



# Lions River Walk Report

22<sup>nd</sup> to 29<sup>th</sup> September 2013



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Duzi uMngeni Conservation Trust (DUCT)  
March 2014

## Background

Following the success of the Source to Sea uMngeni River walk in May 2012, the Mayday team felt that additional walks were necessary along the tributaries, in order to identify impacts originating from tributary streams and rivers.

Thus, on the 22 September 2013, Preven Chetty and I set off from the source of the Lions River. We were accompanied for the first few kilometres by Mike Farley and Pandora Long who were part of our team (with Preven, Pens Malinga and myself) that walked the uMngeni River, and by Stembiso Sangweni, DUCT River Care Team Manager who had at times joined us on the uMngeni Walk. The Lions “walk” proved to be equal quantities of walking, splashing through wetlands and river and hacking our way through seemingly impenetrable bush. Seven days and approximately 80 kilometres later, accompanied once again by Pandora on the last day, we arrived at the confluence of the Lions and uMngeni 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, dictaphone and photograph and Mini SASS river health assessment tests were done as often as possible. This report is the record of these observations.

Reference to left or right bank: a very un-technical, easy to understand direction, especially considering the meanderings of the river whose banks can be on all four of the cardinal points umpteen times in the space of a kilometre! Left bank refers to the left bank of the river as if going downstream, and right bank refers to the right bank as if going downstream.

## Acknowledgements

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- NT3C toll concession and the Midlands Conservancies Forum for making the funds available to walk the Lions River, the largest Midlands tributary of the uMngeni River.
- All the friendly and helpful landowners along the river
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- The Nkanyiso Ndlela and the Lidgetton community members who joined us at the river.
- Nikki Brighton, irreplaceable and invisible member of the team who works till late at night to ensure that our written words and photos emailed to her each night are turned into the blog whose words apparently accompany a quite few morning cups of tea.

Don't ever volunteer as support crew for one of these walks – its hard work! To our Lions support crew John Fourie (who was obviously not put out by his support role during the uMngeni walk), and my son Breandan McKibbin – thank you for the wonderful meals, the hot soup delivered for lunch on a cold wet day, the wonderfully chosen and set up campsites next to the river and the eager daily reception of hearing of our days adventures.

Please feel free to use the information contained herein – we only ask that you credit the DUCT Mayday for Rivers Team and quote the report: *DUCT Lions River Walk Report, March 2014; P.S Rees (author)*

Penny Rees  
March 2014

**The Duzi uMngeni Conservation Trust (DUCT)**

*Dedicated to the health of the uMsunduzi and uMngeni Rivers*

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# Introduction

## 1 Area description

### GPS Co-Ordinates

**Start:** 1,800m altitude

**Finish:** 1,055m altitude

### Altitude drop

745 metres: 1,800 to 1,055 metres above sea level

### General Description

South west of the tiny village of Fort Nottingham, which is situated in the KwaZulu-Natal Midlands, lies a ridge of steeply sloped hills rising up from a long flat bottomed valley which lies parallel to the hills.



The vast plateau atop the hills is edged with higher peaks and is interspersed with small ridges. One of these small ridges running north south forms a crucial divide between two wetlands – one wetland situated to the west of the ridge is Umgeni Vlei, the birthplace of the uMgeni River which drains off the eastern side of the plateau. The second wetland below Lake Le Seuer is the source of the Elands River which later becomes the Lions River. This wetland lies less than three kilometres north east of Umgeni Vlei, is only 40 metres lower in altitude than uMgeni Vlei and drains off the plateau in a northern direction, before swinging south east and running parallel to the uMgeni River, with only one ridge of hills separating the Lions and uMgeni Rivers until their confluence not far upstream of Midmar Dam approximately 80 kilometres from the Lions source.

The source wetland lies amongst high altitude grassland hills, and one of these hill sides forms a low saddle at the downstream end of the wetland, effectively forming a natural barrier to surface water flow.



*Top: Lions source plateau*

*Bottom: Source wetland to right of fence, natural barrier on skyline*

There the water disappears and a dry grassed gully leads down the mountain side. The gully is dotted with sink holes where the underground stream can be seen, until it finally rises above ground forming a beautiful, crystal clear stream that burbles past pristine grasslands and over dolerite rocks. The stream suddenly carves its way down into bedrock, past beautiful Protea bushes standing like sentries and under waving white Ericas.



A small patch of indigenous forest lines the steep slopes beside the stream and then suddenly the stream emerges from the steep area, passes through rolling hills and arrives at the flat valley bottom. The deep soils of this ancient floodplain / wetland complex are intensely farmed, and the Elands River has carved a channel that hugs the edge of floodplain and wetlands, passing intensive dairy pastures and a chicken farm on the plain and timber on the hill slopes. Due to its course now running parallel to the ridge of its birthplace, many other streams tumble off the hills towards the Elands River, forming vast areas of wetlands that cross the floodplain and join the river. Many of the arable lands are former wetlands which were dried out decades ago by means of drainage ditches. Even today, the landscape is littered with functioning drainage ditches. A dam wall causes the water to back up forming yet another extensive wetland in the shallow areas.



From here all the way to its confluence with the uMngeni River, most of the Lions River is deeply incised and meanders across and along flood plains dotted with wetlands, the majority of wetlands having in some cases a few, and in other cases many, drainage ditches.



*Top: Route of underground stream*

*Middle: Carved down to bedrock – the first small cascades*

*Bottom: Floodplain*

It is as though the land is formed in giant terraces as the river alternates between meanders across very gently sloping terrain which suddenly end in a plunge of a small cascades or waterfalls to a lower altitude, once again flattening out to the incised channel. Often the river hugs the foot of hillsides that border one edge of the flat floodplains. Occasionally the river crosses flat sheets of rock or boulder beds, but these are few and far between.



Just below the abovementioned dam wall, a large stream that has descended from the Lions Bush hills around Fort Nottingham joins the Elands River, and from this point the Elands becomes the Lions River. A few guest houses are passed where the river banks narrow and there is some indigenous bush. Out across the next flood plain are more areas with timber and intensive dairy farms with indigenous bush and forest on the steep river banks. An area 6.8 kilometres long comprises mostly natural grassland and indigenous bush covered hills, with a previous wetland with non-functioning drainage ditches running along the rivers edge for most of the 6.8 kilometres. With a little work this wetland could be restored. Further on, a large historical drainage ditch has transformed an area once littered with oxbow lakes and meanders into a straight, deep channel, banked with dykes and bordered with kikuyu pastures and peacefully grazing dairy herds.



At the next small escarpment a large area of the river banks have been invaded with wattle trees which shade out all sunlight from a beautiful long cascade. Small-holdings follow with sheep and cattle grazing on kikuyu pastures being reclaimed by veld grass whilst in the distance, hills of indigenous forest echo with bird calls.

*Top: Cascade*

*Middle: Indigenous bush*

*Bottom: Wetland with old drain – perfect for rehabilitation*

Another intensive dairy lies upstream of yet more wattle infested escarpment cascades which suddenly give way to beautiful grasslands edged with indigenous forest. The Lions continues past a small dairy and then begins its tumble down the steeply sided Lidgetton Valley where river banks are choked with wattle, gum and pine, whilst tumbles over two beautiful waterfalls.



After passing the Lidgetton small-holdings, a last intensive dairy farm, two informal settlements and a partially ploughed flood plain, the drop over the Lidgetton Falls is the gateway to the second un-impacted and wild area on both river banks, where a multitude of wild flowers dot the hillsides with colour and gnarled *Leucosidia* dot the river banks. A restaurant and lavender farm herald another waterfall at Caversham Mill as the river, for the first time since its first 5 kilometres is finally clear enough to see the every stone on the bottom. This lasts for only a few hundred metres – the confluence with the Mpofana River bringing water from the Mooi River transfer scheme adds chocolate brown silt into the Lions River.



Flowing in the characteristic incised channel, the river and floodplain twist and turn between rolling hills covered in timber, take a plunge over a last wattle choked cascade and pass the Lions River small holdings, many with gardens and neat lawns to the river banks. Entering the final floodplain, the Lions meanders this way and that, often doubling back on itself to form horseshoe bends and ox bow lakes. Pastures, wetlands and poplar groves herald the confluence with the uMngeni River after +- 90 kilometres.



*Top: Grasslands & indigenous forest  
Upper Middle: Below Lidgetton Falls  
Lower Middle: Silt laden Mpofana River  
entering Lions River*

*Bottom: Floodplain upstream of confluence with uMngeni River*

## 2 Wild Animals

### Animals

Porcupine  
Antbear  
Jackal  
Water mongoose  
Reedbuck  
Eland

### Birds

Crowned Crane  
Wattled Crane

## 3 Terrestrial Vegetation / Least impacted riparian buffer areas

Due to the intense agriculture which has been practiced along the length of the river for many decades, and in some places for over 100 years, there are few sections along the Lions River that comprise indigenous vegetation.

The Lions River is 77 kilometres long, thus there are 154 kilometres of river bank along the length of the river.

- Of the 154 kilometres comprising both banks there are only 33.4 kilometres of either intact or have a relatively un-impacted riparian buffer. These areas occur in twenty separate locations.
- The single longest un-impacted / low impact stretch on the river measures 12.6km (total of both banks) over a distance of 6.8 kilometres (areas 6, 7, 8 & 9 below on page 5)
- The remaining 20.8 kilometres (of both banks) comprise:
  - eleven sections varying from 100metre - 800 metre lengths
  - two sections of 1km lengths
  - one section of 1.2km length
  - two sections of 2km lengths
  - one section of 3km length

Additionally, indigenous vegetation beyond the riparian buffer only occurs for approximately 21.2 kilometres of the rivers length

### Area 1

*Distance from source:* stretches for 2 kilometres immediately downstream of source wetland.

*Length:* 2 kilometres (excluding the wetland that gives rise to the river)

*Vegetation:*

Right bank: natural grasslands with a few Leucocidia trees beside the stream. Cattle grazing / stream access in lower area

Left bank: natural grassland and wattles beyond the buffer.

The wetland on the source plateau is in good condition, although there are some brambles on the road that skirts the eastern side of the wetland, and a grove of wattle trees on the western side of the wetland. Some of these wattles are extremely old and the grove seems to be used as a woodlot for firewood.



The hillsides below the wetland through which the stream flows as well as the hilly area rising away from the wetland comprise beautiful natural grasslands.



As the stream runs through this high exposed grassland we recorded Yellow Helichrysum, Watsonia, Gerbera, Gladiolus longicollis, and the occasional gnarled & stunted Leucocidia. At the head of the small valley gnarled, stunted Protea and Podocarpus latifolius clung to the rocky slopes and White Erica drakensbergensis over hung the stream. A small patch of indigenous forest lined the banks as the small valley became steeper and more protected, after which the stream again ran through grasslands, and then passed indigenous bush comprising mainly Halleria, Podocarpus, Buddleja, Maytenus and Leucocidia.

Just 2 kilometres from the source wetland, this pristine area ended with Wattle in the river buffer and Solanum (Bug Weed) invading the buffer and grassland.

## Area 2

*Distance from source:* 4km

*Length:* 100 metres

*Vegetation:*

Right bank: veld grass with a few Leucocidia trees beside the stream. Cattle grazing / stream access

Left bank: veld grass and wattles beyond the buffer.



*Top: Area 1 - Source wetland*

*Middle: Area 1 – Grasslands & forest*

*Bottom: Area 2*

### **Area 3**

*Distance from source:* 13.6km

*Length:* 300m

*Vegetation:*

Right bank only: Indigenous bush;  
grassland

(Left bank: Timber into buffer)



### **Area 4**

*Distance from source:* 14.2km

*Length:* 100m

*Vegetation:*

Right bank only: Leucocidia / grassland.

Timber beyond buffer

(Left bank: timber in buffer to river bank)



### **Area 5**

*Distance from source:* 14.8km

*Length:* 200m

*Vegetation*

Right bank: Natural grass with kikuyu  
pasture beyond

Left bank: Natural grass



Areas 6, 7 & 8 comprise one unbroken stretch, the longest stretch on the Lions River with indigenous buffer zones:

*Top: Area 3 – Right bank: Leucocidea / grassland*

*Middle: Area 4 – Right bank: Leucocidea / grassland*

*Bottom: Area 5 – Both banks indigenous grasses*

### **Area 6**

*Distance from source:* 16km

*Length:* 1km

*Vegetation*

(Right bank: historically drained wetland now grassland / wetland with operating drains)

Left bank: Indigenous bush in buffer, steep hillsides of grassland beyond buffer



### **Area 7**

*Distance from source:* 17km

*Length:* 1km

*Vegetation*

Right bank: Wetland

Left bank: Indigenous bush / grassland



### **Area 8**

*Distance from source:* 17.6km

*Length:* 2.2km

*Vegetation*

Right bank: (east bank) Wetland / Grassland. Two stands of wattle in buffer (total +-400m length)

Left bank (west bank): +-300 metre wide wetland with historical drains that are overgrown, good veld grass cover.



