



Paddavlei Ecosystem Rehabilitation

Preliminary draft

Michael Austin MSc Agric

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The Paddavlei-Skilpadsvlei ecosystem has deteriorated by having the wetland ignored as a sensitive, ecological niche which once supported good stands of Milkwood forest and hosts of birds and fish. The greater catchment area has been severely invaded by exotic species, especially Port Jackson – these have very dense stands in the upper catchment area of the Paddavlei. This significantly reduces the water input into the system as well as the clean water into the Bot River Lagoon (part of the newly declared RAMSAR site). The Paddavlei Eco Group (PEG), a subset of the Hawston Development Association (HDA), is proposing to rehabilitate this integrated ecosystem in a systematic, balanced and ecologically-sound manner, such that it will have an easily-maintained, integrated environment, supplying many services to the greater Ward 8 community.

Paddavlei ecosystem rehabilitation

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A Introduction

The Paddavlei wetland has been allowed to deteriorate very badly over the last two decades.

It used to be an integrated wetland with a good water supply that maintained an open body of water, supporting a viable fish population with numerous birds of many different species. Paddavlei was used by local children as a swimming hole and had reeds on the eastern, southern and northern sides. The reeds acted as filters for incoming water. Together with the open water, the Paddavlei behaved as an integrated balanced environment, stable and self-sustaining.

This stable ecological system supported a good growth of Milkwood forest, both north and south of the Paddavlei and especially on the west bank (one of the few larger forests of Milkwoods). The water was clean and supported a host of activities for the local residents such as bird watching, swimming, boating and fishing.

Unfortunately the Paddavlei has been allowed to deteriorate into a very much smaller body of water, most of it covered by extensive reeds. It is polluted by rubble, plastics, sewage and excessive amounts of nutrients such as phosphate and nitrogen. The constant flow of water into the Paddavlei has been severely reduced, especially by the unchecked growth of exotic species in the catchment area, and with severe silt accumulation in the Paddavlei itself. This accumulation leads to further encroachment by reeds. This further compounds the silting and reduction of the open water surface.

A plan to turn the Paddavlei into a simple water reservoir and to divert this water away from its normal flow via Skilpadsvlei (and eventually into the Bot River Lagoon) was partly put into action in 2008, with a pipeline to carry the water through the west side dune. Had this been completed, the Paddavlei and Skilpadsvlei would have been totally destroyed as a wetland. This would have had an impact on the Bot River Lagoon as well.

[Note: Skilpadsvlei also known as Paddavlei 2 or Middelvlei will for the purposes of this document be referred to as Skilpadsvlei.]

Fortunately, some concerned residents of Hawston put together a group called the Paddavlei Eco Group (PEG) which is a sub-group of the Hawston Development Association (HDA). PEG has done extensive consultation with established residents of Hawston as to the previous conditions of the Paddavlei, reviewed most of the literature which included the

Paddavlei and consulted with various experts on the history and present situation of the Paddavlei.

This has evolved into a proposal to rehabilitate the Paddavlei wetland extending through to the Skilpadsvlei wetland, to the Bot River Lagoon and to the greater surrounding catchment area of the wetland system.

B Background to the PEG project

Vision

PEG's vision is to develop a community-based initiative to make possible a comprehensive rehabilitation process of the Paddavlei ecosystem.

Mission

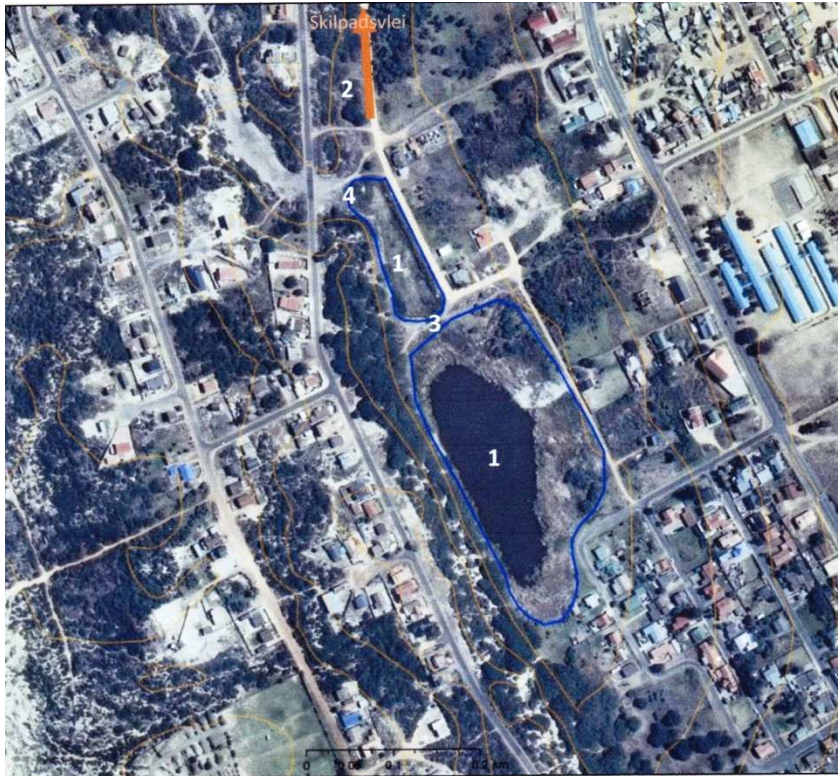
Our mission is to rehabilitate the entire Paddavlei drainage area from the catchment area to the Bot River Lagoon, and to develop the environment and skills of the Ward 8 community.

PEG was founded on 7 October 2016, with the election of office bearers and documentation was forwarded to the WCP DEAP (see Appendix 1 A).

Proposals and ideas to address the rehabilitation of Paddavlei and surrounds were sent to WCP DEAP and Cape Nature, and applications for funding were made. These were unsuccessful.

In a meeting in Thusong Hall on 22 December 2016 at which HDA, PEG, Cape Nature and the National Dept of Environmental Affairs (DEA) were represented, it was decided, after a site visit, that the Paddavlei was worth rehabilitating. Proposals were then made for funding and a way forward. The urgency of this process to halt the destruction of the Paddavlei was stressed by all concerned. The rehabilitation of these wetlands was particularly urgent, given the history and in order to prevent the system from completely collapsing (see Appendix 1 B).

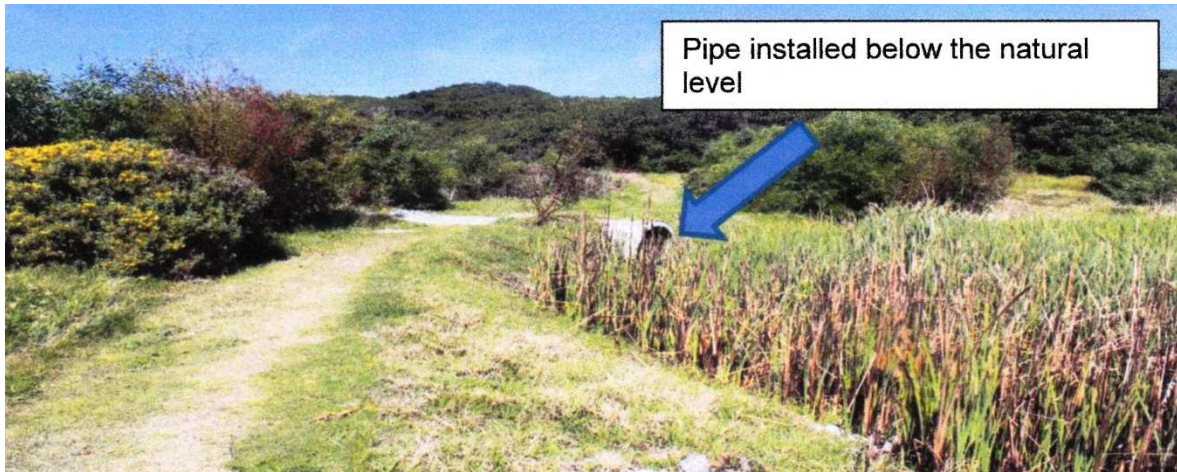
A letter was received from the DEA's Heidi Niewoudt confirming the support of the DEA. Pierre de Villiers of Cape Nature was chosen to be the PEG liaison officer and all supporting documents, maps and reports were to be made available to PEG in order to proceed as soon as possible (see Appendix 1 C).



Map 1: Paddavlei circa 2008, showing a large body of water with minimal reed growth

Problems have subsequently occurred with a lack of documentation from the Overstrand Municipality (OSM) and a PAIA application had to be made (see Appendix 1 D).

On 29 March 2017 some documentation was made available by the OSM. This confirmed that the Paddavlei would have been destroyed completely by the proposal to turn it into a water storage reservoir in 2007. This would also have taken water from the headwaters of the Skilpadsvlei, draining this area against the normal flow and diverting the water through the sand dunes via a massive pipeline to Rem. 3 of Erf 566, the proposed golf course. The project was proposed under the guise of a storm water management system. Work began on this project but was thankfully aborted before the excavation of the Paddavlei began. A section of the pipeline to drain Paddavlei water and part of the Skilpadsvlei was installed. Some earth-moving was done and rubble was dumped into the system before the project was abandoned. This included a new dirt road across the vlei and the construction and tarring of George Viljoen Road extension to Marine Drive, without adequate provision for the wetland which it now crosses. (see Appendix 1E and appendix 2 map1-3).



Picture 1: Entry to the pipeline to drain Paddavlei



Picture 2: Close up of pipeline entry and the pipeline draining water from the Paddavlei

No other work, which would have contributed to a storm water management system for Hawston, has been done in the area since the project was aborted nearly a decade ago. Some of this work should have been done by the OSM in the mean time to control storm water. Parts of this can now proceed, but under the guidance of the PEG rehabilitation project. This project aims to restore the Paddavlei and associated wetlands such that it does not lead to further damage to the wetlands and is in harmony with the wetland and surrounding area of the whole ecosystem.



Picture 3: Roadway constructed across the vlei, which is now just a footpath.



Map 2: Showing the general layout from Hoek van die Berg to Bot River Lagoon with Paddavlei and Skilpadsvlei.

C General discussion and ecological background

The Paddavlei consists of an open body of water within the suburban area of Hawston. Historically it had a permanent stream feeding in from the south with a number of seepages of underground water on the eastern side. To the south and north are patches of Milkwoods and on the west side is a large area of Milkwoods on a raised sand dune with a fairly steep bank directly into the open water area. These Milkwoods are sustained by seepage into the sand dune.

The open water body of the Paddavlei has been maintained historically by a low-lying, relatively impervious layer to the north between the sand dune on the western side and the

higher ground to the east. It is still a wetland area covered in reeds. A recent dirt road which has deteriorated to a footpath crosses this area in an east-west direction.

