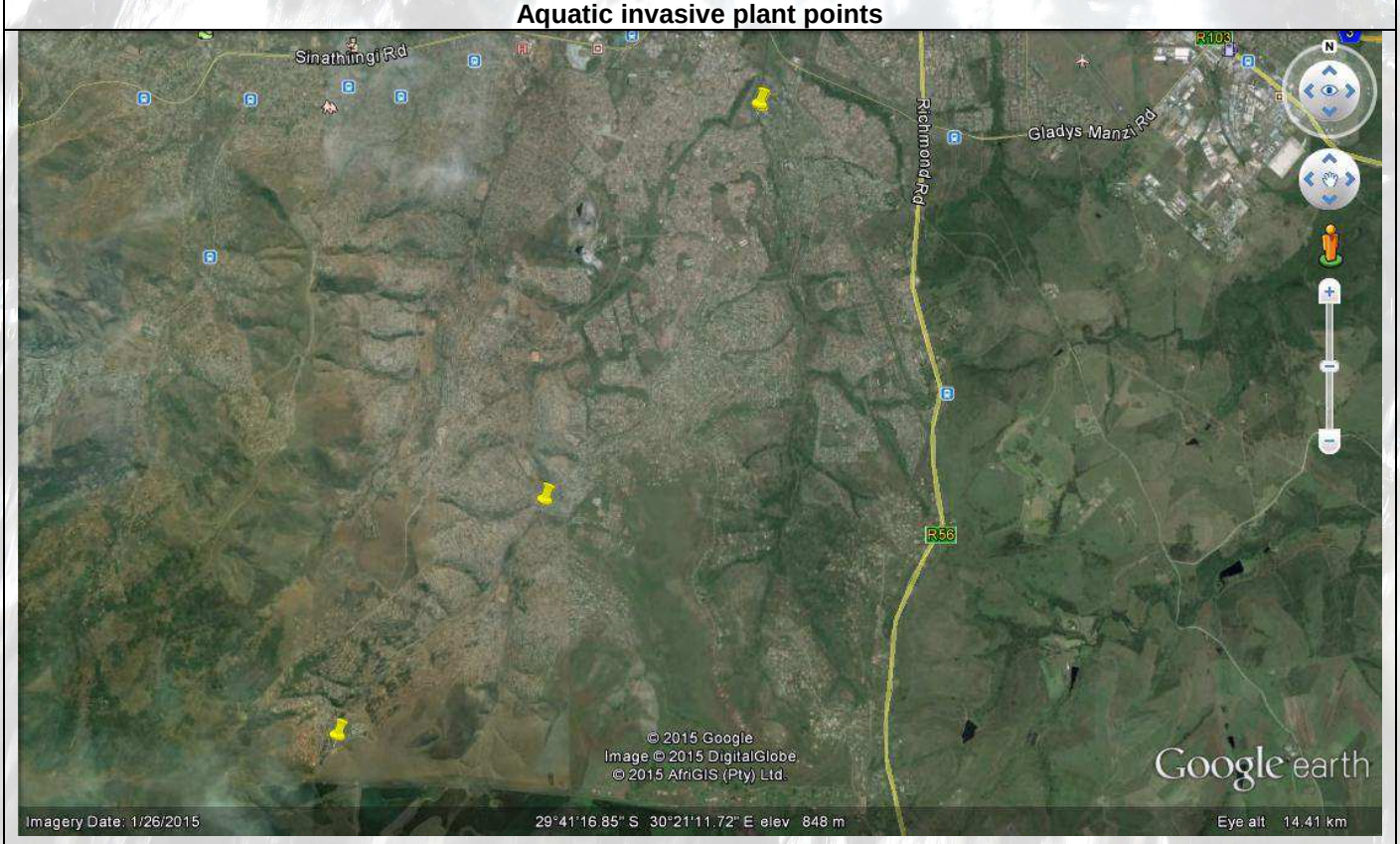
Terrestrial alien invasive plant points

Indigenous native vegetation points

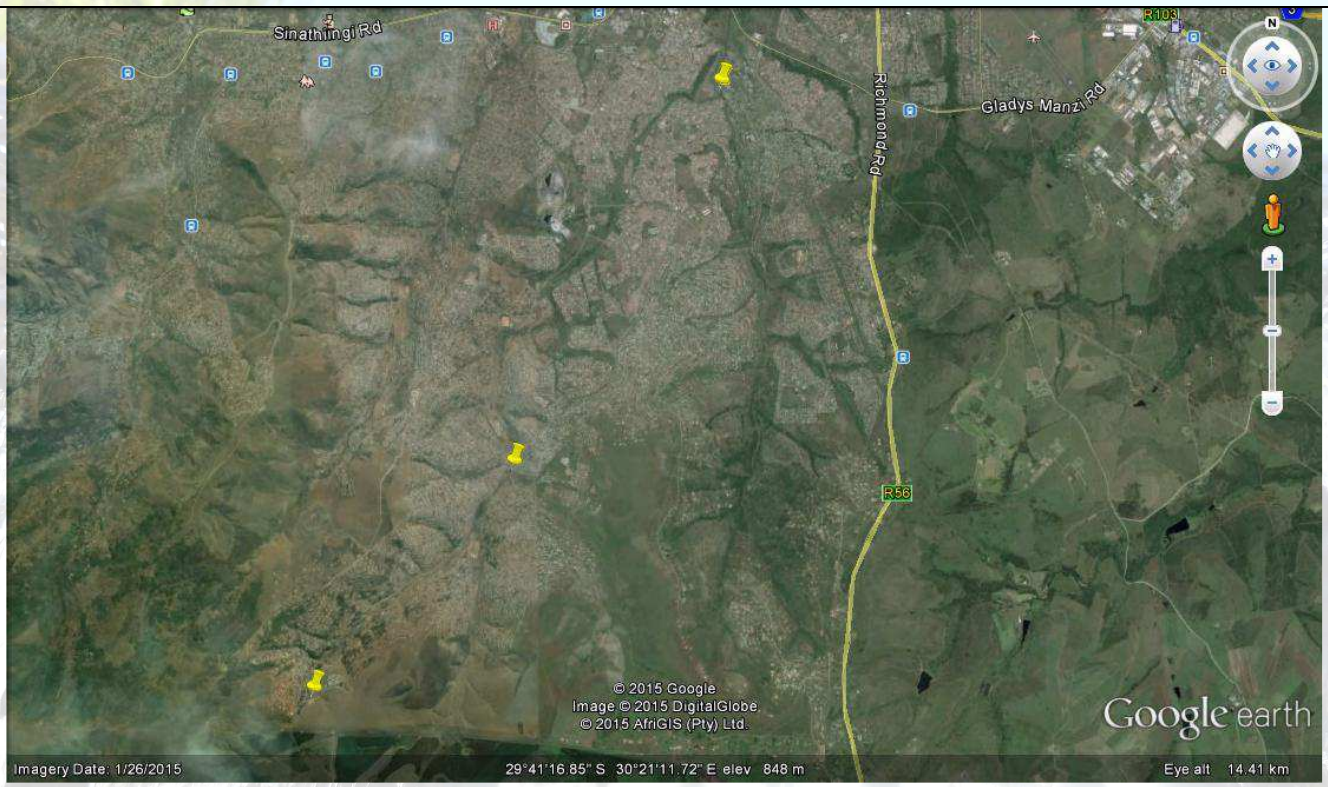


Riverine buffer impact points

Aquatic invasive plant points

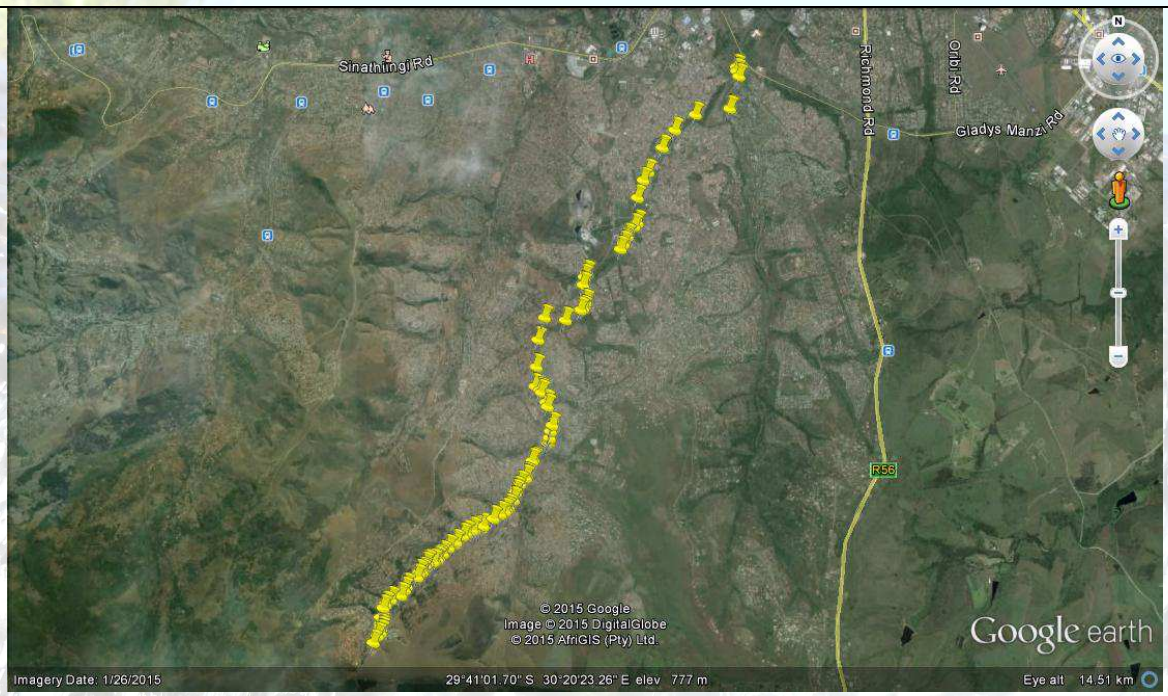


Water turbidity

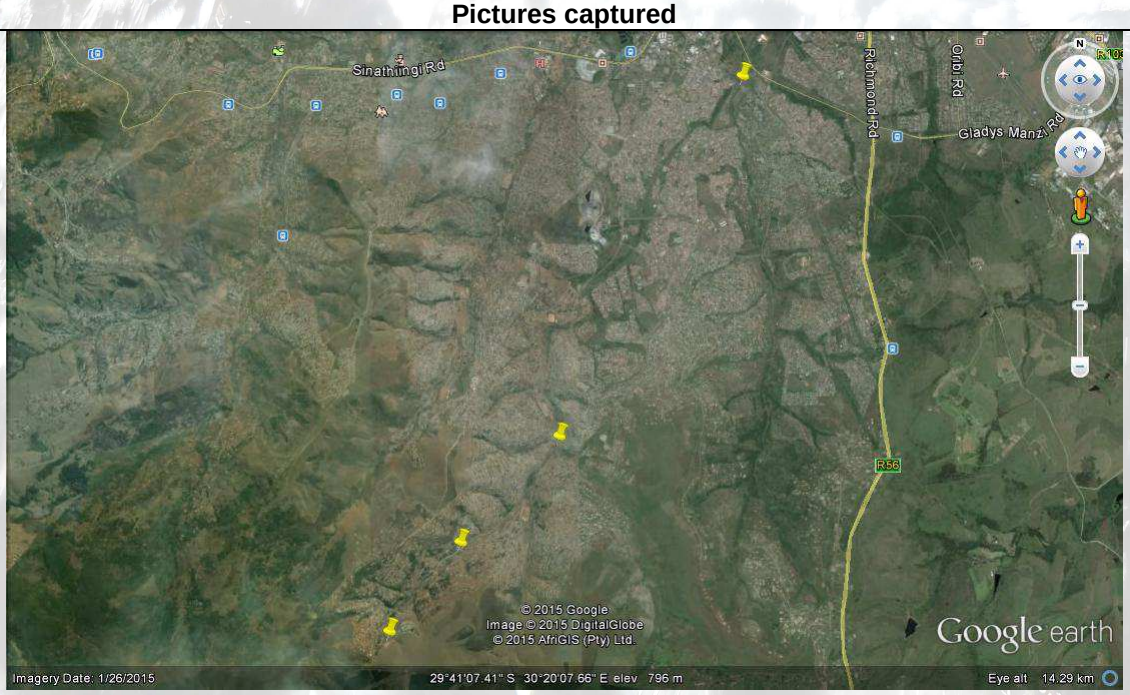


Excessive water turbidity points

Sewer effluent points



Pictures captured



Erosion impact points

Appendix 2 – Invasive plants

Alien weeds
Cannabis sativa
Datura stramonium
Lantana camara
Melia azedarach
Pennisetum clandestinum
Phytolacca dioica
Plantago lanceolata
Solanum mauritianum
Tagetes minuta
Verbena aristigera
Trees