*Top:* Area 6

*Middle:* Area 7

*Bottom:* Area 8

### **Area 9**

*Distance from source: 20.2km*

*Length: 2.6km*

*Vegetation*

Right bank: wetland / natural grass with drainage ditches

Left bank: mown veld grass extending to indigenous bush with four weeping willows on the river banks



### **Area 10**

*Distance from source: 32.2km*

*Length: 300m*

*Vegetation*

Right bank: Natural grassland

Left bank: Natural grassland



### **Area 11**

*Distance from source: 33km*

*Length: 600m*

*Vegetation*

Right bank: Natural grassland

Left bank: Natural grassland / Indigenous forest



*Top: Area 9 - Drained wetland & mown veld grass*

*Upper Middle: Area 9 – Indigenous bush, drained wetland*

*Lower Middle: Area 10*

*Bottom: Area 11*

### **Area 12**

*Distance from source: 43.6km*

*Length: 1km*

*Vegetation*

Right bank: Wetland / floodplain

Left bank: wetland / floodplain



### **Area 13**

*Distance from source: 46km*

*Length: left: 800m / right: 2km*

*Vegetation*

Right bank: Natural grassland / indigenous bush

Left bank Natural grassland / indigenous bush



### **Area 14**

*Distance from source: 49.6km*

*Length: 200m*

Right bank: Floodplain

Left bank: Floodplain



### **Area 15**

*Distance from source: 50.4km*

*Length: 100m*

*Vegetation*

Right bank: Floodplain

Left bank Floodplain



*Top: Area 12 - Floodplain*

*Upper Middle: Area 13 – Indigenous grassland and bush*

*Lower Middle: Area 14 - Floodplain*

*Bottom: Area 15 - Floodplain*

### **Area 16**

*Distance from source: 50.6km*

*Length: 200m*

*Vegetation*

Right bank only: 200 m of floodplain – remainder either timber / road or both in buffer

(left bank invaded by bramble)



### **Area 17**

*Distance from source: 57.6km*

*Length: 3km*

*Vegetation*

Right bank: grassed hillside / floodplain / wetland/ grassland

Left bank: floodplain / wetland



### **Area 18**

*Distance from source: 63.4km*

*Length: 1.2km*

*Vegetation*

Right bank only: Natural grassland

(Left bank: bramble infested grassland)



### **Area 19**

*Distance from source: 68.6km*

*Length: 200m*

Although this is a rehabilitated wetland, the river banks have an estimated 60 to 70% bramble infestation that stretches back from the river for between 5 to 6 metres in the buffer.



*Top: Area 16 - Floodplain*

*Upper Middle: Area 17 - Floodplain*

*Lower Middle: Area 18 – Natural grassland*

*Bottom: Area 19 - Floodplain*

## Area 20

Distance from source: 71.2km

Length: 200

Vegetation

(Right bank: floodplain with brambles in buffer)

Left bank only: floodplain

## 4 Wetlands

Wetlands are nature's water storage and purification works and they are an integral part of natural systems. They slow down the flow of water, thus providing flood prevention; they supply downstream areas with water due to the fact that they store water and slowly release it; wetland plants remove contaminants from water, thus "polishing" or purifying the water, and of course wetlands provide an extensive habitat for a large variety of birds, mammals and amphibians.

Historically, wetlands were not seen in such a positive light, and farmers were encouraged to drain them in order to increase arable land acreage. One farmer commented that "30 years ago we were told to drain the wetlands, today they ask us to rehabilitate them". It is now illegal to make any new drains, however it is permitted to keep historical drainage ditches functioning. Draining a wetland is not a once off action – drainage ditches need to be kept open so that the water which constantly seeps out of the wetlands can be channelled down the drainage ditches and away into the nearby river.

The majority of the wetlands along the Lions River are still drained by these historical ditches which vary in size from perhaps 60 centimetres wide by 40 centimetres deep, to as large as 2 metres wide and a metre or more deep.



*Top: Area 20 - Floodplain*

*Upper middle: Small wetland*

*Lower middle: Small wetland drain*

*Bottom: Large wetland drain*

The largest (deepest and longest) drainage ditch on the Lions River wetlands is a diversion built many decades ago. Originally this section of river comprised a slow meandering current that spilt its waters over wetlands, countless horseshoe bends and oxbow lakes.



Today the diversion shortens the river by 2.2 kilometres, runs almost as straight as a dye and in its second half is deep enough that a freight train would not only fit in it, but would be hidden from the surrounding landscape. There is little sign of the original wetlands which have mostly been turned into arable lands.

+7km from the source lies a series of six wetlands, situated at right angles to the river. As the wetlands approach the river, their size increases and they become part of a long wetland that extends on and off for some 5 kilometres along the edge of the river. All these wetlands are surrounded by arable lands, pastures and centre pivot irrigation mechanisms, many of which are situated on drained and dried out wetlands kept at bay by the drains. A large dam has flooded some of the original wetland – but created new wetlands in its shallow areas. Three kilometres downstream the wetland draining scenario is repeated for a distance of 7 kilometres, the only difference being that drainage ditches are far more in evidence for 4 of these kilometres, whilst a 3km stretch lacks pastures and arable lands, seems to be all natural vegetation and the drainage ditches are no longer in use. The aforementioned diversion is situated downstream of this area.

It is quite remarkable that in the upper reaches of the Lions River a length of approximately 20 kilometres of river had, before the advent of modern agriculture, almost half its length comprise wetlands.

Similarly, in the lower reaches, 13.8 kilometres of the river comprise impacted and/or drained wetlands and floodplains – mostly surrounded by timber plantations. This all adds up to the fact that originally, almost half the length of the Lions River comprised wetlands and floodplains, almost all of which are today drained to a greater or lesser extent.

## 5 Negative Impacts

### Extraction / Water Demand

The Lions River is heavily extracted by agriculture and the Lidgetton and Lions River smallholdings. Subsequently, the river size 50 kilometres from the source (just upstream of the Mpofana / Lions confluence) does not look larger than it looks 15 kilometres from the source.



### Riparian buffer zone

The riparian buffer is a 32 metre belt of land stretching from the river bank outwards (both banks). Rivers and the land function together and impacts on one have a direct effect on the other. Thus a healthy buffer zone will have positive impacts on the health of the adjacent river. It is for this reason that disturbance in the buffer zone is illegal. Exemptions to this are historical activities (eg decades old pastures planted to the rivers edge).



### Terrestrial Invasive Vegetation

Pine and Wattle trees are allelopathic - they release chemicals which change the soils chemical composition to suite themselves, thus dominating by harming or killing other plants growing there. Thus in areas of wattle infestation the soil is generally bare of any vegetation other than the wattles.



Additionally large invasive trees shade out the river, change the water temperature and acidity and deposit excess detritus on the river bed all of which has negative impacts on the rivers ecology and health

Only 22% of the banks of the Lions River have intact riparian vegetation and only three areas have intact riparian vegetation in equal length on both banks: a mere 3.4 of the Lions +-80km length - the source area, one area of veld & indigenous forest and the area downstream of Lidgetton Falls (near Granny Mouse).



*Top: Lions River +- 15 kilometres downstream of its source*

*Upper middle: Lions River +-50 kilometres downstream of its source*

*Lower middle: Timber planted into wetland buffer*

*Bottom: Pine and self seeded wattle in river buffer*

Invasive vegetation in the 32 metre riparian buffer zone comprises either planted vegetation (Kikuyu pastures, home gardens or Pine, Eucalyptus and Wattle plantations), or self-seeded timber species and other invasives characteristic to the Midlands (Bramble, Bug weed etc).

Wattle infestation along the river occurred in many places, predominantly on steep slopes. The five largest clumps of Wattle were all adjacent to the large cascades and waterfalls of the Lions River.

Appendix 2 contains maps and lists of all invasive and alien plants recorded in the buffer

### ***Drainage ditches / dykes / diversions***

The majority of wetlands on the Lions River have drainage ditches in either what were once wetlands and are now pastures and arable lands, or in some cases are still draining existing wetlands – to the extent that water was running down the ditches into the river. Others were disused and overgrown. The minority were clearly no longer functioning.

The aforementioned diversion has changed a section of the river irrevocably as the diversion channel runs straight as a die increasing in size and depth as it approaches a small escarpment where it ends in a wattle choked waterfall.

Prior to this diversion, the Lions River used to meander across a vast wetland in an eastern direction, then head south and then east again over a distance of just over 5 kilometres. The river now flows for just under 2 kilometres along a straight channel from the north west to the south east with dykes on some banks, and no sign of the original wetland which is now planted to kikuyu pastures.



*Top: Wattle choked river bank*

*Upper Middle: Network of disused wetland drains*

*Lower middle: Wetland drain*

*Bottom: River diversion*

Whilst walking, Preven and I often debated the situation – wetlands, flood plains, deeply incised river. We came to the conclusion that in times past, what are now floodplains were perhaps wetlands, which due to all the drainage ditches have dried out and been reduced to flood plains. Combined with the lowering of the river level from the extensive water extraction for agriculture, the river, instead of spreading out over wetlands has become a channel which perhaps occasionally bursts its banks.



### **Construction / buildings**

- The Lidgetton informal settlement is situated on the river banks and dwellings as well as pit toilets are in the river buffer.
- Water extraction pump stations
- Timber roads
- Three houses with gardens – historical.



*Top: Historical Dyke*

*Upper middle: Pit toilet on river bank, Lidgetton informal settlement*

*Lower middle: Water extraction pump station*

*Bottom: Garden*

## Erosion

Elevated, unnaturally high levels of silt in a river blocks sunlight, which impacts negatively on aquatic plants and animals. Plants need sunlight to produce their food and silt levels block the visibility of aquatic creatures, effecting hunting and fleeing behaviour. Fish and many other aquatic insects have gills which can be clogged by silt. All this have a profound impact on the health of a river.

Natural erosion takes place in the meandering incised river channels as the river erodes the outer banks and deposits silt on the inner banks. Upstream of the Mpofana confluence, this has most likely been exacerbated by the draining of wetlands, thus creating a deep river channel as opposed to a shallow river which easily spills its over its banks onto floodplains and wetlands.

Surprisingly, there was minimal erosion due to cattle paths accessing the river, although we saw signs such as faeces in the river from cattle drinking there. Two dairy farms and one cattle farm had river banks heavily trampled by cattle resulting in areas bare of vegetation.

Some of the timber roads close to the river will erode during heavy rains due to a lack of storm water control, and due to the steep slopes on which the timber is planted there will be erosion during heavy downpours after the timber has been felled.

Erosion was observed at three river causeways.

The four single largest sources of silt in the Lions River were, in order of impact:

- The Mooi uMngeni inter catchment transfer scheme which releases high volumes of water into the Mpofana which then empties into the Lions River downstream of Caversham Mill.



*Top: Erosion at earth dam overflow*

*Upper middle: River banks trampled bare by cattle*

*Lower middle: Blue Gums trees on steep slope of river buffer*

*Bottom: Silted Mpofana meeting clear Lions*

Water is gravity fed via a pipeline from the Mearns Weir on the Mooi River, then released into the Mpofana which was previously a small stream. Thus due to the now regular high volumes of water the banks of the Mpofana are eroding badly causing heavy turbidity in the stream. All this silt is transferred into the Lions River at the Mpofana / Lions confluence. Between the confluence and the Lions River settlement, the Lions River is being eroded to such an extent that some of the banks have been shored up with stone gabions. This seems to be having limited success. This situation will be exacerbated when the transfer from the new Springrove Dam on the Mooi River begins, as the release levels will be higher.



- Natural erosion on floodplain meanders
- The outlet of the historical river diversion which is situated in a deep cutting.
- Major earthworks that were undertaken adjacent to the river to dig drainage ditches.