Further north, the Paddavlei drains through a wetland area with a few patches of Milkwoods fed by a number of seeps on the eastern side. Development has taken place in this area leaving only a narrow band of wetland with little open water. A further road, the Chapel Street Extension, crosses the wetland area at an oblique angle. This is a recently-constructed dirt road, subject to flooding along most of its length. This intersects with the tarred George Viljoen Extension which crosses this area in an east-west direction. There are a few seeps on the eastern side of this area.

The wetland area opens out to a wider wetland area which then feeds into the Skilpadsvlei. The Skilpadsvlei wetland consisted of a number of small open water bodies draining into the main Skilpadsvlei, a relatively large water body surrounded by extensive reed-covered wetland. The sand dune in this area is not so large but continues to define the western side of the wetland. The eastern side of the wetland consists of gently-rising ground with the extension of Hawston Main Road defining the eastern side of the wetland. The road runs very close to this part of the wetland and the main sewage works border the eastern side of the road. There are a few seeps at the start of this area but, for the rest of the river beyond Skilpadsvlei, there is no evidence of seeps into the river course.

Below the Skilpadsvlei a few smaller open water bodies were historically in evidence. The drainage area continues north and then gently curves to the west, finally entering the Bot River Lagoon in a clearly defined V-shaped entry point. A road crosses this area to provide entry to Meerenbosch.

The V-shaped entry point into the Bot River Lagoon, the land form of the lower river area, the absence of evidence of seeps and the historical maintenance of a large body of water in the Skilpadsvlei complex point to relatively large volumes of water draining through the system. Historical evidence from the older residents of Hawston indicates that semi-permanent water ran all the way to the Bot River Lagoon. There is now very little water running through the system.

D Previous reports, conclusions and actions taken

Very little work has been done on the Paddavlei and its immediate surrounds in order to preserve it as a wetland. Many of the declared residential and partly agricultural erven of Hawston intrude into the wetland area. The industrial area on the lower side of Church Street is mostly within the wetland area. There is evidence of a relatively strong farming community in Hawston previously which was dependent on a good water supply. The presence of Milkwoods throughout the upper end of the system supports this evidence. A

part of the Milkwood forest area, immediately adjacent to the Paddavlei, has been preserved as a green belt. (see Map 4.)

The Paddavlei has for decades been used as a dumping ground. Very little evidence exists that any attention has been given to preserving it as a wetland. The Paddavlei itself, the wetland area extending to the Skilpadsvlei, Skilpadsvlei itself and the area extending to the Bot River Lagoon have not been declared green areas. Rubble, storm water, sewage leaks, roads and even houses have been built within the wetland area.



Picture 4: Rubble and waste dumped into the wetland.

A storm water plan was begun in 2007 (Vivier 2007) (See maps 1-3 in Appendix 2). This was designed to convert the Paddavlei into a simple water storage reservoir with steep-sided banks covering a much larger area than the historical Paddavlei. This water was to be diverted through the sand dune to the west, to be used in a different drainage system. Water was to be collected from halfway to the Skilpadsvlei and via a pipeline, moved against the normal flow of the water course and also diverted through the sand dune. This would have removed most of the storm water and most of the seepage water out of the system altogether. The Paddavlei and its adjacent wetland would have been destroyed altogether. The Skilpadsvlei would then have had very little water entering it and would have also been completely destroyed. This would probably have left no water entering the Bot River Lagoon from this system, except for the water from the sewage works. In time, this would have resulted in the Skilpadsvlei being a mere polluted extension of the sewage works. If this overflowed, this polluted water would have been the only supply into the Bot River Lagoon from this natural waterway. This would have had disastrous results for the Bot River Lagoon.

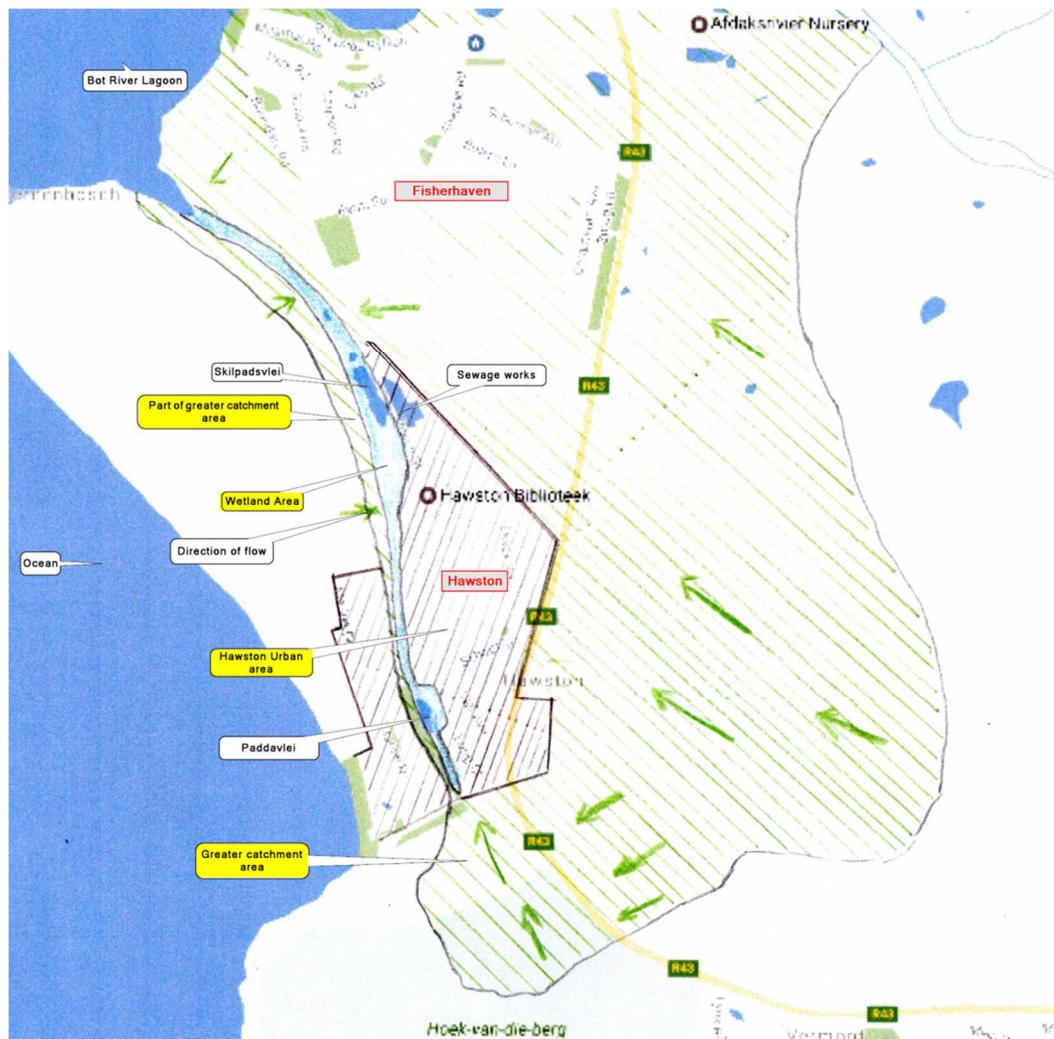
Thankfully the scheme was aborted without extensive damage to the wetland system. The pipe through the dunes was installed, some earth-moving was done and roads were constructed through the wetland without any attention to natural water flow (obviously because there would not have been any left, had the scheme been completed). The Milkwoods probably would all have died and the rest of the wetland below Paddavlei would have dried up. Flooding in Hawston would probably have increased, except for the fact that the pipeline was installed low enough to have been able to drain the new water reservoir to a very low level when water was needed for the proposed golf course on the other side of the sand dune.

The area below Paddavlei has been dried out in the last ten years, resulting in a smaller Skilpadsvlei, partly because of the work done in the so-called storm water plan. The only real intervention then in the Paddavlei-Skilpadsvlei system would have resulted in it being destroyed completely, had the scheme been completed. Especially with the RAMSAR declaration, the rehabilitation of the Paddavlei-Skilpadsvlei system needs urgent attention, in order to rectify the destruction done to it with the aborted storm water plan.

E Recommendations

In the beginning, the Paddavlei project was initiated just for the Paddavlei open water body area. However the Paddavlei is not an isolated system. In view of the great amount of damage which has been allowed to take place in the whole catchment area and the intricate linkages which exist, we have to look at the drainage area as a whole. After the meeting with the DEA this project was extended to include the area from the Paddavlei to the Bot River Lagoon. The recommendations below will be divided into:

- 1 the wetland areas and drainage area to the Bot River Lagoon
- 2 the suburban area of Hawston and
- 3 the greater catchment area.