Acacia sieberiana
Acacia mearnsi
Callistemon viminalis
Casuarina cunninghamiana
Casuaria equisetifolia
Cinnamomum camphora
Ziziphus mucronata
Eucalyptus grandis
Leucaena leucocephala
Melia azedarach
Morus alba
Pinus sp.
Phytolacca dioica
Shrubs
Rhus lucida
Chromolaena ordata
Diospyros lycioides
Lantana camara
Ricinus communicus
Rubus cunefolius
Solanum mauritianum
Senna didymobotrya
Senna occidentalis
Senna septemtrionalis
Sesbania punicea
Bulbs
Bulbine abyssinica
Crinum bulbispermum
Hypoxis hemerocallidea
Watsonia densiflorus
Orchid
Eulophia ovalis
Aloes

Aloe maculata
Herbaceous perennials
Ageratum conyzoides
Amaranthus hybridus
Becium obovatum
Canna indica
Chaetacanthus burchellii
Conyza bonariensis
Coreopsis lanceolata
Eriospermum mackenii
Gnidia caffra
Helichrysum setosum
Lactuca inermis / Wild lettuce
Pachycarpus spp
Platycarpha glomerata
Thunbergia atriplicifolia
Tithonia diversifolia
Wahlenbergia grandiflora
Grasses & Sedges
Aristida junciformis
Bambusa balcooa
Cortadeira selloang
Cynodon dactylon
Imperata cylindrical
Piennisetum clandestinum
Pennisetum purpureum
Paspalum urvillei
Perennial Aquatic
Pistia stratiotes
Climber
Aristolochia elegans
Caesalpinia decapetala
Cardiospermum grandiflorum
Dolichandra unguis-cati
Impomoea indica
Passiflora suberosa
Solanum seaforthianum
Reed
Arundo donax