### **Roads**

A number of dirt roads are situated inside the buffer area in the timber plantations.

*Top: Rock gabions and eroded banks downstream of the Mpofana confluence  
Bottom: Earthworks adjacent to the river – part of drainage ditches*

## In-stream Impacts

### Nutrification

Nutrification is the process whereby excess loads of nutrients enter a river. Sources include agricultural fertilisers, human and livestock faeces, industrial waste, insecticides and herbicides involving a variety of elements such as ammonia, nitrites, nitrates, phosphates, organic carbon and nitrogen. This can occur via poor management of effluent, incorrect application, dumping, leaks and spills.

When water courses are contaminated with excess nutrients there are visible indicators of over nutrification: “sludge” (actually elevated levels of microscopic organisms called Diatoms) is sometimes evident on submerged rocks and is a sign that there are increased levels of nutrients. The second obvious sign is the occurrence of large numbers of various invasive aquatic plants which flourish in nutrient enriched water, and can actually smother the entire surface of the river if there are enough nutrients for them to multiply sufficiently. The third sign can be large amounts of green algae

There are a number of indicators of over nutrification in the Lions River, the most obvious being elevated levels of Diatoms on the river bed and or submerged rocks and secondly various aquatic plants which flourish in nutrient enriched water, and can actually smother the entire surface of the river if there are enough nutrients for them to multiply sufficiently.



*Top: Possible Potamogeton*

*Upper middle left: Fine Oxygen Weed*

*Upper middle right: Parrots Feather*

*Lower middle: Watercress*

*Bottom: Elevated level of diatoms on river bed & submerged rocks*

High levels of these aquatic plants can negatively impact the river as follows:

- By covering the surface of the water, they block sunlight penetration which in turn decreases visibility for aquatic creatures and deprives naturally occurring plants of sunlight
- The creatures living on the river bed and rocks can be smothered by excess Diatoms
- In the case of algae the water is robbed of oxygen which is needed by other residents of the river

It should be kept in mind that rooted and floating invasive aquatic plants are actually removing nutrients from the water and substrate. By removing the source of nutrients, these plants will naturally dissipate.

Seen regularly down the Lions was the presence of large quantities of Potamogeton (Pond Weed) and Lagarosiphon muscoides (Fine Oxygen Weed) in the dams, Myriophyllum aquaticum (Parrots Feather), Nasturtium officinale (Water Cress) and bright green patches of algae. Elevated levels of diatoms (were also noted

The abovementioned nutrients in the Lions River originate from:

- dairy effluent being piped directly into the river,
- leaking / lack of slurry dams,
- irrigation with effluent (allowed by law and safe if practiced properly)
- fertilizers used on agricultural lands
- The informal settlement at Lidgetton comprises a number of pit latrines within 2 or 3 metres of the river bank. Should the river flood and burst its banks, such an event would cause human faecal contamination of the river.



*Top: Dairy slurry leaking down hillside to Lions River*

*Upper middle: Dairy effluent in Lions River*

*Lower middle: Effluent irrigation*

*Bottom: Fertiliser stains on river rocks*

### **Dams / Weirs**

Dams negatively impact on river health by reducing flows, depositing water of a different temperature into the river and depositing silt either via outlet releases or when changing water temperatures during spring and autumn cause currents that stir up detritus on the dam bed.

There are five large dams in the upper reaches of the Lions River, the first being situated on the plateau above the source wetland. This dam is +-4 km in circumference, and feeds the source wetland.

Downstream lies a second earth dam, +-1km in circumference, followed by a large dam approximately 10 kilometres from the source with two smaller dams immediately upstream of the large dam. When full, the headwaters of the large dam push back into the two smaller upper dams. This inundates a length of approximately 3 kilometres. The left bank is extremely steep hillside whilst the right bank is very shallow and in the headwaters particularly, there are extensive reed beds and areas of other aquatic vegetation providing habitat for a large number of aquatic birds.

Downstream towards the confluence with the uMngeni River, there are five small farm weirs, a historical hydro electric wier, a historical trout breeding dam and a gauging weir, the latter at Lions River.

### **Litter / dumping**

Generally the area was free of litter and illegal dumping apart from the two Lidgetton informal settlements which have no formal waste removal services. Large quantities of solid waste, particularly plastic, is wind blown into the Lions River.



*Top: Large dam on upper reaches of the Lions River*

*Upper middle: Historical trout dam*

*Lower middle: Gauging weir near Lions River settlement*

*Bottom: Solid Waste from Lidgetton informal settlement*

## 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 whilst IHI indicates the percentage of disturbance to river and buffer.

### 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

Unfortunately the Lions River conditions are not often suitable for Mini SASS testing due to the presence of so many deep pools and channels resulting in a lack of rocks and riffles and we were thus able to carry out only eight Mini SASS tests, the results of which are as follows:

- *Seriously / critically modified / very poor condition*: two sites (scoring 4.6 & 5.1)
- *Largely modified / poor condition*: three sites (scoring 5.2, 5.2 & 6.1)
- *Moderately modified / fair condition*: three sites (scoring 6.2, 6.2 & 6.4)

Of the eight Mini SASS tests conducted on the river, none scored Natural or Good condition. The highest score was only 6.4 (fair condition) whilst the lowest score of 4.6 (critically modified) was a mere 5 kilometres from the source.

(Appendix 3 shows the location of the Mini SASS test sites)

### Site 1: Mini SASS

*Site description:* Approximately 4km from source, +- 100m downstream of earth dam with flourishing Oxygen weed in shallows, algae below the dam wall and gulley erosion at dam overflow. River upstream of site is shallow and rocky.

*Surrounding Land use:* Cattle

*Surrounding Vegetation:* Right bank: pastures to river edge; left bank: indigenous bush & Wattle into buffer

*Turbidity:* Water 100% 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:

- Lack of intact riparian buffer - pastures to within 5 metres of the rivers edge and Wattle intruding into buffer
- Elevated levels of nutrients indicated by algae & Oxygen Weed in the dam & Diatoms at test site
- Gulley erosion at dam overflow resulting in elevated silt level in river



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### Site 2: Mini SASS

*Site description:* Approximately 16km from source, +- 500metres downstream of large dam. River upstream of site is shallow and rocky.

*Surrounding Land use:* Right bank - poultry, Left bank - guesthouse

*Surrounding Vegetation:* Right bank – kikuyu/veld grass; left bank indigenous

*Turbidity:* Water 100% clear

*Siltation on river bed and submerged rocks:* Elevated levels on rocks and river bed

*Mini SASS score:* 5.2 Largely modified POOR condition

*River Health negatively impacted* due to two large earth dams and elevated nutrient levels. The site is situated a few hundred metres downstream of a confluence of two rivers, each river with a large earth dam a few hundred metres upstream of the confluence.

- Low water level in river due to upstream dam
- We did not see the second dam wall, however from the small size of river at the test site it would seem that the second dam also has very minimal releases
- Immediately below the upstream dam wall the river surface was smothered in Parrots Feather, an indicator of elevated nutrient levels.
- Algae in water indicated elevated levels of nutrients, the origin of which we were unable to identify – there were no signs of livestock accessing the river, nor signs of effluent from the poultry farm.



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### Site 3: Mini SASS

*Site description:* +-28km from source. Downstream of pastures, irrigated lands and wetlands with both large and small drainage ditches on right bank and indigenous bush on left bank. River upstream of site is deep, canalised and meandering.

*Surrounding Land use:* Intense dairy

*Surrounding Vegetation:* Right buffer cleared for road and drainage ditch, left bank indigenous grasses and bush with some bramble invading the buffer

*Turbidity:* 80% visibility

*Siltation on river bed and submerged rocks:* Elevated levels of silt on river bed

*Mini SASS score:* 5.1 - on the edge of VERY POOR / critically modified and POOR / largely modified condition

*River Health negatively impacted* due to the lack of an intact riparian buffer - ploughed wetland drains, levelled road, kikuyu pastures & bramble.



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### Site 4: Mini SASS

*Site description:* +-33km from source. Downstream of the end of the river diversion, and a home with garden up to the river banks, historical kikuyu pastures planted to rivers edge, historical drainage ditches overgrown with kikuyu (seemingly no longer functional), and close to a small quarry on the edge of the riparian buffer. River upstream of site is naturally deep, canalised and meandering.

*Surrounding Land use:* Cattle grazing

*Surrounding Vegetation:* Kikuyu pastures

*Turbidity:* 75% visibility

*Siltation on river bed and submerged rocks:* Elevated levels of silt on bed and rocks

*Mini SASS score:* 6.2 Moderately modified, FAIR condition

*River Health negatively impacted* due to the lack of an intact riparian buffer - no natural riparian vegetation, quarry on edge of buffer, kikuyu pastures

- Livestock access to river resulting in bank sheet erosion and siltation of river bed from cattle trampling
- Low water level in river due to upstream water extraction and dams



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### Site 5: Mini SASS

*Site description:* +-35km downstream of source, downstream end of intensive dairy farm. River upstream of site is naturally deep, canalised and meandering.

*Surrounding Land use:* Dairy pastures

*Surrounding Vegetation:* Kikuyu pastures to within +-5 metres of river edge

*Turbidity:* Not recorded

*Siltation on river bed and submerged rocks:* Elevated levels of silt on bed and rocks

*Mini SASS score:* 6.1 on the edge of moderately modified, FAIR condition & largely modified POOR condition

*River Health negatively impacted* due to the lack of an intact riparian buffer – kikuyu pastures

- Although the majority of the river on the property is fenced off from livestock, the test site has been trampled by cattle accessing the river causing bank erosion and siltation of the river bed



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**Site 6: Mini SASS:** +-37.5km downstream of source. Site is just under a kilometre downstream of indigenous forest. Riparian buffer upstream has narrow band of wattle trees, and surrounding areas comprise natural veld grass / kikuyu pastures and a hill of indigenous grass. River upstream of site is predominantly shallow and rocky.

*Site description:* Cattle watering point in river

*Surrounding Land use:* Cattle farm

*Surrounding Vegetation:* Right bank - short grazed veld & pastures into buffer; left bank - steep slope with occasional pine trees to river edge, ground covered with pine needles to rivers edge

*Turbidity:* +80% visibility

*Siltation on river bed and rocks:* Bed and rocks invisible under thick layer of silt

*Mini SASS score:* 6.4 Moderately modified FAIR condition. Highest score on Lions River

*River Health negatively impacted* due to the lack of an intact riparian buffer – Pine trees and kikuyu pastures

- Livestock access to river resulting in bank erosion and siltation of river bed from cattle trampling
- Layer of pine needles on river bed
- Acidification of soil and water by pine needles
- Low water level in river due to upstream water extraction and dams



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### Site 7: Mini SASS

*Site description:* +-41km from source. Lower end of +-3 kilometres of predominantly wattle growing to the edge of the river banks. River upstream of site is shallow, rocky and fast flowing over a steep gradient with rapids, cascades and waterfalls.

*Surrounding Land use:* Timber interspersed with small residential properties

*Surrounding Vegetation:* Wattle to river bank. Wandering Jew and some Bug weed

*Turbidity:* 50% turbidity

*Siltation on river bed and submerged rocks:* Elevated levels of silt on rocks

*Mini SASS score:* 6.1 on the edge of moderately modified, FAIR condition & largely modified POOR condition

*River Health negatively impacted* due to the lack of an intact riparian buffer - Wattle trees and some Bug Weed and Wandering Jew. The wattle trees are so dense that they shade the river and they change the pH of the water and soil

- Low water level in river due to upstream water extraction and dams



## Site 8: Mini SASS

*Site description:* +-48km downstream of source, downstream of the Lidgetton small holdings, Lidgetton's two informal settlements, and the Lidgetton floodplain. River upstream of site is deep, naturally canalised and meandering.

*Surrounding Land use:* Right bank – indigenous; left bank - road, railway line, dairy farm

*Surrounding Vegetation:* Indigenous

*Turbidity:* 100% clear

*Siltation on river bed and rocks:* High levels of diatoms indicating elevated level of nutrients

*Mini SASS score:* 5.2 Largely modified, POOR condition

*River Health negatively impacted* due to:

- Low water level in river due to upstream water extraction and dams
- Excess nutrients as indicated by diatoms on rocks and algae in water
- This site is situated downstream of the combined impacts of the intense agriculture along the upper Lions River as well as being at the lower end of the impacts from a 10km stretch which comprises a number of small holdings, timber, a large dairy farm, and two informal settlements.