Map 3: Three main areas of discussion of the Paddavlei and surrounds

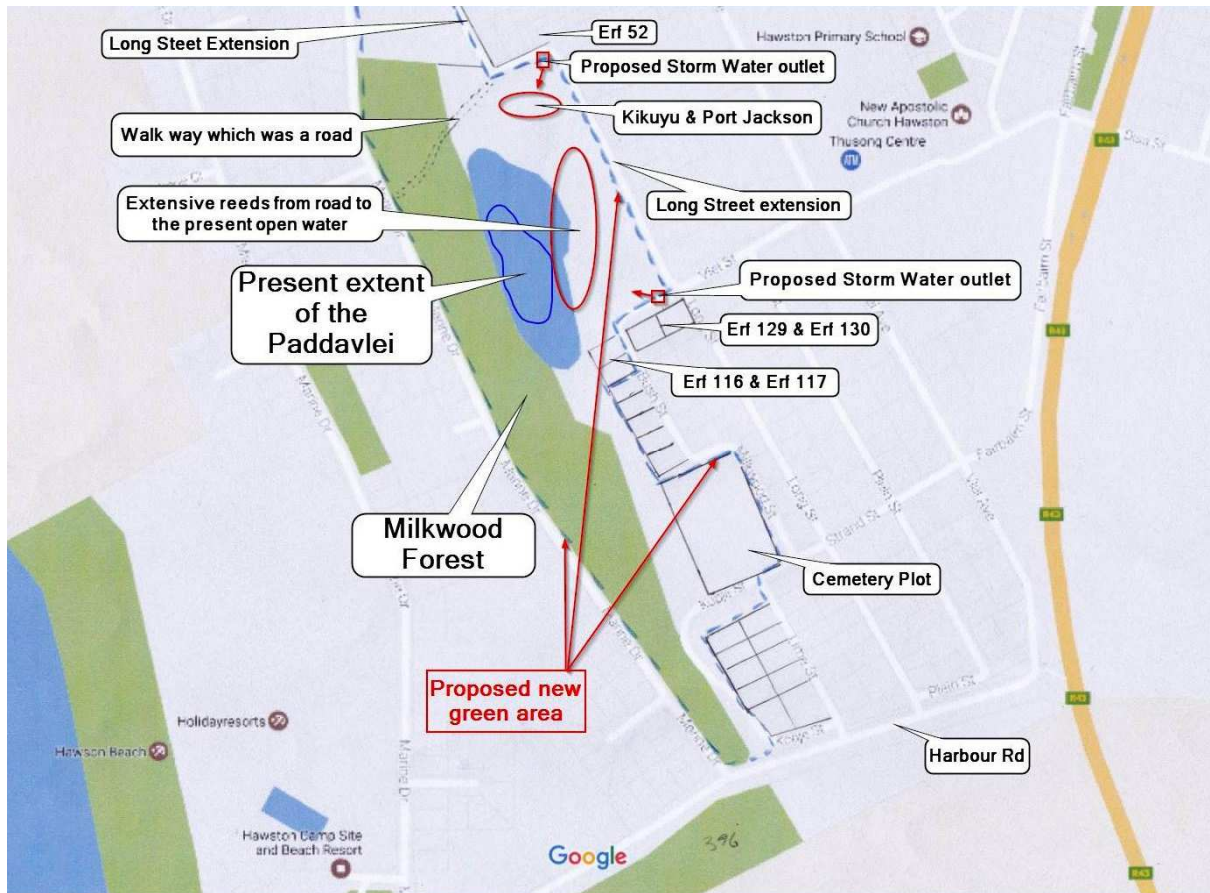
1 Wetland areas

The wetland areas are a small part of the greater drainage area of the Paddavlei watercourse. For the purposes of this report we have defined the ecosystem as *the area which drains into the wetland* and have referred to surrounding areas which have a significant influence on this drainage area.

We will look at the wetland area from:

- the immediate head waters of the Paddavlei as defined by Harbour Road, through the Paddavlei itself
- the wetland on the way to the Skilpadsvlei and
- the immediate surrounds of the Skilpadsvlei and the immediate drainage area into the Bot River Lagoon first.

1.1 Paddavlei and immediate surrounds



Map 4: Paddavlei and immediate surrounds

The open water area of the Paddavlei has been reduced considerably. In Map 3, the extent from 2008 is shown and older satellite images show a similar size open water body. In the last decade, the open water surface has been reduced considerably, with severe reed encroachment, especially on the north east and south sides. This is due to severely-reduced water input from the southern catchment (Map 3) and the effective draining of the Paddavlei. The southern catchment has been severely encroached on by invasive species, especially Port Jackson, which has considerably reduced the water flowing into the Paddavlei. [This will be discussed in the section dealing with the greater catchment area. The draining of the Paddavlei will be discussed below]. The Milkwood forest in the green belt is showing severe signs of stress. These were traditionally fed by seepage from the Paddavlei.

The road to the harbour cuts across the top of the wetland area with little regard to the wetland. Drainage below the road will have to be further investigated once the stream which flowed into Paddavlei has been re-established. A very narrow green belt runs along Kopje Street. This widens below the cemetery plot and should be extended at least up to, if not including, the cemetery plot on the east side. Older residents in the southern part of Bush Road say that water seeps onto the road in the wet season. The graveyard in this area

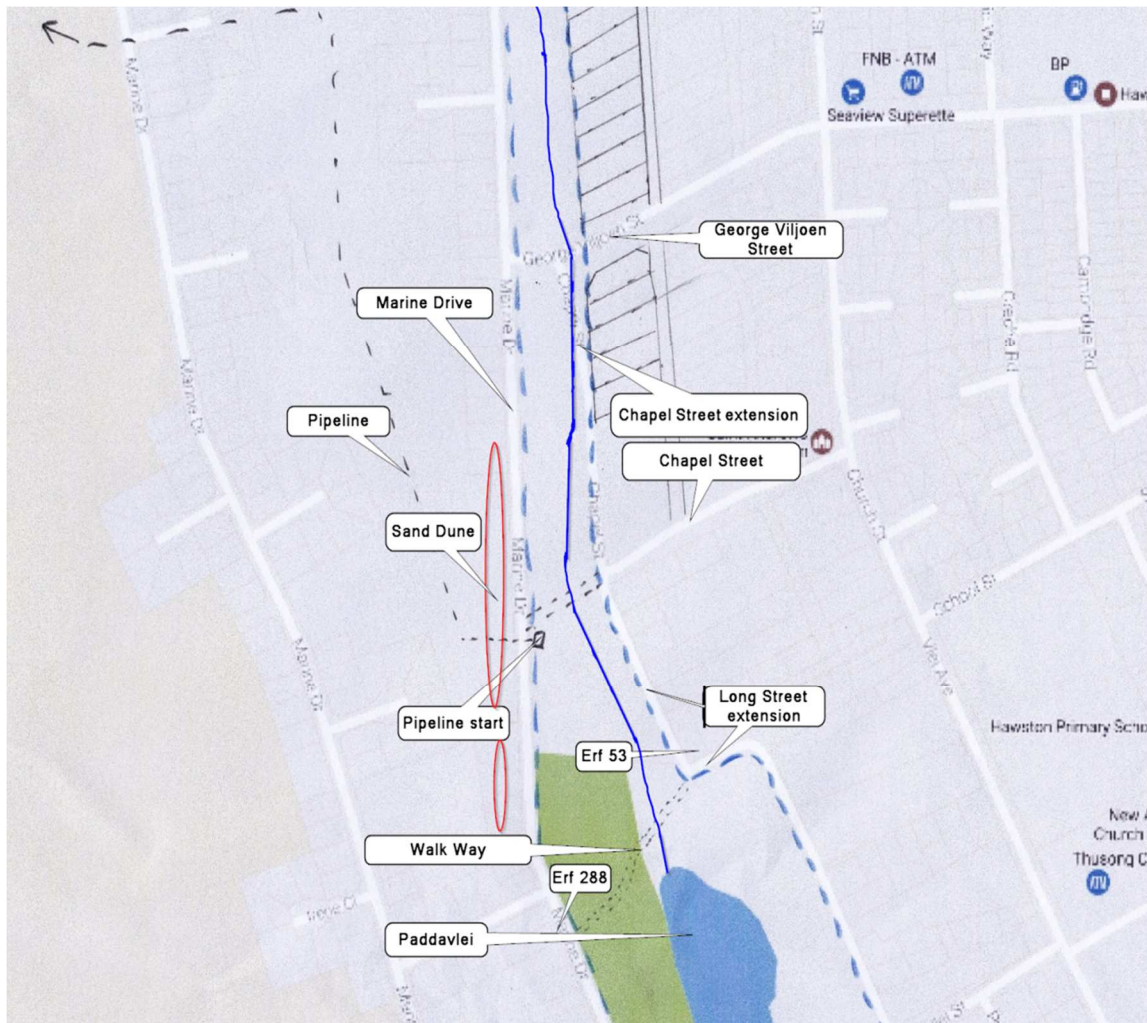
was abandoned because of excessively wet conditions. This seepage may need to be diverted into the narrow old stream flow area. Five of the plots below Bush Road have been built on; the two closest to the Paddavlei are too wet to build on (Erf 116 & Erf 117). They were to be raised with the aborted storm flow plan (Vivier 2007). As they are so close to the open water area of the Paddavlei and are subject to flooding, they should be consolidated into the green area of Paddavlei.

The plots to the south of the bottom of Vlei Street are also subject to flooding, especially below Long Street (Erf 129 & Erf 130). This is caused by storm water coming down Vlei Street and not by proximity to the Paddavlei. The storm water ditch on the south side of Vlei Street had a good growth of reeds which acted as a filter for debris, but was recently cleared. As a result, an excessive amount of plastic and other debris have washed down into the Paddavlei at the corner of Vlei and Bush Streets, flattening the reeds and depositing a huge amount of plastic, glass and other debris into the Paddavlei. A catchment grid needs to be designed and put in place to control the flood water entering into the Paddavlei and to catch the debris. This should be at the corner of Long Street and Vlei Street to allow easier dispersal of the water into the reed area of Paddavlei, along the lines and proposal of the aborted storm water flow plan (Vivier 2007).

The extension of Long Street joining Vlei Street to Chapel Street is subject to flooding at times. There are very wet areas above this road and some occasional flooding does occur. This is from above this road and results from increases in the seeps along this section during the wet season. Where this extension road makes a right turn adjacent to the Rem. Erf 52, a storm water outlet as proposed in the aborted storm water plan needs to be constructed (Vivier 2007).

The main problem with this area is the rubble and other litter which have been dumped below this road into the Paddavlei. This has to be removed. Most of this area below the Long Street Extension has reed growth up to the road. This will be maintained to act as a filter of storm water from the suburban area above the road. At the Long Street Extension corner, some Port Jackson has invaded and needs to be removed. Kikuyu (*Pennisetum clandestinum*) has also invaded parts of the dry land area. A systemic herbicide can be used on this area to prevent further invasion into the vlei area. Spot spraying can also be used, with care being taken to not get drift onto the natural plants in this area.

1.2 Area between Paddavlei and Skilpadsvlei



Map 5: Paddavlei to George Viljoen Street, showing the pipeline which drains the Paddavlei through the natural barrier into the sand dune area.

There is a narrow band of wetland remaining on either side of Chapel Street Extension and between Long Street Extension and Marine Drive, which are part of the urban area. Above the North-South section of Chapel Street, damp wetland and reeds do occur and some flooding occurs. This is from above this road and results from increases in the seeps along this section during the wet season. The main problem is mostly the rubble and other litter which have been dumped on either side of Chapel Street Extension. This rubble has to be removed.



Map 6: Satellite image showing the vegetation as it was in 2010 with the original river course and the pipeline drain installed in 2008.

The pipeline which was put in to drain the Paddavlei through the sand dune, away from the natural water flow to the Skilpadsvlei, needs to be closed. This will restore the natural water flow to the Skilpadsvlei. It will provide better seepage to the Milkwood forest and restore the Paddavlei to what it was before the abortive attempt to destroy it and convert it to a

water storage reservoir (Vivier 2007). The major problem may be increased seepage, where the pipeline was dug through the dune and the relatively impervious layer below the sand was cut through to instal the pipeline. This may need some remedial action to save the Milkwoods at the bottom end of the Milkwood forest, ***which are showing signs of stress.***



Picture 5: Stressed Milkwoods versus healthy Milkwoods

The lowest point of Marine Drive in the vicinity of the pipeline is at the 8.5 and 9.0 metres contour in terms of the original land form. Immediately to the east of Marine Drive in the wetland, the contour lines are 7.0 to 7.5 metres, which is where the Paddavlei naturally drained to the Skilpadsvlei. (see Map 1: Appendix 2)

The pipeline which was to be installed against the gradient to pick up water from below the sports fields, to lead it south and then out of this drainage area is shown on Map 6.