## 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	4km	Earth dam	Dairy	15% Indigenous Grasses & invasives	Pastures & wattle	100%	Bed and some rocks not visible. Elevated diatoms	4.6 Seriously / critically modified, VERY POOR condition
2	16	Large dam	poultry, guesthouse	80% Indigenous grass & bush, some invasives	kikuyu/veld grass;	100%	Elevated levels on rocks and river bed	5.2 Largely modified POOR condition
3	28	pastures, irrigated lands, wetlands with drainage ditches	Intense dairy	20% indigenous grasses & bush, some invasives	Bramble invading the buffer	80%	Elevated levels on river bed	5.1 - on the edge of VERY POOR / critically modified and POOR / largely modified condition
4	33	river diversion, domestic kikuyu pastures, small quarry	Cattle grazing	Kikuyu pastures	Kikuyu pastures	75%	Elevated levels of silt on bed and rocks	6.2 Moderately modified, FAIR condition
5	35	intensive dairy farm. River upstream of site is naturally deep, canalised and meandering.	Dairy pastures	Kikuyu pastures to within +-5 metres of river edge	Kikuyu pastures	Not recorded	Elevated levels of silt on bed and rocks	6.1 on the edge of moderately modified, FAIR condition & largely modified POOR condition
6	37.5	Indigenous forest. wattle trees, natural veld grass / kikuyu pastures and a hill of indigenous grass	Cattle farm	10% Veld grasses & invasives	kikuyu pastures, pine trees	+80%	Bed and rocks invisible under thick layer of silt	6.4 Moderately modified FAIR condition. Highest score on Lions River
7	41	+3km wattle	Timber interspersed with small residential properties	Invasives	Wattle Wandering Jew and some Bug weed	50%	Elevated levels of silt on rocks	6.1 on the edge of moderately modified, FAIR condition & largely modified POOR condition
8	48	Lidgetton small holdings, two informal settlements, and Lidgetton floodplain	road, railway line, dairy farm	Indigenous		100%	High levels of diatoms indicating elevated level of nutrients	5.2 Largely modified, POOR condition

## Reasons for poor river health

As a result of the impacts described in 1.6 above, the health of the Lions River varies between very poor to fair condition. Aside from the source area, there are no sections of the river that are in Natural or good condition

### **Turbidity:**

For the 1<sup>st</sup> 6 kilometres the river is clear, with 100% clarity. Thereafter until the confluence with the Mpopana, the water was extremely turbid at all times apart from a few of the shallow rocky areas. From the Mpopana / Lions confluence until the Lions / uMngeni 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 cattle defecating in the river or from irrigation of slurry). Turbidity from erosion was soil coloured, whilst the effluent turbidity was a grey colour.

### **Nutrients:**

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

- the excessive loads of diatoms (sludge) on river rocks
- by physical matter on the river bed
- by fertilizer stains on the rocks
- flourishing populations of various invasive aquatic water weeds - Potamogeton (Pond Weed) and Lagarosiphon muscoides (Fine Oxygen Weed) are *“Opportunistic aquatic plants respond to various disturbances and are usually symptomatic of a problem, and not the problem itself. Disturbances range from nutrient enrichment of the water through runoff of fertilizers from farm lands, and contamination of rivers with sewage, to manipulation of river flow and water levels, such as the building of dams, and destruction of riverine and other wetland vegetation”* (Cilliers & Henderson).

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

- *Effluent*
  - Two farms were observed disposing slurry effluent directly into the river
  - It is common (and legal) practice to irrigate with slurry as a fertiliser on arable lands. If too much irrigation takes place, or if irrigation takes place during rainfall events, the slurry will wash into the river before it has time to be absorbed into the soil
  - Cattle access to the river cause additional nutrients from faeces
  - Fertilisers such as phosphates that are used on arable lands wash into the river. Although invisible in the river water, they leave evidence by means of crystal like stains on the rocks.
- *Sewage*
  - the Lidgetton Valley has a high density of small holdings, all on septic tanks which may be contaminating the river
  - The Lidgetton informal settlement is situated on the floodplain and there are a number of pit toilets only two or three metres from the river bank.

A farmer situated opposite and upstream of Lidgetton Low Cost Housing Village has E. coli contamination of his borehole water to the extent that it is not fit for human consumption. Whether this is due to the Lidgetton informal settlement or due to the fact that he is downstream of the small holdings of Lidgetton Valley as well as all the intense agriculture upstream is not known.

## **7 Green Corridor**

### **Potential Stewardship / Conservancy Sites**

Appendix 4 shows the location of the sites discussed below.

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

*Source wetland and stream below (possibly already a Stewardship Site)*

Potential: Stewardship

*Manor Farm*

Potential: Stewardship

*Indigenous Forest and grassland upstream of Lidgetton Valley*

Potential: Stewardship

NB – a 200 metre length of wattle regrowth in the river buffer would need to be cleared

*Lidgetton Falls – valley immediately downstream of Falls (near Granny Mouse)*

Potential: Stewardship or Conservancy

### **River hiking way potential**

The terrain along the Lions River is generally not conducive to a hiking path due to some extremely steep terrain, thick bush and wetlands.

There are however some beautiful areas that would be suitable for a walking route. It would obviously be up to the individual landowners to decide if they were prepared to allow walkers on their properties. A possible solution could be limited access to either hiking clubs who often conduct day hikes led by responsibly trained leaders or controlled groups led in a manner similar to current Midlands Conservancy Forum walks whereby landowners conduct short walks on their properties on a monthly basis for the public.

# Findings and Recommendations

## Findings

### Impacts

The cumulative impacts on the Lions 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 water itself all of which are exacerbated by the reduced flows from extraction.

### 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.

### Catchment Management

Role Players have become increasingly aware of the importance of maintaining a healthy river catchment and the Lions River is no exception.

## Recommendations

### Buffer lengths.

As indicated by the Mini SASS tests, the health of the Lions River (as with all rivers) can and does improve – provided it is given enough length without impacts. 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. The Lions seems close to this situation as the Mini SASS scores and visual observations indicated some improvement in a few places, but the river never has enough un-impacted length to regain its health to good or natural condition.

#### *Recommendation 1:*

In order to increase the resilience and health of the Lions River it would be sensible to have, where possible, a suitably long buffer length. Of the 77 kilometres of the Lions River the only areas with intact riparian vegetation on both banks are:

- *Source area* – both banks for a distance of 2 kilometres
- *Indigenous Forest & grassland*: both banks un-impacted in two sections for 300 metres and 500 metres respectively, with a 600 metre section of wattle in the centre of this length that would need to be cleared. Total 1.4 kilometres
- *Lidetton Falls Valley* (near Granny Mouse) – both banks un-impacted for 1.5km)

None of the above three are a suitable length.

#### *Manor Farm*

The only area with the longest viable length suitable for rehabilitation in order to function as a buffer length on the Lions River is Manor farm, as it comprises almost 7 kilometres of either fairly un-impacted or healthy riparian area. Additionally this length has the potential to be far wider than the required 32 metre buffer width. The rehabilitation and protection of this area can only assist in mitigating and improving the health of the Lions River. We are of the opinion that this should be prioritised as this location is unique on the river.

On the upstream section of the area, grassland hills rise from the western edge of the wetland. These hills have numerous seeps draining to the wetland. The ecotone between hills & wetland has been dyked, effectively damming the hillside seeps which have also been trenched, preventing the water from spreading onto the wetland. A light infestation (+- 5 metres width) of bramble is growing on the edge of the road / wetland in the ecotone / wetland edge



Although this area is beyond the riparian buffer, the rehabilitation of these wetland drains will contribute tremendously to the rehabilitation of the main wetland (Area 8 above)



Rehabilitation would comprise the following:

- The rehabilitation of drains in the wetland / floodplain on both banks
- the removal of a small dyke which acts as a barrier to hillside seeps and wetlands (left bank)
- the removal of the road on the ecotone between hill toe and floodplain (left bank)
- the removal of the mostly small drains at the foot of the hillside (left bank)
- the removal of a small infestation of bramble along the road edge and on the floodplain (left bank)
- the protection of the natural grasslands on the hillside (left bank)
- the protection of the small water courses and their associated intact riparian vegetation that occur on the hillside (left bank)



We feel these few measures will enable the small wetlands at the foot of the hill (left bank) to then spread out onto the wetland / floodplain which will in time revert to a proper wetland.

*Top: Grassland hills to west of wetland*

*Middle: Dyked ecotone with drains*

*Bottom: Bramble in ecotone on dyke*

### *Timber areas*

The timber areas situated along the lower reaches of the Lions River would also be suitable as buffer lengths, however due to the impending increased water flows from Springrove Dam that will flow down the Lions along with the predicted heavy erosion of the river channel and the resultant predicted change in the river course it seems unwise to invest large amount of time and money in rehabilitating river banks which may well soon be eroded away. Additionally rehabilitation in these areas will entail far more effort to rehabilitate than Manor Farm.

- All roads inside the 32 metre buffer will have to be closed and the compacted ground rehabilitated and planted with indigenous grasses
- All timber in the 32 metre buffer will have to be removed and the areas rehabilitated
- All invasive bramble in the buffer area will have to be removed
- An ongoing alien vegetation control program will have to be implemented

The remaining sections of un-impacted or low impacted riparian buffer are all too short to provide a buffer length.

### **Lidgetton**

In the informal settlement situated adjacent to Lidgetton, residents make use of pit toilets, some within 2 metres of the rivers edge. This is a health hazard to the residents as well as the river. Additionally, due to a lack of service provision, a large amount of solid waste, particularly plastic, gets washed and blown into the river.

#### *Recommendation 2:*

- Intervention is needed in the Lidgetton informal settlement re the pit toilets
- An initiative such as run by Wildlands Trust in Mpophomeni whereby recyclables are exchanged from residents for vouchers at nearby shops may assist in preventing much of the litter / waste in the area from entering the river
- Installation of a trash boom on the river near the road bridge. This would trap all the floating rubbish and prevent it from being washed downstream. However, arrangements would have to be made to ensure that the boom was cleared when there was a build up of rubbish.

### **Poplar trees**

Historically, Lion Matches contracted farmers to grow groves of Poplar trees beside the river as this was the wood used in the manufacture of matches. Poplar wood has now been replaced by Eucalyptus for match production and thus poplar plantations in the area are no longer needed for this purpose.

#### *Recommendation 3:*

As these trees are all planted very close to the river and they utilise a lot of water, it is recommended that some liaising with the farmers takes place to remove these trees.

### **Invasive plants**

Over 14 kilometres of the Lions Rivers bank are infested with Wattle, Pine and Gum trees – either self-seeded or planted in the buffer. Wattle trees comprise the majority of the invasives along the river - some areas are impenetrable, no sunlight penetrates and no other plants grow in the soil beneath the trees and the river is shaded. Additionally a common feature in these areas are log jams across the river from fallen wattles which impede water flow.

*Recommendation 4:*

Remove all wattle from the buffer zones as well as all other timber species planted in the buffer. This would clear 28 Kilometres (both banks).

### **Timber Plantations**

*Recommendation 5:*

Owners of timber plantations are encouraged to remove planted and self-seeded timber from buffer areas.

### **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 invasives 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 6:*

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

### **Dairy effluent**

*Recommendation 7:*

Liason with Farmers organisations is urgently needed to ensure that all dairy farms have slurry dams that are in good working condition in order to prevent effluent from entering the river.

### **Drainage Ditches**

*Recommendation 8:*

Encouragement of landowners to reduce drainage ditches.

### **Erosion from cattle paths**

There were areas on the Lions River where there were multiple points within metres of each other where cattle have accessed the river, resulting in eroded river banks and a silted river.

*Recommendation 9:*

Perhaps landowners could put their thinking caps on and devise ways to prevent this erosion. The following options have either been suggested to us by landowners or observed during our river walks, and most are dependent on a single strand electric fence run along the top edge of the river bank:

- Limit access points
- Provide drinking troughs away from the river
- Electric fence strand to keep cattle from the river banks
- Allow access only where there are natural sheets of rock on the river bed

- Place rubber matting on the river bed to prevent disturbance
- Only allow access where the banks are not steep to minimise erosion

### Extraction

Extraction seems to be a problem which will only be exacerbated as time goes by and more pumps are installed. Landowners downstream could thus face the scenario seen on other rivers – where suddenly they do not have sufficient water, and the problem worsens for landowners farther downstream.