The temporary road and drainage pipe which was installed across the wetland from Erf 53, linking through the Milkwood forest to Marine Drive in the vicinity of Erf 288, should be removed. This has deteriorated into a footpath. However, it seems to be used regularly for pedestrian access and it could be a problem to remove this. Consideration should be given to constructing a raised boardwalk in this section across the wetland, with some maintenance through the Milkwoods section to stop erosion of the sand dune.

There are patches of Milkwood along both sides of Chapel Street Extension on the way to George Viljoen Street Extension, where it was linked to Marine Drive. This is a natural flow and seepage area and in fact Chapel Street Extension just south of George Viljoen does get flooded and crosses the wetland area at an oblique angle. Extensive invasion of exotic and declared invasive species have occurred recently in this area, compounded by the draining of Paddavlei through the sand dune. In the last decade this has resulted in less water running through this area; invasive species are growing right into the wetland. The natural flow of water is to the east of the George Viljoen and Chapel Street Extension intersection.

The exotic species, mostly Port Jackson, need to be removed with appropriate follow-ups. The edge of Chapel Street Extension is at present being used to dump litter and rubble. This should be removed. Policing of dumping seems to be ineffective as some of this litter was dumped a long time ago.

Consideration needs to be given to closing the northern section of the Chapel Street Extension. This road was installed at the same time as the pipeline draining through the dune and the extension of the pipeline that was to run to the north would have followed Chapel Street Extension, which would have been excavated to instal the pipe. This extension was obviously temporary.

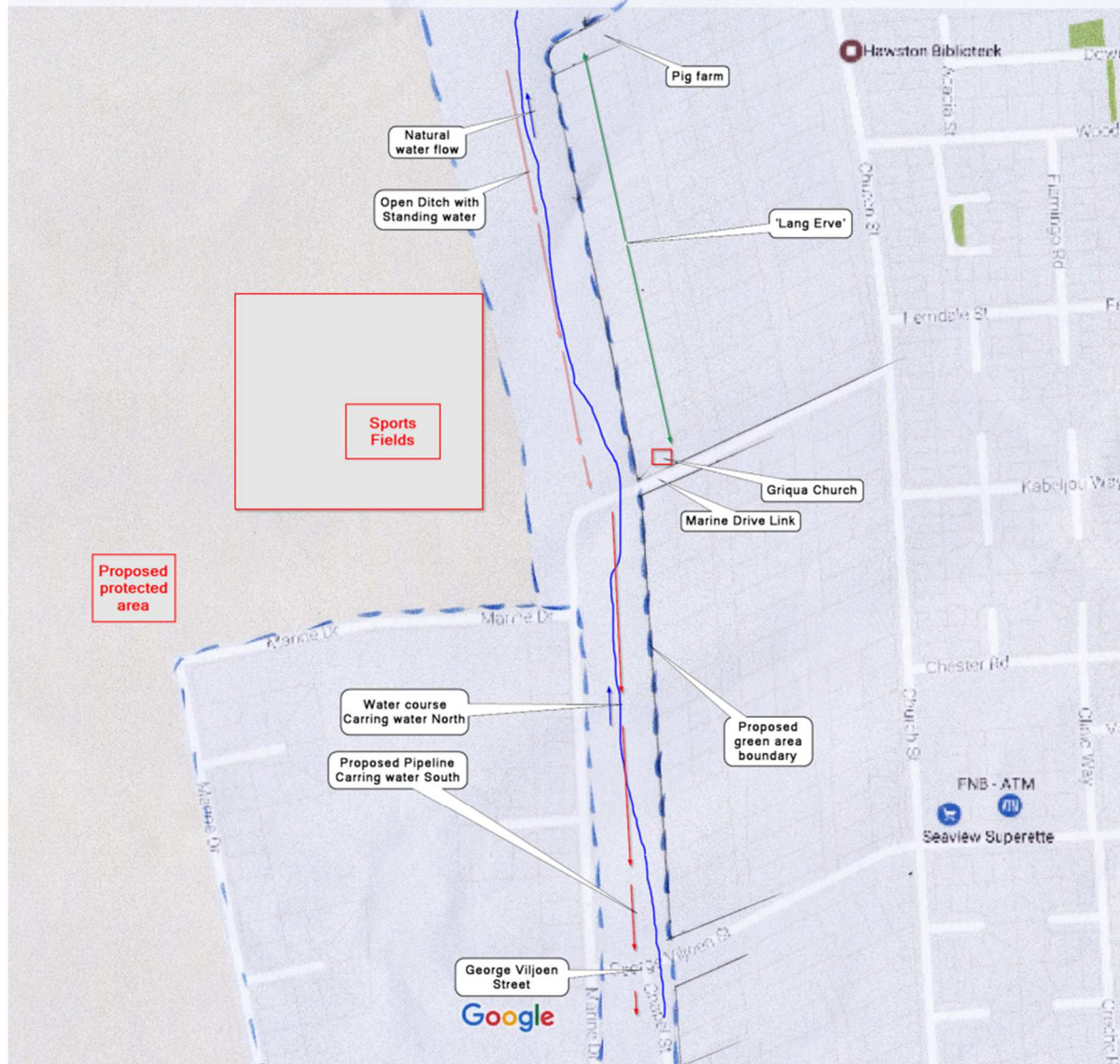
An open channel graded canal may be required in this area, with proper drainage across George Viljoen to carry storm water into the area just below it where it can resume its natural flow on the way to Skilpadsvlei. This can follow the Chapel Street Extension which has already been disturbed by building the temporary road. The design of this open channel cannot be concrete as seepage water needs to enter it from both sides all along its length.

Short sedge grasses can be planted in the wide open channel. This will allow storm water to flow easily through this section. The growth of trees or shrubs should be limited and controlled in order to keep it clear for storm water. The idea is to keep it natural-looking and seemingly part of the natural landscape: it should not be in a perfectly straight line.



Picture 6: An example of the open water channel

Also note that erven have been demarcated into a wetland and across the normal flow in some places. Some development has taken place recently on some of these erven. Some of the erven are very damp in places and have Milkwood trees growing on them. These erven appear to not have been sold and should be withdrawn as building erven and included into the new demarcated wetland/ green corridor. The Milkwoods must be preserved.



Map 7: George Viljoen Street to Marine Drive link showing the open water ditch from 2008 and the proposed pipeline

The area below the George Viljoen to Marine Drive link, where it crosses the wetland, was used in the past for agriculture. Most of this area has very large Port Jacksons and other exotic species which need to be removed. There appears to be not much damage done to this area, but it will need to be checked once the very dense invasives have been cleared. The drainage area needs to be kept clean of trees such that storm water can pass through. A number of seeps enter this area from the east.



Map 8: Satellite image showing the natural course of the river with extensive exotic tree growth with some Milkwoods

Below Marine Drive link, a deep ditch (2-2.5m deep) has been dug, blocked at the Skilpadsvlei end. This was to accumulate water from the 'Lang Erve' and seepage water from this area, and not allow it to flow to Skilpadsvlei.

This water was then able to be fed into the proposed pipeline starting at the Marine Drive link, which would drain this seepage and storm water southwards, against the natural flow, to be led out of the wetland, through the sand dune to the west. This removes the water out of the natural drainage area to be used in the adjoining drainage area. The net result was that seepage water and storm water from the northern end of the 'Lange Erve', all the

way back to just below the Paddavlei, was to be harvested from the system to be used in the proposed golf estate.

This is blocked at the pig farm end and results in storm water being accumulated in the ditch and seeping sideways, mainly to the east into the 'Lang Erwe'. The ditch still has standing water at the end of the dry summer in April.



Picture 7: Open ditch, south end 3.5m deep and north end 1.5m deep

The damming of water in the ditch has resulted in more reed growth on the 'Lang Erwe'. One of the owners of a plot, whose father used to cultivate his plot, now finds it too wet to use for vegetable production. It would appear that this area was relatively dry on the surface but had a reasonably high permanent water table. Parts of this area have extensive invasion of Port Jackson, with young trees with stem diameters of 20-30mm, standing as high as 12 metres. Obviously this is very fertile ground, with good water, capable of growing just about anything adapted to the area.



Picture 8: Large Port Jackson trees

A number of hand-dug wells were evident in this area, some dug to considerable depth, and were used for supplementary irrigation on the agricultural plots.

The earth works done here need to be filled in and the gentle run of storm water to its original flow through this area to be re-established. This will help to drain this area of excess water and re-establish the water flowing into the Skilpadsvlei. The damage done to the sub-surface flow of water may never fully recover, but it is hoped that this will start functioning in the same way that it used to with time. It will have to be monitored and maybe future adjustments will need to be made. The blocking of the normal flow needs to be investigated once the area is cleared, to be sure that it will not continue to hinder both storm water flow and seepage flow.

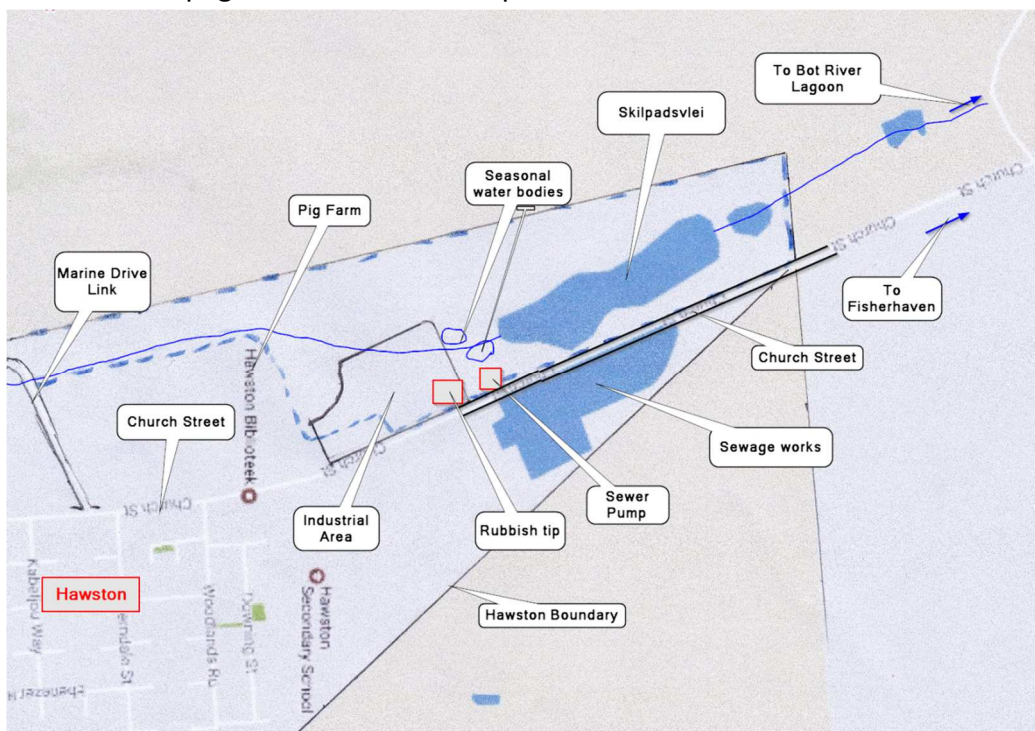
Once the normal flow of water through this area has been re-established, the owners of these agricultural plots will be encouraged to re-establish agricultural production in this area.