#### *Recommendation 10:*

- Form a Water Users Association, so that all the water users on the river can work together to distribute the water fairly.
- Re-look irrigation regimes – there is an oft quoted case of a farmer in the upper uMngeni catchment who, after the 1980's drought continued using the drought irrigation routine for many years as he found that he had better results with his crops, had less leaching of his soils and of course used far less water.

### Monitor River Health

#### *Recommendation 11:*

Each landowner / occupier learn to do Mini SASS, and undertake regular Mini SASS tests on their stretch of river (four times per annum), thus they will each be able to monitor their impact on the river, and take remedial action if necessary

Mini SASS is an activity that the whole family can take part in, and is always great fun for adults and children alike. More information can be accessed on [www.minisass.org](http://www.minisass.org)

### 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 Lions River, but also inspire rehabilitation and care of this precious resource for the benefit of all those “downstream”

## Conclusion

Dr Ian Player told us before the uMngeni River Walk that *rivers are the arteries of the earth, and that if we abuse our rivers nature will “kick back at us”*. He believes that *“we have lost Hlonipa (Respect): for Nature, for Ourselves and for Each Other”*. This just about sums up the story of the Lions River.

We need to regain that respect for our rivers, and the team trusts that the record of the Lions River in this report will not only highlight the problems experienced along the river, but will assist in remedial action and initiate a restoration of the rivers health, as well as to renew the readers Hlonipa. The journey of the Lions River is far from over, and it is up to each of us to take part in looking after this river.

Penny Rees

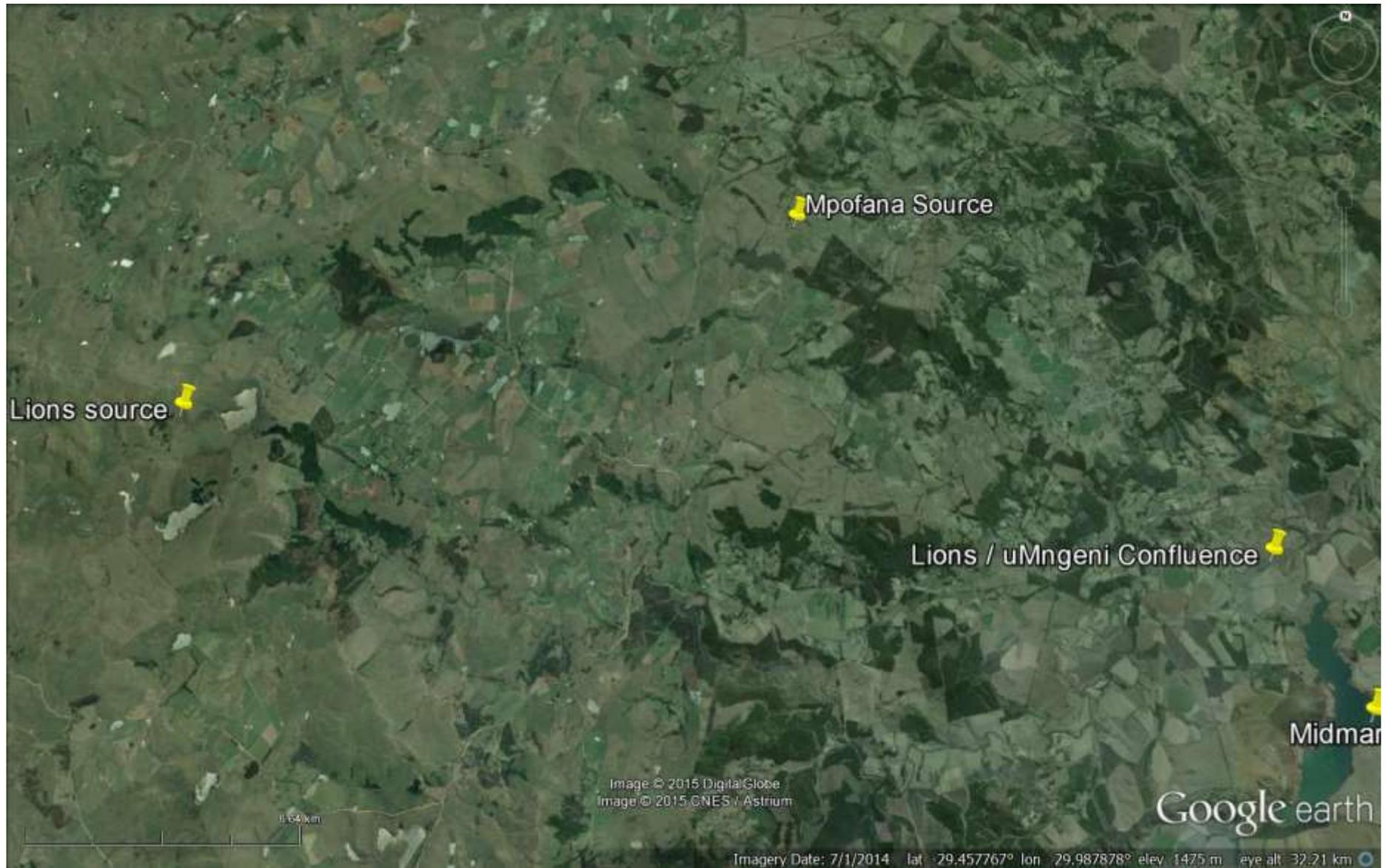
March 2014

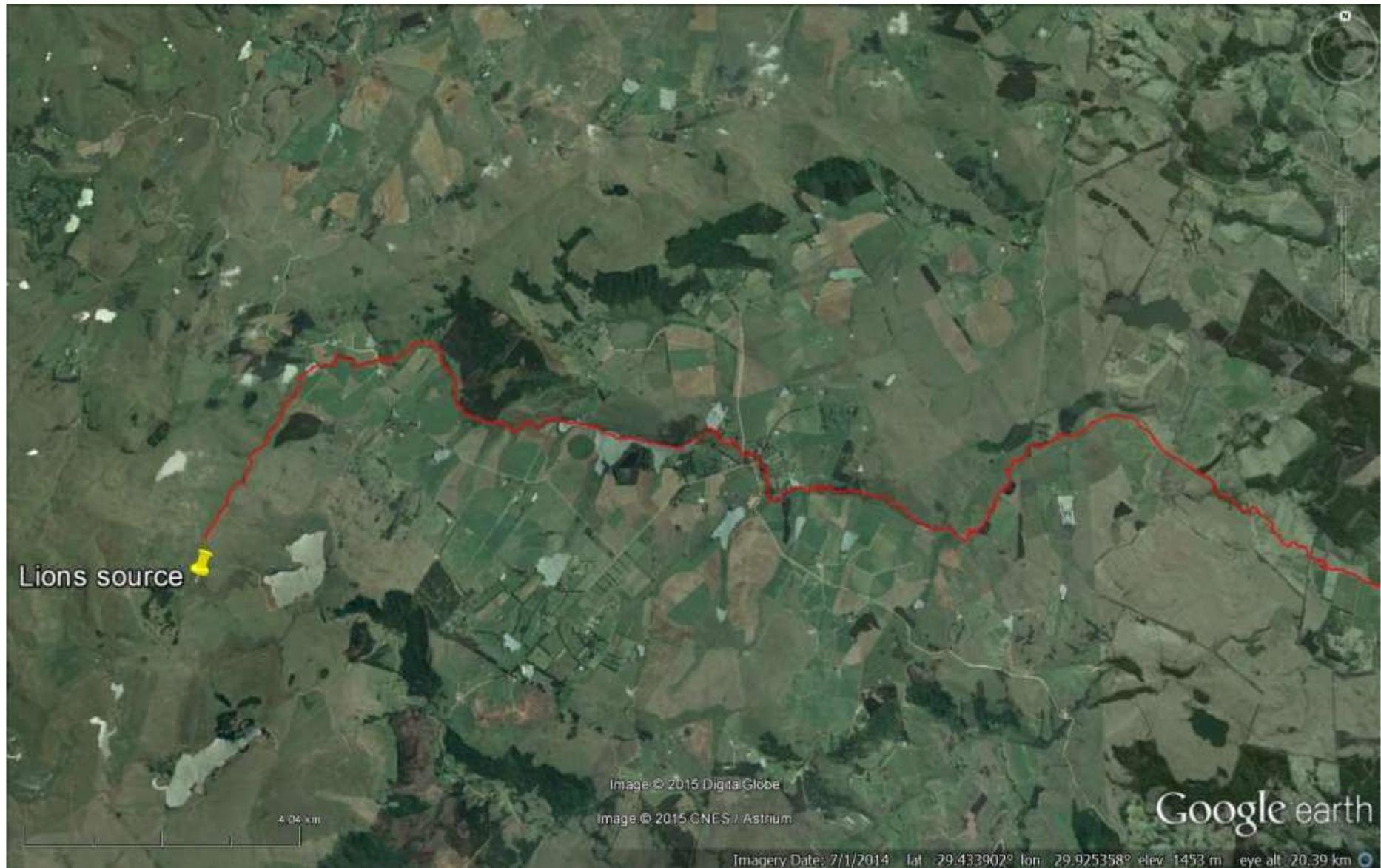
[pennyduct@vodamail.co.za](mailto:pennyduct@vodamail.co.za) [River Walk Blog: uMngeni riverwalk.wordpress.com](http://RiverWalkBlog:uMngeniRiverWalk.wordpress.com)

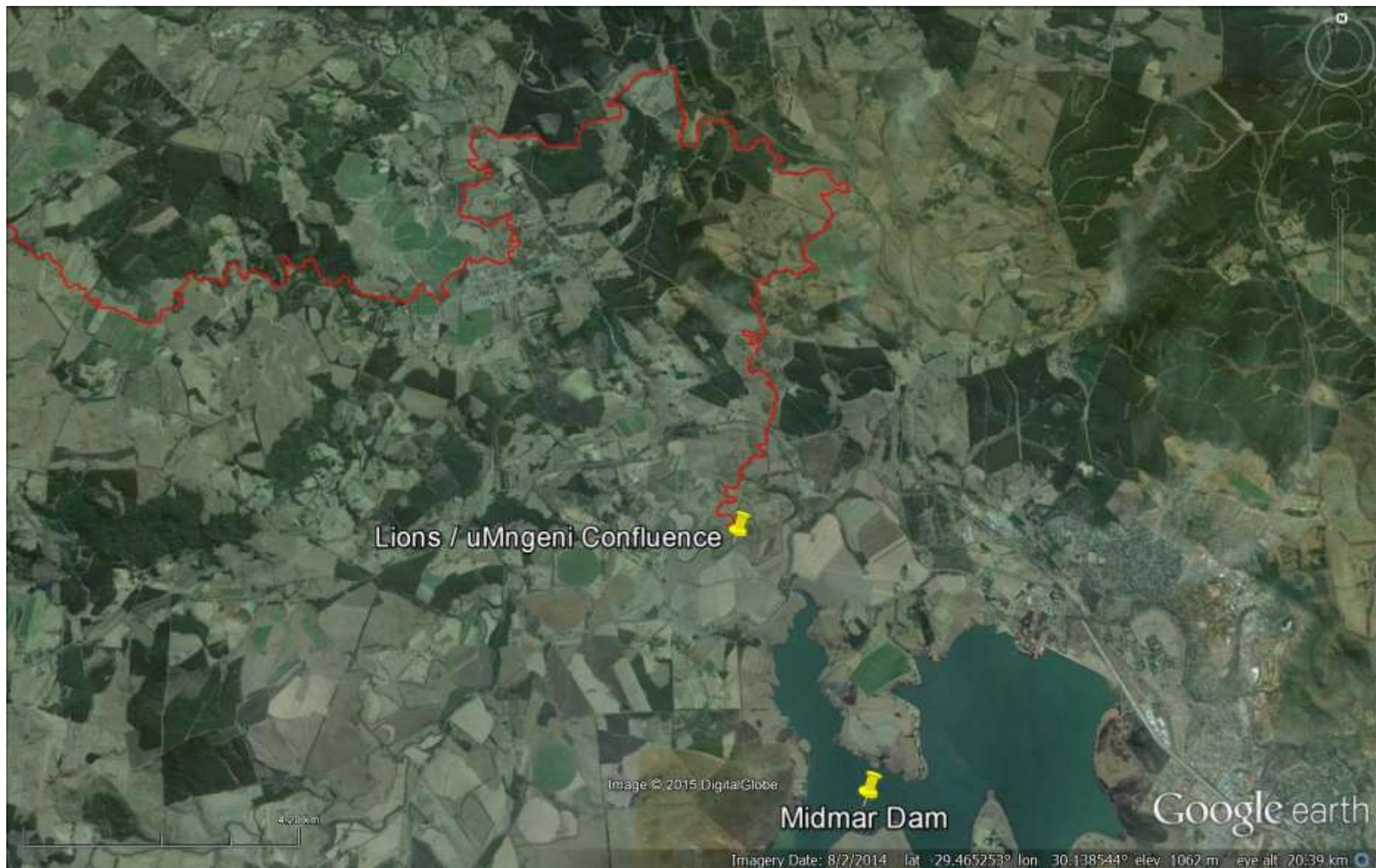
With these hands and with this heart  
and with the pure intention of God  
this water is now blessed  
Removing and transmuting all impurities and  
returning them to the light forever  
Peace.  
Kuan Yin Water Blessing