Picture 9: Griqua Church

The old Griqua church below George Viljoen was built on dry ground but had lots of sub surface water: essentially a wetland without surface water. Storm water had not caused damage in the past. However, the work done on George Viljoen and the earth works done in 2007 have increased the risks of water damage. This is a national monument and any work done in the area needs to protect this church.

The area between the Paddavlei and Skilpadsvlei will be cleared of invading exotics and the existing Milkwood stands should thrive on the re-established adjacent wetland with additional seepage water and the competition from the exotics removed.



Map 9: Marine Drive link to Skilpadsvlei showing the river course, sewage works and industrial area

Off to the lower end of Church Street, an industrial area has been demarcated into the wetland area. This should be removed, both because of the environmental issue but because it is not easily accessible and there is an area close to the R43 for this purpose. Below this area are a rubbish tip and a sewer pump which pumps sewage from the sewer truck across the road to the sewage works. Both of these should be moved to the east side of the road at least. Run-off and leaks from these facilities run directly into the wetland area of Skilpadsvlei.

The sewage farm facility feeds water across the road directly into the wetland area of Skilpadsvlei. This is not always clean water, and it has a high nutrient load. (Note the prolific growth of the reeds in the wetland area of Skilpadsvlei.)

It should be rather released north from the sewage farm, preferably spread over a relatively large area which could be growing some crop of value, where the soil/sand could further reduce the nutrient load before it seeps back into the natural drainage area below the Skilpadsvlei where it will get further cleaned before finally entering the Bot River Lagoon.



Massive growth reeds



Sewer from Wetland side



Rubbish tip site pushed into wetland

Algae growth on water entering Skilpadsvlei

Picture10: Reeds, sewer dump, rubbish tip site and water entering Skilpadsvlei

1.1 Skilpadsvlei to the Bot River Lagoon

Immediately below the Skilpadsvlei is a large flat area with extensive reed growth and below that there is a narrow water channel with a few reeds confined to where the water flowed in the past. A few small patches of water are present in some of the older images. There is no evidence of seeps in this area. It appears that what water enters this area flows straight through to the Bot River Lagoon or seeps into the river bed feeding the lagoon underground.

The road just before Fisherhaven leads to an old dump site bordering on the Bot River Lagoon. This is a very poor area for any sort of dumping as waste can very easily enter the Bot River Lagoon directly. At the time of the Fisherhaven festival in 2017, the toilets on the way to the festival were observed dumping sewage at the site. Other toxins were observed on the site and the general public and OSM were still dumping materials on the site. The picture shows pollution in the inlet to the site which is more than the normal growth of algae from receding water levels in the Bot River Lagoon.



Picture 11: Close up and general view of pollution from the dump site



Picture 12: The inlet near the dump site and north of the inlet showing very little algae grow

It appears this dump site is been discontinued and some cleaning has occurred. However, the site has to be properly cleaned and the road has to be closed to avoid further pollution of the lagoon. The road has to be dismantled and the Fynbos be allowed to return to the road area, especially because of its very close proximity to the lagoon. It is suggested that this has to be done under the guidance of Cape Nature.



Map 10: Satellite image of the wetland area.

1.2 General recommendations to the whole area

The whole area of the Paddavlei and its surrounds up to the suburban edge and the wetland area between Paddavlei and the Skilpadsvlei, including the Skilpadsvlei and its surrounds and the wetland area from Skilpadsvlei to the entry into the Bot River Lagoon, should be declared a green belt area with the protection status this will give this area (see Map 4, 5, 7 and 9). There are some invader plants in this area, but not many. Obviously all exotic invader species need to be correctly removed and maintenance clearing needs to be carried out for the future.

The reeds which are so prolific in the urban plots around the Paddavlei need to be removed. These do occur on wetland areas which should be included into the Paddavlei surrounds and the area should probably never have been divided into building erven. However these cannot be reasonably reversed. The removal of these reeds will increase the water flow and seepage into the wetland area. Attention can be given to simple, cost effective drainage from these plots across the road, bordering the true wetland area.

1.3 Open water bodies and their surrounding reeds

The reeds, both bulrushes *Typha capensis* and *Phragmites australis*, are indigenous to the area and serve many good purposes. However, for various reasons, there has been a

massive expansion of the reeds and a great reduction in the amount of open water within the area in just the last 10 years. The system has become unbalanced, with a huge loss in bird numbers as well as a variety of other species such as fish, frogs, beetles, etc.

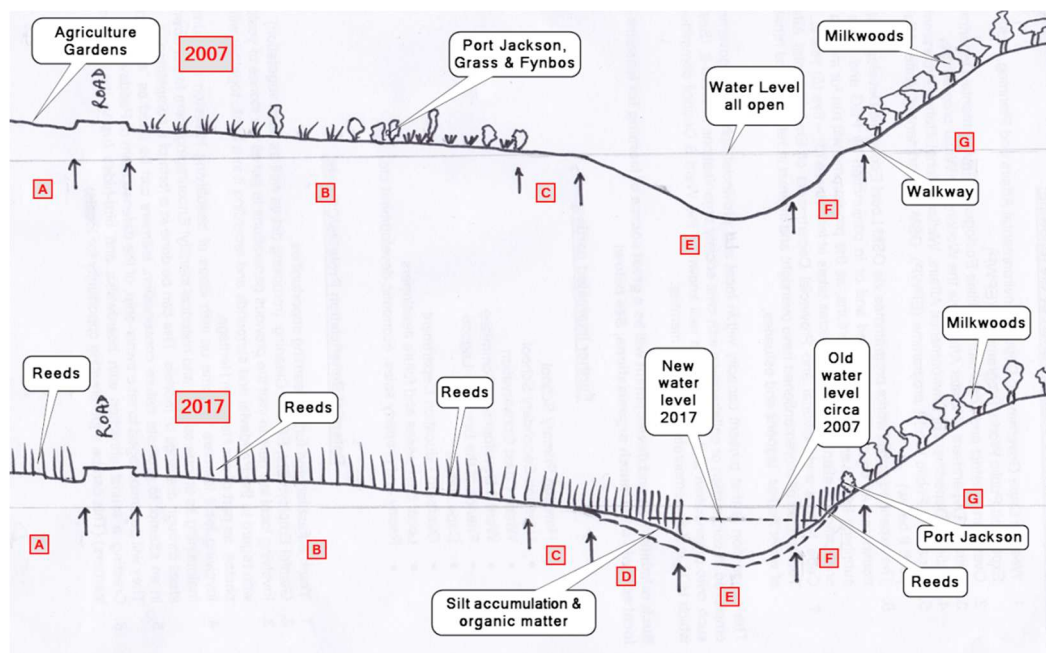
The main reasons for the expansion of reeds are:

- a) pollution in various forms and
- b) the impact of humans on the wetlands themselves and in the surrounding areas.

Our management practices have reduced the flow of water, caused more silting up of traditional open water areas and of the huge extra load of decomposing organic matter from the reeds. This causes changes to the water body, leading to more pollution. The reeds advance further into the open water, compounding the problem.

We need therefore, to return the extent of the reeds to their former areas, or at least to what they were 10-15 years ago. This can be done by:

- increasing the water flow into these wetlands primarily by removing invasive exotic species initially in the primary watershed areas and eventually within the whole catchment area.
- reducing the pollution from built-up areas with changes in these areas, and conducting necessary simple engineering works to reduce or eliminate glass, plastics and other pollutants.
- removing building rubble and waste dumped into the wetlands, and by not adding more pollutants, especially sewage.
- leaving some reeds to act as barriers and filters, to consume pollutants in the water such as phosphate and nitrogen
- possibly deepening the water, especially near the banks of open water to hinder the further invasion of reeds.



Legend Figure 1 and 2

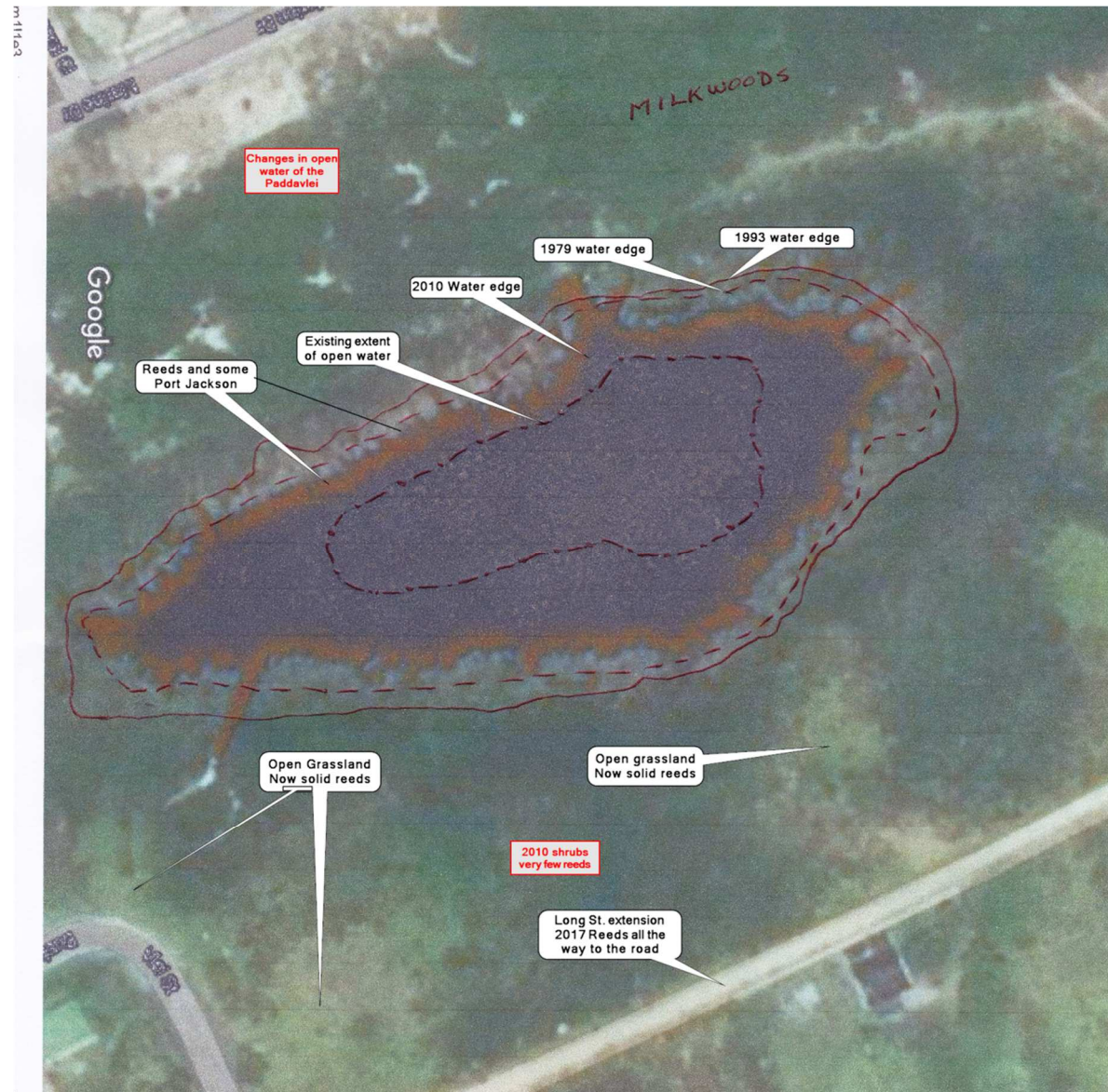
| area | date | description | remediation |
|------|------|--|--|
| A | 2017 | reeds or buildings on private land | cut and drain to below road |
| | 2007 | buildings and agriculture on private land | |
| B | 2017 | dense reed growth | cut and remove; roots left in place to re-grow |
| | 2007 | open grassland in patches with sparse Port Jackson and some Fynbos | |
| C | 2017 | dense reed growth; excessive organic matter | remove reeds including roots to re-establish beach area; digger-loader and hand clearing |
| | 2007 | open sandy area | |
| D | 2017 | dense reed growth; excessive organic matter & silt accumulation | dredge reeds with roots and silt |
| | 2007 | open water | |
| E | 2017 | reduced open water | |
| | 2007 | open water | |
| F | 2017 | reeds | remove altogether using dredger and by hand; maybe instal boardwalk |
| | 2007 | open water; easy access on foot | |
| G | 2017 | milkwoods stressed | do not disturb |
| | 2007 | milkwoods | |

Figure 1 & 2: Profile of Paddavlei 2007 and 2017.

The Paddavlei open water body needs to be expanded to where it was 15 years ago. Up to 2010, the open water body changed very little from as far back as 1938. There were some drier years when it was reduced slightly, (Map 11) 1979 slightly less open water than 1993. The open water was surrounded by sandy almost beachy areas. The surrounding area had some reeds with scattered trees, primarily Port Jackson, and many grassy areas used to graze livestock. The 2010 satellite image shows a slightly reduced water area with open access to the water from the west and even from the east side. A pathway along the west side gave access for water activities directly to deeper water in the Paddavlei. Now the reeds have covered most of the grassy areas and are virtually impassable to get to open water.

Around the open water the reeds (mainly bulrushes *Typha capensis*) have invaded into the shallow water to a very large extent on all sides and between the 1979 open water section and the present extent the reeds are growing in open water almost impossible to wade through. There are very few signs of any animals or birds and within the shallow water is a large volume of rotting vegetation, mostly reeds from previous years. This is adding large amounts of nutrients to the water which causes more vigorous growth of reeds further into

the water, compounding the problem of reed invasion. Within a year or two, at the present rate of invasion, there could be no open water left.



Map 11: The Paddavlei open water 2010 extent with the 1979 and 1993 water edge and the present extent of the open water, now surrounded by reeds

It is proposed that the area be dredged to re-establish this open water body. This will remove the reeds with their roots and remove accumulated silt without damaging the underlying saturated partly-sealed subsurface which will maintain the open water body and still provide seepage, particularly to the Milkwoods on the western bank and to the Milkwoods between Paddavlei and Skilpadsvlei. On the western side of the re-established open water body, the reeds will be removed entirely so that they do not readily re-invade the water body. This provides a cleaner link between the sand dune and the open water body directly into deeper water (which was the case before). This also provides a slightly different sub-environment on the west bank of Paddavlei with a different species mix leading to a healthier ecosystem.

On the north, east and southern side, the reeds will be retained to act as filters and to buffer the re-established open water body. They will provide habitat for fish, birds, frogs and all the other species which exist in the interface between an open water body and its immediate surrounds in a natural system with a different species mix to the west bank. An area of approximately 2 to 3 metres of reeds will be removed around the re-established full water level (Fig. 2) to re-create the open beach area. This will assist in controlling the reeds and will also assist in handling storm water flow when it rains. It will also provide very shallow water or almost dry land for birds which will feel protected from disturbance by predators and humans by the buffering reeds which have been left in place. In future years reeds will need to be kept in check and it is a good idea to harvest the reeds for a few years at least to remove accumulated nutrients. This must be done when the bird species are not breeding. With increased clean water input from the main catchment, water will be moving through the Paddavlei carrying nutrients out of the open water leading to less control efforts. In time Paddavlei will revert to a stable water body as it was before with very little control needed.

The Skilpadsvlei open water body has been substantially reduced, especially in the last 7 years. With the increased normal water flow, much of the invaded reeds will tend to be drowned, adding a huge nutrient load of rotting vegetation which will be detrimental to the open water body. The reeds which have invaded into the traditional open water body area will be removed, re-opening the Skilpadsvlei to what it was 15 years ago, surrounded by reeds on all sides. Some Milkwoods can be re-established on the higher ground around Skilpadsvlei above the normal flood area.



Map 12: Skilpadsvlei 1938 showing smaller main water body and large area to the north which had no reeds and would have experienced periodic flooding



Map 13: Skilpadsvlei 1961 showing vastly extended water area to the north of the main body



Map 14: Skilpadsvlei 1993 with main water body adjacent to the sewage farm and open water both north and south of the main body

The extent of the open water in the Skilpadsvlei has varied tremendously over the years: there were times (1938, 1961) when it was four times bigger than it is now. That was before the sewage works were built. It also varies much more than the Paddavlei, depending on the time of year. A large area below the main Skilpadsvlei now consists of solid reed growth with no open water. It used to have no reed growth and would have periodic water with a dry pan in the dry season; it hosted many wading birds when it was flooded. Unlike the Paddavlei, this area is relatively dry, without continuous water flowing through it. When it was flooded, it was shallow and dried out after a few months. An initial control of these reeds is needed by herbicide and hacking to re-establish an open area with periodic flooding.

After clearing, the enlarged open water bodies of both the Paddavlei and Skilpadsvlei will be filled with the first reasonable winter rains. However, the continued maintenance of these bodies will rely on re-establishing the infiltration of water into the greater catchment area of the system. This will re-establish a regular flow into the Paddavlei during the dry season and will increase the water from the numerous seeps which occur throughout this area. Some of these seeps have been blocked, which usually means this underground water will simply come out somewhere else. Mostly though, all the seeps have substantially reduced, according to all discussions which we have had with the established residents of Hawston. Many were used as water sources in the past within Hawston, for bathing or washing purposes.

The large reduction of water into the Paddavlei and the reduction in the volume of water from the seeps has been the result of the massive invasion of exotic species in the greater

catchment area and the large spreading of reeds throughout the wetland areas, especially into the open water bodies.

2 The urban area

The urban area of Hawston is in very close proximity to the wetland areas. In fact, many of the declared erven extend into the wetland. In general, very little attention has been paid to the importance of the wetland. Some suggestions about changes to some of the erven have been recommended. This may be difficult to do and sensitive negotiations will need to take place. The co-operation of Hawston residents is vital to the success of this project.

A big factor in our favour with this project is that the initiative came from within Hawston itself; it presently has the support of most of the leaders within Hawston. Some very visible changes which will occur early in the project should extend this support and PEG has proposed a number of options to both involve Hawstoners in the project and for them to see early direct benefits from the project.

These include:

- workers will be recruited from Hawston as far as possible
- PEG members are volunteering to start as soon as direction has been provided
- a youth wing group has volunteered to become 'Eco Warriors' to help police the initiative.
- training will be provided to Hawstoners and, with successful implementation of this project, can be used in other areas
- part of the project is to generate funds for Hawston students to study in environmental subjects
- school projects will be initiated, and commitments have already been made to do workshops and talks on aspects of the project.

Primarily, we need all members of the community to reduce the pollution entering the wetland. Some of this is by utilising engineered structures to stop plastics, bottles, etc from washing into the wetland as proposed above. Access roads are to remain, except for the northern Chapel Street Extension. A walkway is proposed across the wetland, which will provide a viewing spot. Luckily there does not appear to be much in the way of chemicals entering the system but this should be policed. The chemicals enter the system with the sewage, both because of a poor design and from leaks. The leak problems needs to be attended to by the local council, with normal maintenance. The design problems should be solved by the upgrade, which is planned. However, a temporary solution has to be urgently made before more damage is done to the wetland.

From an environmental point of view the narrow area of remaining wetland both above and below George Viljoen poses a problem. The urban edge extends into the wetland in many places and a very narrow area is left for storm water disposal. The proposed gently sloping, open channel will work if it is not interfered with, and maintained to carry both seepage water and storm water to the Skilpadsvlei.

The proposed extensions to Hawston will have EIAs done by town planning and particular attention has to be paid to how this affects this wetland water-course.

Although the area from the sea to the western edge of the Paddavlei/Skilpadsvlei falls outside the drainage area of the Skilpadsvlei, it is recommended that all this area, excluding the built up areas of Hawston and Meerenbosch, be declared a protection zone. This is particularly important in view of the sensitive nature of this area and the RAMSAR declaration (see Map 9).

Even the proposed extension of Hawston above the R43 needs to take into account the water feeding the numerous seeps in this area, particularly as much of this water is absorbed into the ground at the base of the steep mountain slopes.

3 The greater catchment areas of the Paddavlei Skilpadsvlei wetland system

1.1 Introduction to the Paddavlei Skilpadsvlei catchment area

The primary objective in the greater catchment area is to promote a healthy, well-covered environment to promote infiltration of water to feed the numerous seeps which occur in the area. This will supply more permanent water into the Paddavlei Skilpadsvlei wetland system. This will also reduce storm water volumes. The wetland is suffering from a much-reduced amount of water entering into it. In order to successfully rehabilitate the wetland, one will have to look at the whole ecosystem (water catchment area) or else efforts are not likely to succeed.

1.1.1 General Background

The Hawston/ Fisherhaven area falls within the Fynbos biome which consists of a) Rhenosterveld and b) Fynbos veld, as per the original Acocks classification (Acocks 1988).