## **Appendix 1**

### **Area Description: Location of Lions River**







## **Appendix 2**

### **Invasive / Alien Vegetation in buffer**

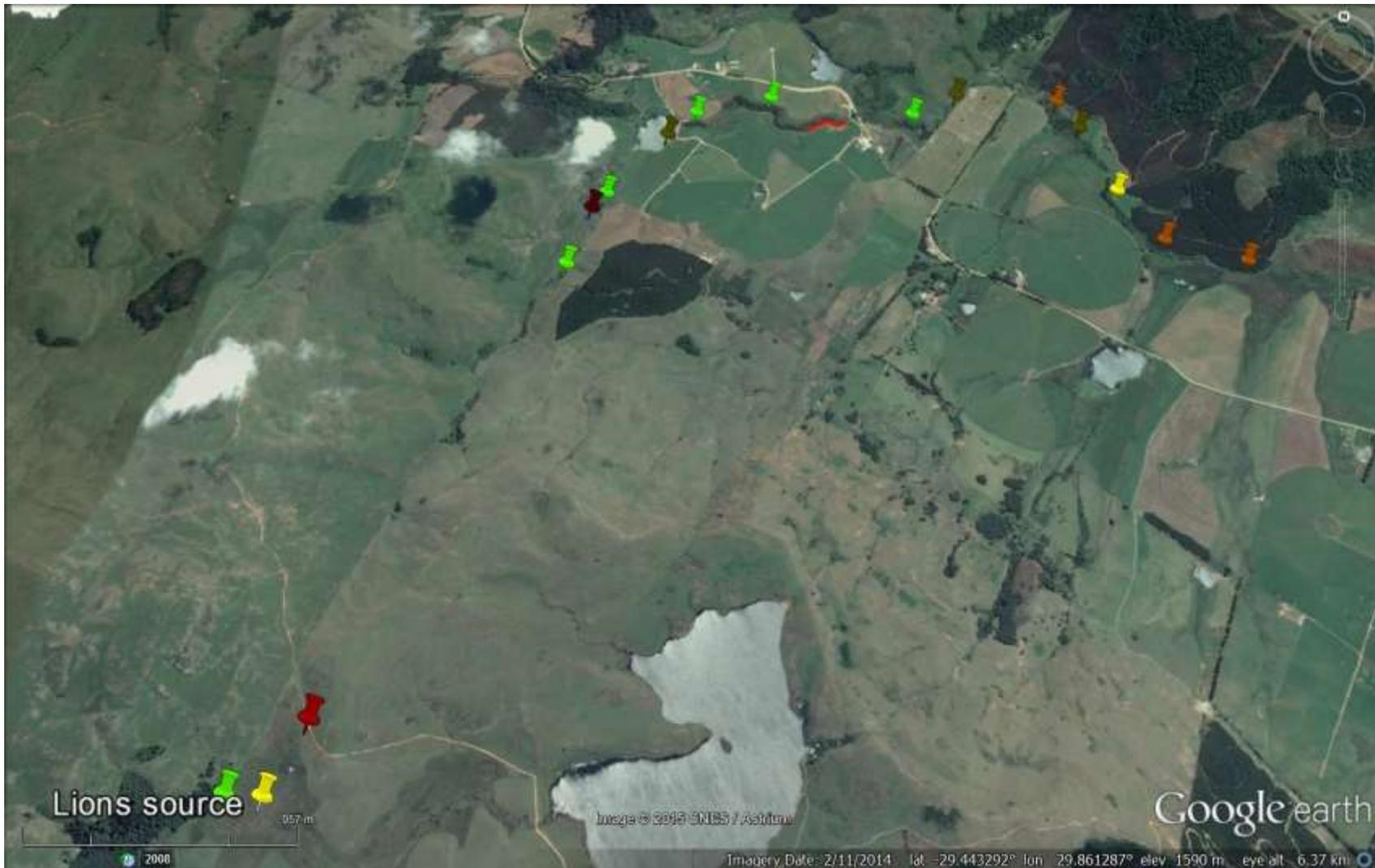
As a reference for species recorded on the walk, we compiled our list from three sources:

- Sanbi's list of Declared Weeds
- The book *Invasive Aquatic Vegetation* by Lesley Henderson.
- The book *Common invasives and weeds* by Clive Bromilow.

Thus plant species on our list are either officially declared invasives or are recognised problem plants. In order to differentiate between the two, the list of CARA declared weeds follows the list of plant species recorded below.

## Invasive Plants and Weeds Identified

Wattle	<i>Acacia dealbata / mearnsii</i>
Crofton Weed	<i>Ageratina adenophora</i>
Bamboo	<i>Bamboosa balcooa</i>
Indian shot / canna	<i>Canna indica / generalis</i>
Blue Gum	<i>Eucalyptus</i>
Mulberry	<i>Morus nigra</i>
Black locust	<i>Robinia pseudoacacia</i>
Ivy Creeper	
Jasmine	<i>Jasminum</i>
Lawn	
Honey Locust	<i>Gleditsia triacanthos</i>
Wild Ginger	<i>Hedychium gardnerianum</i>
Privet	<i>Ligustrum japonicum</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Cats claw	<i>Macfadyena unguis-cati</i>
Pine	<i>Pinus spp</i>
Poplar	<i>Populus</i>
Bramble	<i>Rubus fruticosus</i>
Weeping willow	<i>Salix babylonica</i>
Bug weed	<i>Solanum mauritianum</i>
Wandering jew	<i>Tradescantia spp</i>
Stinging nettle	<i>Urtica urens</i>
Periwinkle	<i>Vinca major</i>
Fine Oxygen Weed	<i>Lagarosiphon muscoides</i>
Parrots Feather	<i>Myriophyllum aquaticum</i>
Fennel Leaved Pond Weed	<i>Potamogeton pectinatus</i>



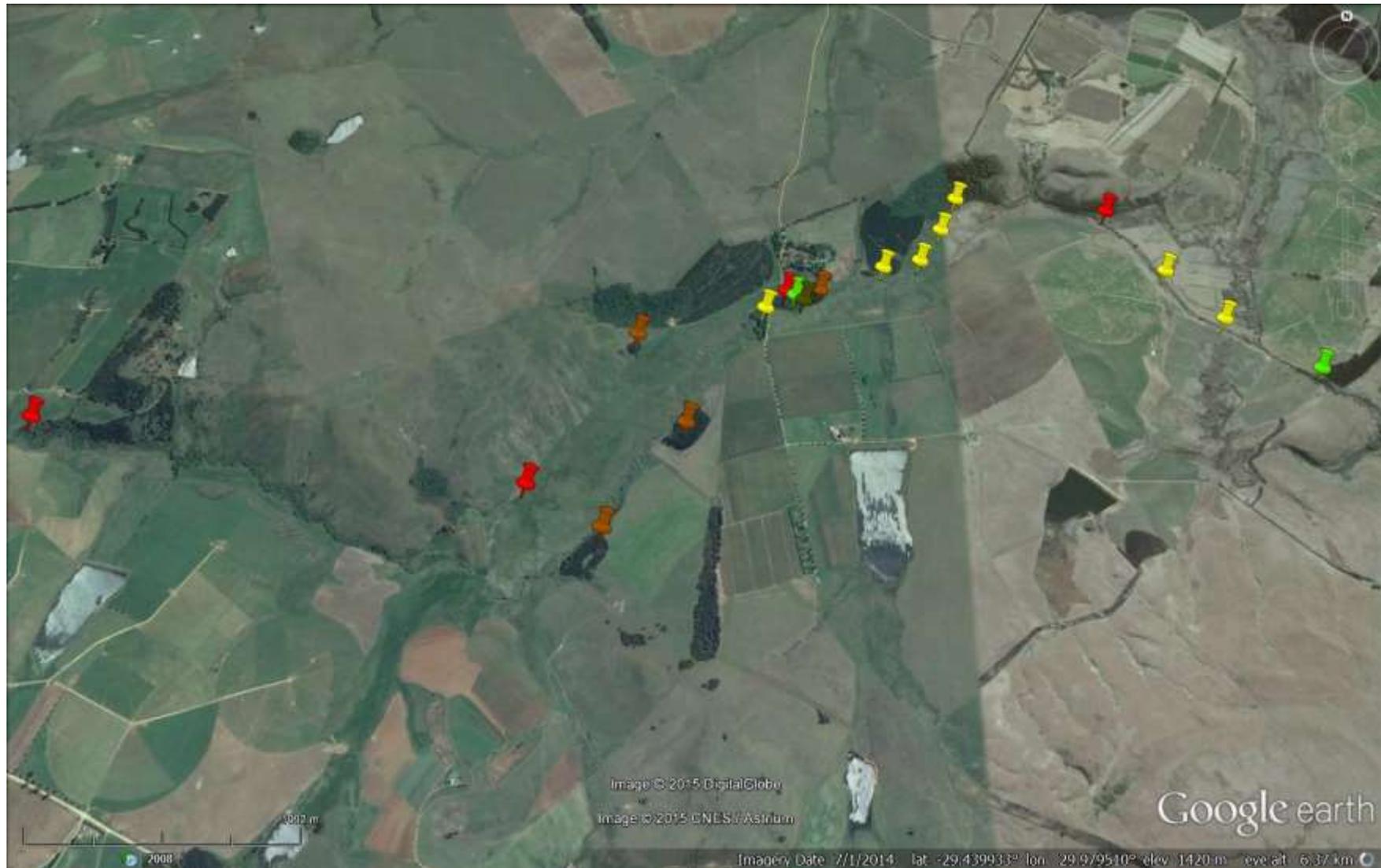
Key

- |               |  |                    |   |
|---------------|--|--------------------|---|
| <b>Red</b>    | Bramble  | <b>Brown</b>       | Pine & or Blue Gum                                    |
| <b>Green</b>  | Wattle   | <b>Olive Green</b> | Aquatic invasive: Fine Oxygen Weed, Water Cress       |
| <b>Purple</b> | Bugweed  | <b>Red line</b>    | Riparian zone recently cleared of invasive vegetation |
| <b>Yellow</b> | <b>Other alien or invasive species: Poplar</b> |                    |   |