- a) The original definition of the Rhenosterveld was where the **Rhenoster bush** tended to dominate the species mix. The Rhenoster bush occurs where there is generally higher fertility, with more of a grass component in the mix than in Fynbos. The Rhenosterveld supported a large game component with its higher grass component. Many of the same plant species occur in both Rhenosterveld and Fynbos, with changes in the dominant species

in different locations. The Rhenoster bush tends to take over where areas have become degraded from farming practices, primarily from overgrazing from the early Koi San settlers. Estimates are that 80-90% of the original Rhenosterveld has been destroyed, by ploughing to grow wheat and other crops because of its higher fertility, by the early farm settlers.

- b) The **Fynbos** areas have been subdivided into various categories, depending mainly on composition changes of species which primarily occur because of different soil types, rainfall, slope and frequency of fire. This leads to over 60 types of sub-classifications of Fynbos. This is based on structural adaptations of the more than 8000 species which occur in the Fynbos biome. It is very difficult to distinguish and separate these on a map. In the short term, the frequency of fires can also have a major impact on defining the vegetation structure and species composition. The Fynbos generally has:
- a restionaceae component, i.e. the Cape reed family of sedges and many grasses,
 - an ericoid or heath component and,
 - a proteoid component.

There are very few animals in Fynbos because the high carbon to nitrogen ratio of most plant species precludes browsing by animals. A few animals, such as ants burying seeds of some plant species, do play a role in seed distribution, but a minor role in vegetation structure and composition.

Fire plays a major role and, with infrequent fires in some areas, it can lead to senescent forest (forests dying off) or thicket invasions developing.

Fynbos has very low productivity, due mainly to infertile soils, and was little utilised for agriculture. Now, of course, the fertility problems have been overcome with high fertilisation and much of the Fynbos area has changed to fruit and vine production in the better rainfall areas, especially with the advent of irrigation.

The major uses of Fynbos are for recreation, water catchment and exotic plantations with a small but growing component for cut flowers. The main problems are alien encroachment, urbanisation and wild fires. There are over 8 000 plant species in the Fynbos versus only about 1 400 species in the whole of Britain. **We need to conserve the vast amount of genetic material for future cultivar selections.**

1.1.2 The Hawston / Fisherhaven environment

The Fynbos, which traditionally covered the whole Hawston/Fisherhaven area, consists of well-leached, infertile soils in which fire has played a prominent role in the past. There has been major alien encroachment, primarily Port Jackson within this area and Rhenoster bush often dominates disturbed areas such as roadsides.

The exotic invasive species generally out-compete the indigenous species except where there is a healthy growth of indigenous species which are well-adapted to the low phosphorous, dry, sandy environment. The Port Jackson exploits open spaces caused by humans, such as overgrazing, other poor management practices and mechanical removal, by naturally open spaces made by rats, fire, etc. or by natural die-off of indigenous species. **Our objective is to balance this plant competition more in favour of the indigenous species and allow them to dominate the area.** Where such domination occurs, the seed bank of exotics naturally deteriorates over time and so become less of a problem; as a result the area is easier to maintain.

Occasional fire is a natural force in the area – there is still some debate as to how often it should be used. In fact, some species require fire for the seeds to germinate; some can coppice (grow from the base) or recover quickly from a burn; others are induced to germinate from the smoke: these are mostly succulents. The best approach is to utilise fire at the start of the wet season, preferably with damp soil. The idea is to use a cooler fire. There is evidence that a hotter fire, which results from burning when conditions are dry, is more effective in promoting a wider range of Fynbos species and that the continued use of cooler fires leads to a different mix of species than was traditionally present (Hall et al., 2017, Blanchard et al 2008, Deacon et al 1992).

1.1.3 Port Jackson

The exotics such as Port Jackson add additional fire load to the area when they are growing and are full of flammable oils. As soon as they are cut down, they reduce the fire load considerably; once cut down, they lose their leaves in a few days and the fire load is further reduced (as much as 75%). The dead exotics and indigenous vegetation do not add so much to the fire load as such, but do increase the heat of the fire (which is not necessarily bad for a burn).

When Port Jackson grow in this poor environment, they absorb a considerable amount of the scarce nutrients available in the soil; **if the dead trees are removed, the nutrients still in the trees are removed, therefore impoverishing the poor environment further.** The removal of dead Fynbos and the bulk removal of Buffalo grass does decrease the fire heat and fire load and makes the area look prettier. However, this impoverishes the poor environment and removes soil protection. The debris from the chopped down exotics limits wind erosion and the debris and organic matter resulting from it provides a micro environment which is more suitable for seed germination. Any seed on the chopped down exotics should be removed and preferably burnt.

While some nitrogen is utilised in the decomposition of the Port Jackson, most remains behind – the organic matter in the Port Jackson adds nutrients to the soil. In addition, this process increases the water-holding capacity of sandy soil, critical in a low rainfall area. The Port Jackson's root system is large and vigorous and penetrates well into the hard sub-soil. When the tree is cut off and poisoned, the roots provide channels for water penetration and also release nutrients deeper into the soil profile – all good for other plants to grow. There is much evidence to suggest using trees to help rehabilitate a spoilt environment, especially where nutrients exist in the subsoil, or have been buried there by soil movement. **It is not suggested that we plant Port Jackson, but rather that we use the fact that they have invaded to our advantage as much as we can when we remove them.** Studies have been done in the Rhenosterveld and Fynbos veld which show that a surprisingly high percentage of the nutrients in the burnt vegetation are returned to the soil after a fire (Esler et al., 2010, Forsyth et al, 2008). Nitrogen in the burnt material volatilises and is lost to the air.

1.1.4 Nitrogen cycle in Fynbos

Very few studies have been done on the nitrogen cycle in Fynbos. It is generally accepted that increasing the nitrogen cycle leads to better plant growth. The invasive leguminous species such as Port Jackson (*Acacia saligna*) and *Acacia cyclops* (Rooikrans) do lead to increases in nitrogen in the soil profile primarily due to litter drop. These are long term effects.

There is some evidence which suggests that an increase in the nitrogen cycle inhibits the germination and of Fynbos seedlings. These effects were measured mainly in long term invaded areas 20-25 years of dense stands of invaded *Acacia* species. Soil type also has an effect and some studies have not indicated a significant difference, the studies which showed a significant effect on Fynbos germination were conducted on acid sand plain lowland Fynbos (Krug et al, 2010; Ruwanza et al, 2012).

The grass component, both indigenous and invasive grass, will respond to increased levels of nitrogen and the other increased nutrients in the soil after a burn.

The burning of such densely invaded areas volatilises the nitrogen component to a large degree and there may be some merit in a repeated burn in very densely-invaded areas. The idea is that the young plants have taken up considerable nitrogen which can then be volatilised by a repeated burn. The problem is that there is a reduced seed bank of Fynbos in these areas and what few Fynbos plants that do germinate after the first burn, have not been allowed to seed themselves. The second fire may do more damage than good.

Much of the dense stands of Acacia in the Hawston/ Fisherhaven area are relatively recent , so the nitrogen cycle may not have increased enough to have a significant effect on Fynbos germination and the main problem is probably a reduced seed bank of Fynbos in these areas. Re-establishment of Fynbos will be longer term in the very densely- invaded areas and may require some help with introducing seed back into these areas after initial clearing of invasive species.

Generally the grasses which grow after clearing at least cover the area, especially those that are prone to wind erosion with the extremely sandy soils. Proper follow-up clearing is required and areas need to be monitored and the management adjusted, if necessary, in certain sections of the general area.

Therefore ...

- a) In terms of the law, invasive species need to be removed.
- b) The objective of removing invasive species in the Fynbos is to create a mixed species environment which is much more stable and as close as possible to the original, historical species mix.
- c) Management practices need to promote species diversity, biological diversity and finally ecosystem diversity.
- d) Management practices should also make the indigenous Fynbos areas aesthetically pleasing.
- e) A mixed indigenous species area will be much more stable, and provide more services to the community. This is particularly relevant when we consider the estuary environment, hugely affected by what happens on its borders and throughout the catchment area of the estuary.
- f) The amount of water extracted from the environment by the invasive species is so much more than the indigenous species: of the order of 3-12 times as much. The clearing of exotics will promote more infiltration into the soil and substantially increase the clean fresh water in the numerous seeps throughout this area.

1.1.5 Dealing with exotics

There exist many reports dating back to the 1980s (Koop 1982) which essentially call for the same solutions over and over again. However, over the years, the infestation of exotics has simply become worse. In limited areas, for short time periods, some areas have been cleared. With limited follow-ups and misguided operations, there is now a vastly bigger problem of invasive species. A great deal of the indigenous seed bank and many of the species which occurred throughout the area have been lost. Much scientific data is available on control measures, effects of fire, increases or decreases of water (both surface and underground), etc. (van Wilgen 2009; Holmes et al 1999; van Wilgen 1985; van Wilgen 2010; van Wilgen et al., 2016; van Wilgen et al., 2014).

The gist of all this information is that invasive exotics need to be cleared, and management should try to recover the large number of indigenous species in a well-balanced mix which leads to a more stable environment. This will deliver numerous benefits in the whole ecosystem, especially the increased underground water, leading to increased water of the rivers within this ecosystem.

Using fire as a tool in clearing very dense stands of exotics is a quick and environmentally useful tool. It produces quick results and with proper follow-up can start the process of rehabilitating the environment before it reaches a tipping point. Many areas have been protected from fire, but not protected from invasive species. Where some invasion has occurred, with a build up of the invasive seed bank and then gets burnt by a fire the invasive species germinate very densely. With no follow up clearing they dominate the environment and may canopy over resulting in the indigenous vegetation being shaded out and extremely dense stands of exotics occurring. A controlled fire in these areas is economically sound especially when the damage to infrastructure and the control of wild fires is considered. The fire load in severely invaded areas is increased massively. Many calls have been made in recent years to hold owners, of land severely invaded areas, responsible for massive damage to other areas, when fires inevitably burn through their land. Fire is a natural element of the environment in Fynbos.

How recent the fire was before it can be repeated is an extremely debatable point:

- The literature is full of different recommendations varying from 8 to 25 years. Most of these recommendations assume a reasonable mixture of invasive species and Fynbos. Much of the literature assumes very little presence of invasive species and considers only the ideal cycle of fire for the Fynbos component.
- Where the re-growth after a fire is very dense and has allowed the invasive species to canopy over, the invasive species are shading out any Fynbos that was growing causing more damage to the area.
- There are problems of trying to deal with fire in small areas and fire may spread to less invaded areas, therefore the size of the area becomes a factor.
- The promotion of germination of the invasive species by fire may become an overriding factor as long as proper follow-up clearing is in place.
- The different reactions of the different invasive species to a fire, is also a factor.
- The risk of losing control of an instigated fire is obviously a factor. This is also very dependent on the location and the immediate surrounding area in terms of other recent fires and infrastructure.
- The continuous build up of risk because of the yearly increase in fire load also becomes a factor, which may override most other factors.
- Waiting for an inevitable wild fire to solve the problem is both extremely risky and is also against the law. Waiting for funds to do manual clearing is not an alternative. This may take years and the problems have arisen because nothing has been done for years.