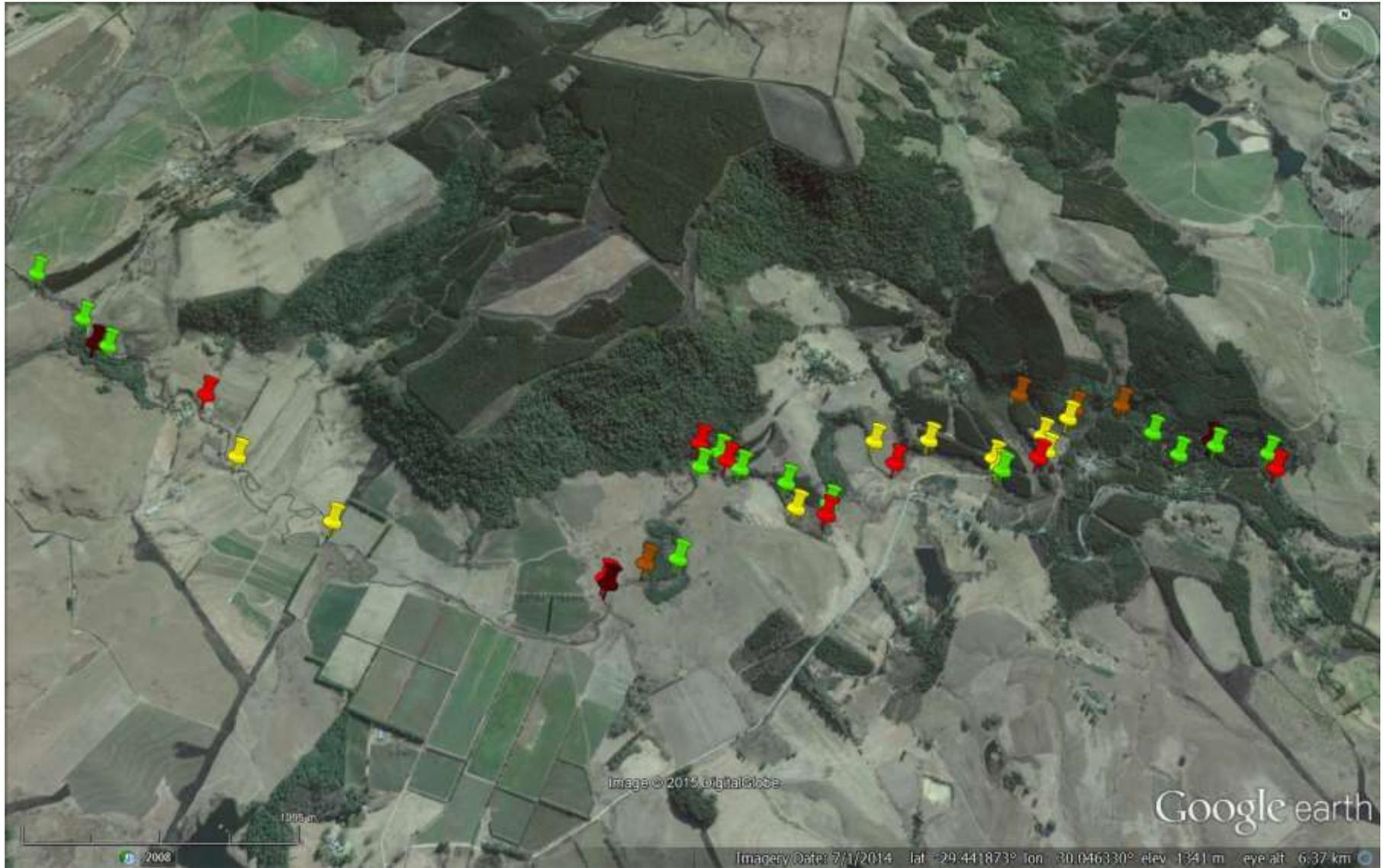
Key

- |               |  |                    |   |
|---------------|--|--------------------|---|
| <b>Red</b>    | Bramble  | <b>Brown</b>       | Pine & or Blue Gum                                    |
| <b>Green</b>  | Wattle   | <b>Olive Green</b> | Aquatic invasive: Parrots Feather, Algae, Water Grass |
| <b>Purple</b> | Bugweed  |                    |   |
| <b>Yellow</b> | <b>Other alien or invasive species: Bamboo, Poplar</b> |                    |   |



Key

- |               |  |                    |                                   |
|---------------|--|--------------------|-----------------------------------|
| <b>Red</b>    | Bramble  | <b>Brown</b>       | Pine & or Blue Gum                |
| <b>Green</b>  | Wattle   | <b>Olive Green</b> | Aquatic invasive: Parrots Feather |
| <b>Purple</b> | Bugweed  |                    |                                   |
| <b>Yellow</b> | <b>Other alien or invasive species:</b> Poplar, Weeping Willow |                    |                                   |



Key

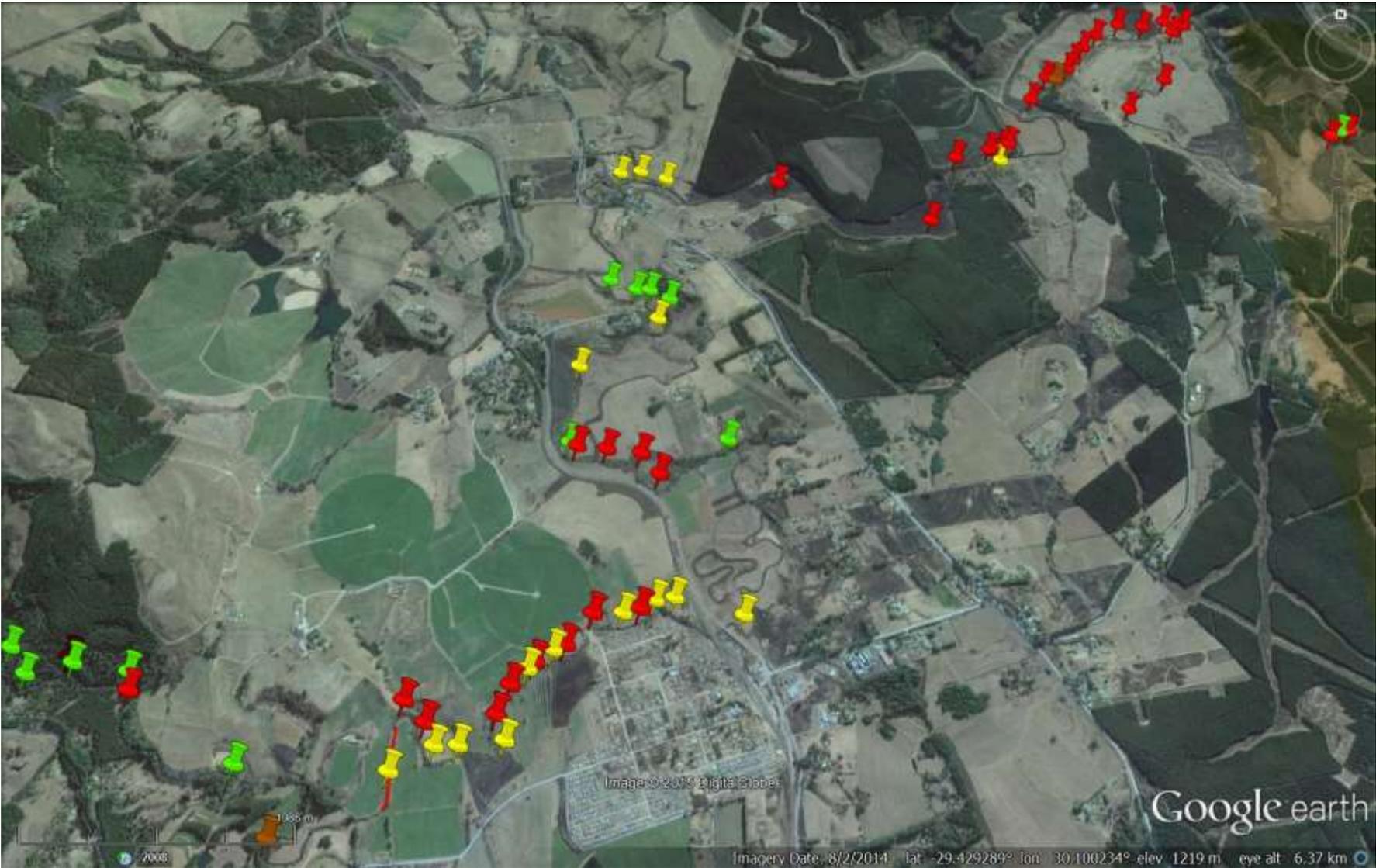
- Red**
- Green**
- Purple**
- Yellow**

- Bramble
- Wattle
- Bugweed

- Brown**
- Olive Green**

- Pine & or Blue Gum
- Aquatic invasive: None

**Other alien or invasive species:** Possible Black Locust, Periwinkle, Jasmine, Ivy



Key

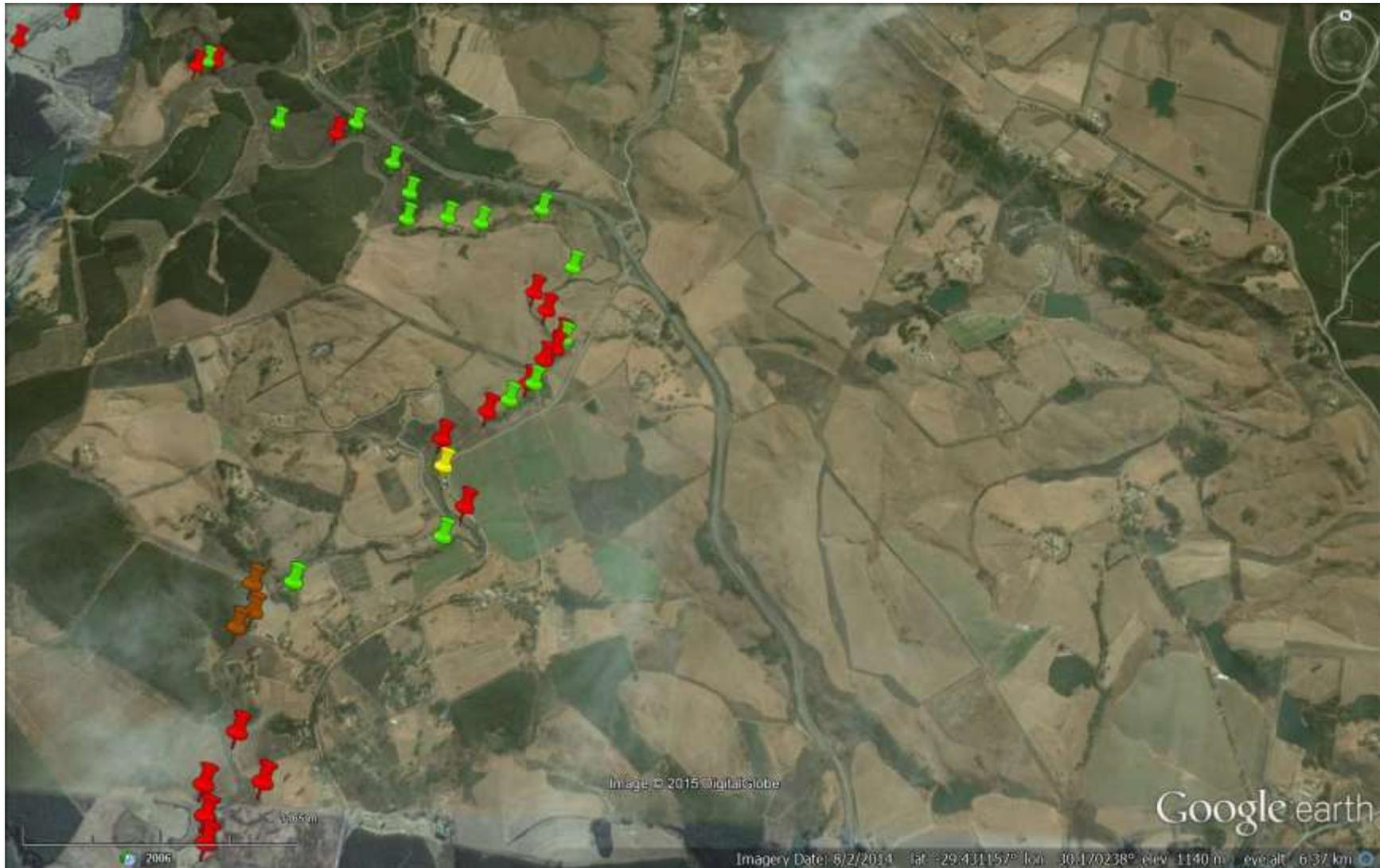
**Red**  
**Green**  
**Purple**  
**Yellow**

Bramble  
 Wattle  
 Bugweed

**Brown**  
**Red line**

Pine & or Blue Gum  
 Riparian zone cleared of invasive vegetation

**Other alien or invasive species:** Weeping Willow, Privet, Cats Claw, Japanese Honeysuckle, Poplar



Key

- |               |   |                    |                        |
|---------------|---|--------------------|------------------------|
| <b>Red</b>    | Bramble   | <b>Brown</b>       | Pine & or Blue Gum     |
| <b>Green</b>  | Wattle  | <b>Olive Green</b> | Aquatic invasive: None |
| <b>Purple</b> | Bugweed   |                    |                        |
| <b>Yellow</b> | <b>Other alien or invasive species: Ivy, lawn</b> |                    |                        |



Key

- |               |  |                    |   |
|---------------|--|--------------------|---|
| <b>Red</b>    | Bramble  | <b>Brown</b>       | Pine & or Blue Gum                                    |
| <b>Green</b>  | Wattle   | <b>Olive Green</b> | Aquatic invasive: None                                |
| <b>Purple</b> | Bugweed  | <b>Red line</b>    | Riparian zone recently cleared of invasive vegetation |
| <b>Yellow</b> | <b>Other alien or invasive species:</b> Privet, Poplar, Mulberry |                    |   |

## **Appendix 3**

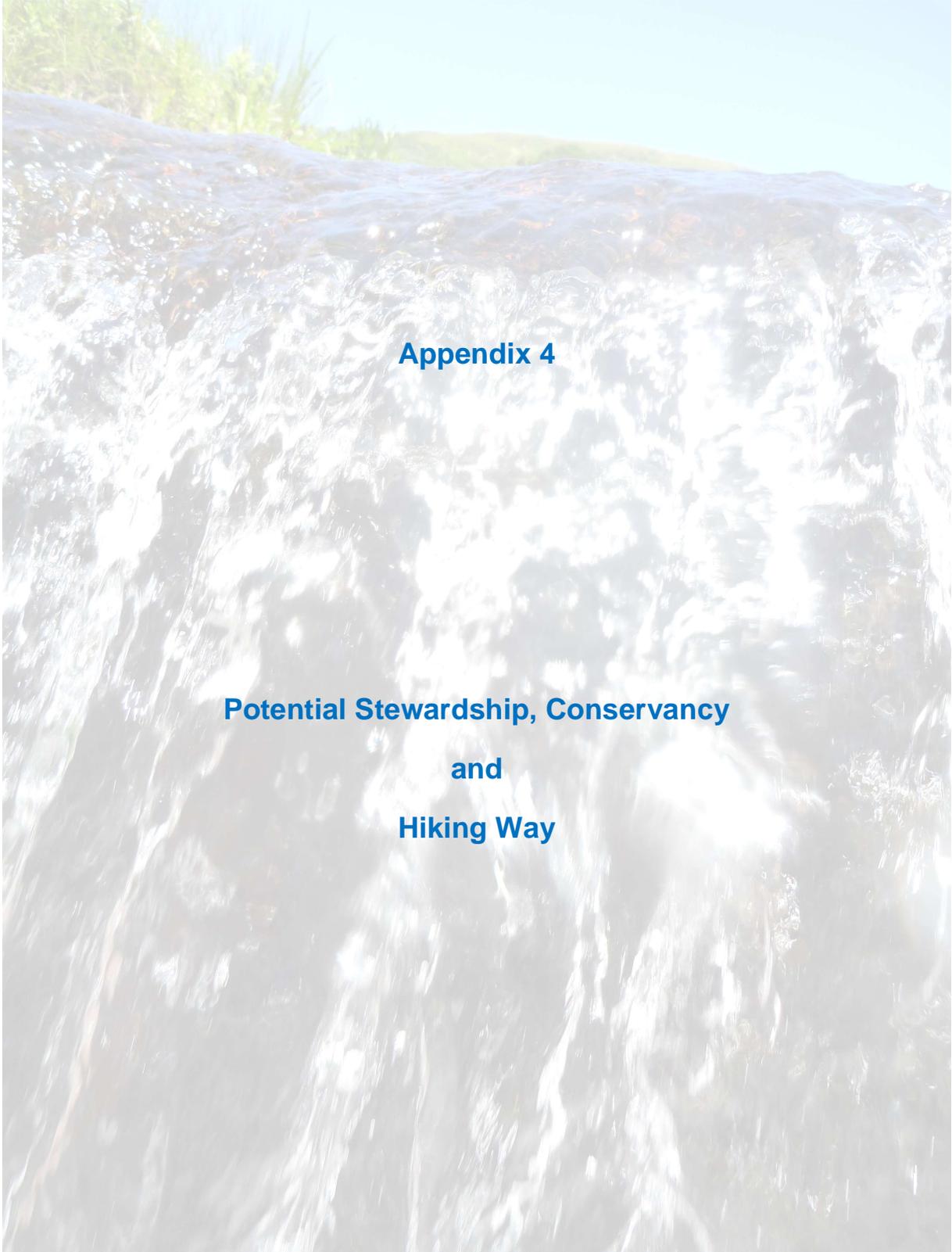
### **Mini SASS Test Sites**

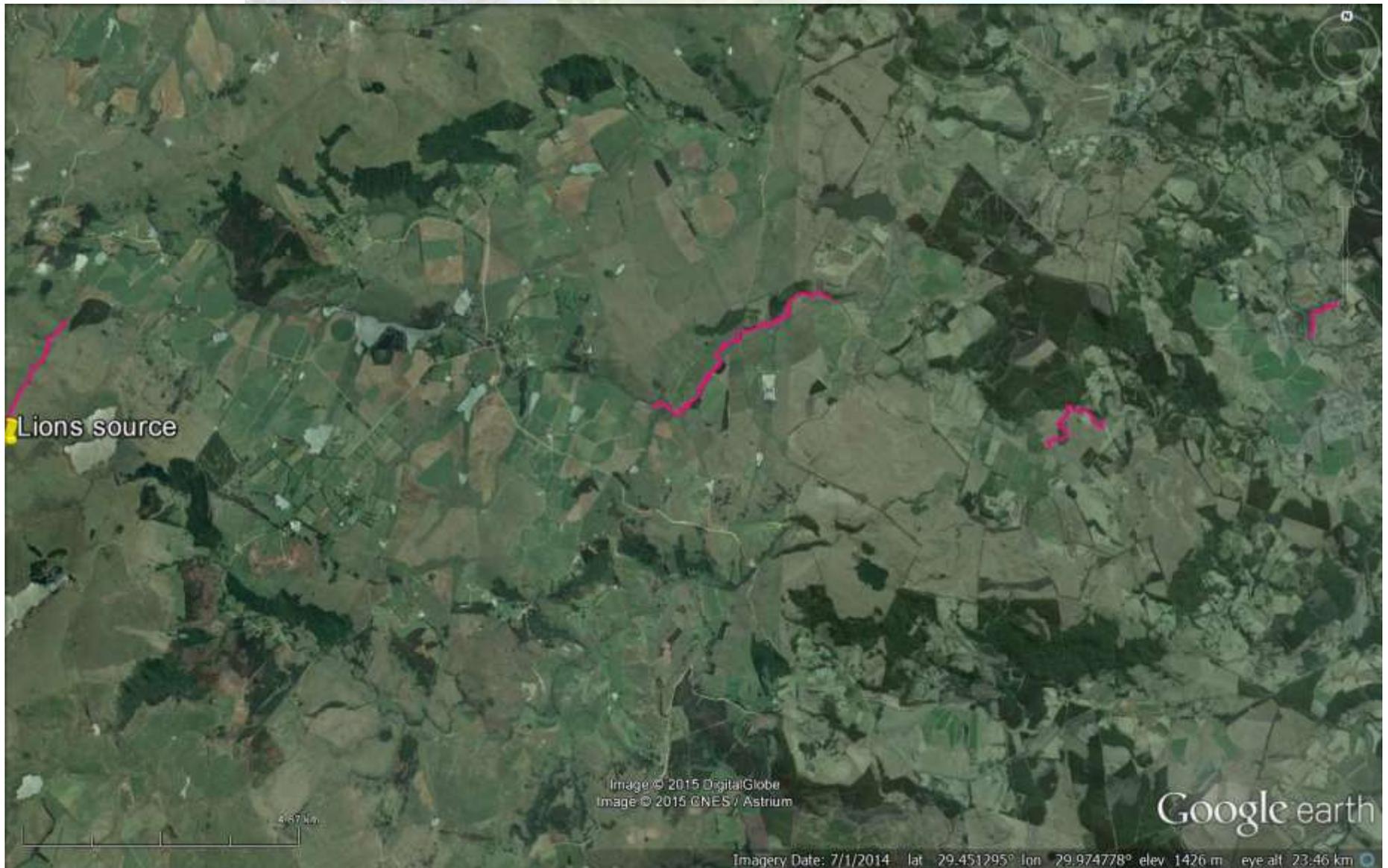


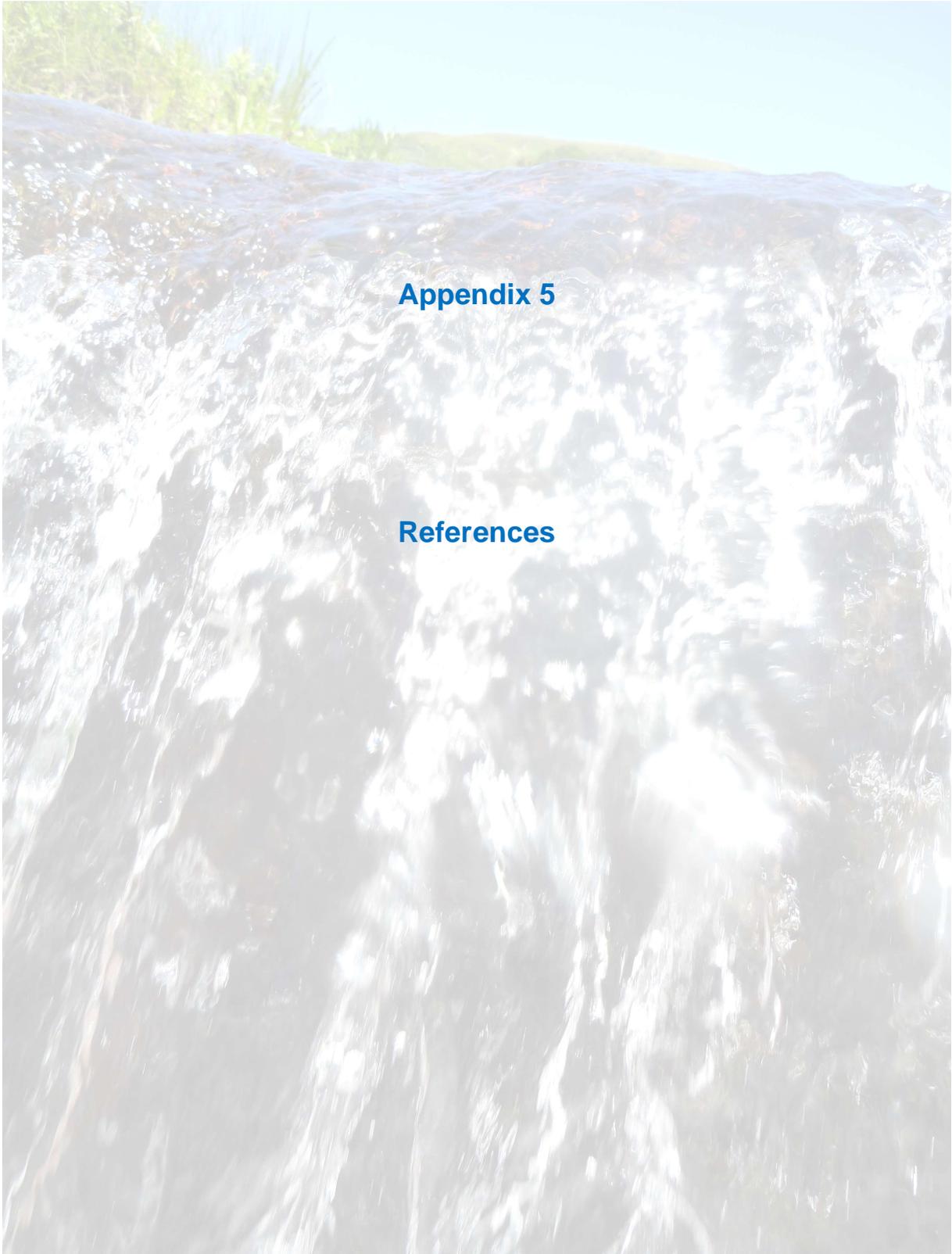
Site 1	4.6 Critically modified, Very poor condition
Site 2	5.2 Largely modified, Poor condition



Site 3	5.1 Critically to Largely modified / Very poor to Poor condition	Site 6	6.4 Moderately modified, Fair condition
Site 4	6.2 Moderately modified, Fair condition	Site 7	6.1 Moderately to largely modified / Fair to poor condition
Site 5	6.1 Moderately to largely modified / Fair to poor condition	Site 8	5.2 Largely modified, Poor condition







**Appendix 5**

**References**

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