- The lack of responsibility of instigating a fire has to be weighed against the lack of responsibility of not instigating a fire.
- When a wild fire starts in an area and spreads into extremely invaded areas it makes sense to back fire these areas and allow them to burn out. The use of a back fire is an extremely useful tool in controlling a wild fire.

These areas need to be treated differently. If an area has such dense stands (say 90% or more invasive species), with more than six years since the last fire, it should be burnt where weather conditions are conducive to low risk, as opposed to waiting for the inevitable wildfire where the risks have massively increased.

The aim should be for the **original mix of species**, adapted to an environment developed over thousands of years, before the advent of large numbers of humans destroying and unbalancing the environment. This aim will probably be never quite achieved, because of the impact of humans on the environment. Further destruction cannot continue and needs to be halted. If we do not do this, we will no longer be able to exploit the resources, albeit limited, which this environment can provide. As stated in the introduction, timing has become critical for the urgent implementation of a plan of action.

1.2 Plan of action within the Hawston/Fisherhaven Fynbos area

Within the Hawston/Fisherhaven area, which includes the catchment area from Hoek van die Berg, along the mountain tops half way to the Afdaks River and includes the Bot River Estuary, we need to divide the area into management areas. These include severely infested areas, partly-infested areas and waterlogged or wetland areas. Management proposals have to differ for each of these areas.

3.2.1 Very dense areas of invasive species



Primarily Port Jackson with Gum trees in the background Port Jackson, Myrtle and some pine
 Picture 13: Very densely invaded areas

One tool that we can use is fire for extremely dense stands of invaders, primarily Port Jackson, Myrtle and Pine. These dense areas are, in any case, extreme fire hazard areas. Immediate results of a burn are apparent: destruction of invasive species seeds, increases

in water and removal of the invasives to give the indigenous species some chance of growing in the area. After the fire we can much more easily control the re-growth of exotics since there will be better access and a much smaller volume of vegetation to deal with. After a fire in these dense stands, huge numbers of the exotic seeds will germinate in the bare areas, especially Port Jackson. Within a small patch, say 25 x 25 mm as many as 50 Port Jackson seeds will germinate, they then compete with each other and only 2 or 3 may grow to 50cm high, these are easy to pull out. The seed bank in the soil is therefore been rapidly reduced. This does need follow-up within months of a fire, rather than letting it all get away again. Fire also promotes the germination of the exotic invaders, much easier to deal with when they are still small. This will lead to significant reduction of the exotic seed bank over time; after seven or eight years the exotic seed bank will have been greatly reduced.

Continued invasion from seeds brought in from the surrounds are then the main problem.

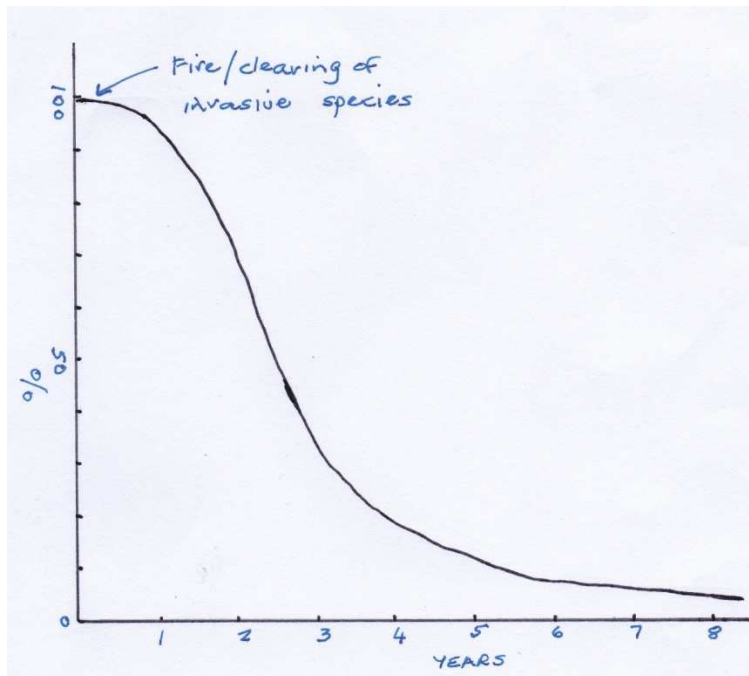


Figure 3: Reduction of seeds of a species in the soil profile over time, assuming no further input from nearby.

3.2.2 Invaded areas



Picture 14: Less densely invaded areas

Management needs to remove the invasive species, preferably using pullers to remove the roots. Stumps should be cut and treated with poison immediately, with some ring barking which assists the effectiveness of the poison. We need, however, to limit the use of poisons as much as possible, especially because of their long residual effects.

Recently burnt areas are included in this category. These areas may have very dense growth of invasive species but:

- they have young growth which is relatively easily removed and
- another fire through these areas will be detrimental to the Fynbos component

Where a single indigenous species such as the buffalo grass has taken over large areas, we can spot-poison it with a systemic herbicide which will sway the balance in favour of other species and return this area to a mixture of species which is much more stable and aesthetically more pleasing.

3.2.3 Cleared areas

Follow-up clearing, initially at least every year, is extremely important, especially after fire where a large germination takes place of the invasive species. There is a massive seed bank of invasive species and it takes time for the indigenous species to re-establish themselves, grow to maturity, seed themselves and build up a good competitive cover. If the invasive species are not allowed to seed themselves the balance gets swayed more and more in favour of the indigenous species.



Picture 15: Good stand of Fynbos

Fires, which will probably occur more often than desired in this area, will be much less expensive to control and will cause much less damage to infrastructure. Control burns will be required in some areas to both maintain healthy Fynbos and a wide range of species. These can also be strategic to help reduce the spread of wild fires throughout the area.

3.3 Management zones of the Paddavlei catchment area

The area has being divided into four main management zones with different strategies applied within each management zone.



Map 15: The different management zones of the catchment area within the system

3.3.1 South of Paddavlei

The area south of Paddavlei has mostly been very badly invaded by Port Jackson (*Acacia saligna*), Rooikrans (*Acacia cyclops*, limited in this area), Australian Myrtle (*Leptospermum laevigatum*) and Gum Trees (*Eucalyptus spp.*).

Fire should be used as a tool to remove most of the huge volume of exotic invaders in this area. Since it has been so severely invaded and much of it is covered with tall, dense stands of exotic species which have not had a fire through the area for many years, there exists an extremely high fire load. This poses a severe threat of extremely high damage to infrastructure. It is inevitable that a wild fire will go through this area in the near future and will probably occur when conditions are extreme: very dry and with high winds. The area is large and it is so expensive to clear by hand, and with limited funds available this has not

been an option. This is a classic case of doing nothing because the problem became too big, which then compounds the problem. The fire load is continuing to increase every year, making it more difficult to sort out. We cannot afford to wait for a wild fire to solve the problem. It is imperative that we burn out this area under conditions of our choosing, as soon as possible.



Picture 16: South of the Paddavlei, tall dense stands of Port Jackson with some Gums and Myrtle, mostly a closed canopy of invasive species (Area C10 on map 15).

A controlled fire will eliminate the extreme fire load and considerably reduce the risk of extreme damage to infrastructure. Secondly it will benefit the environment almost immediately. Proper follow-up after the fire will not allow such a huge fire load to build up again and will start the rehabilitation of this environment with all its benefits. Almost immediately the infiltration of water into this relatively flat area will start supplying the Paddavlei with much needed running water during the dry summer months. Many of the seeps in Hawston will get re-established or increased which will speed the rehabilitation of the wetland system.

Speaking to the established residents of Hawston, it seems a good flow of water was experienced under the Harbour Road and into the Paddavlei.

The immediate catchment area above the R43 supplies water to the catchment area below the R43. This area is flat and deep sands and maximum absorption occurs from rain. The densely invaded area is using all this water at present. With the removal of the exotics, which use much more water than indigenous Fynbos, much more water from this area will be available. A conservative calculation showed that, on average during the dry months, there would be an additional 500 litres per minute flowing into the Paddavlei: enough water

to fill a 300mm pipe with only 0.1m/sec flow rate. Some of this would move through as seepage water but would end up in the Paddavlei.

A study and proposals for Hoek van die Berg area has been put together. This includes a large area that drains into the Paddavlei (Kruger M 2015). This includes removal of the invasive species from most of the immediate catchment area of Paddavlei. However, the catchment area of the Paddavlei is probably the lowest priority area for them. We will do some of the clearing of exotics within this area and promote the re-establishment of Fynbos. In addition a sewage works has been proposed in this area but will be situated right on the edge of the Paddavlei drainage area and will have minimal negative effect on the Paddavlei but will provide additional water into the Paddavlei drainage area. The amount of water which would then drain into the Paddavlei is difficult to estimate but should re-establish a reasonable flow throughout the year into the Paddavlei.

The area above the R43 is not severely invaded by exotics but needs to be also cleared of invasive species to increase seepage into the sandy lower lying area below the R43 which will increase seepage towards the Paddavlei.



Map 16: Hoek van die Berg showing area C10 and adjacent areas on either side that drain into the Paddavlei (Kruger, 2015).

3.3.2 West of Paddavlei and Skilpadsvlei

Most of the area from Hawston harbour, west of the Paddavlei, down to the Bot River Lagoon drains to the sea and is not in the catchment area of the Paddavlei Skilpadsvlei system. However, this area consists of very little cover on what were until recently moving sand dunes and is subject to severe wind erosion which could have a large effect on the Paddavlei Skilpadsvlei system. A recent fire has burnt most of this area. Therefore this area will also be cleared of exotics and the Fynbos promoted to stabilise this area to control erosion into the Paddavlei Skilpadsvlei system, especially those areas which do drain into the system immediately to the west of the Paddavlei Skilpadsvlei wetland.

This area is extremely sandy and very prone to wind erosion. A very large amount of invasive species and severe reed growth is to be removed from Paddavlei which is close to this area. Since transport cost are so high, for this bulky material, it is proposed that the removed material be spread over the large bare areas within this area, rather than carted to the Karwyderskraal composting facility. Since vehicle traffic in this area will do more harm than good in the loose sands of this area, it is proposed to distribute it by hand, especially in the areas close to the Paddavlei system.

For ease of transport the material should be chipped or shredded and spread out to dry, to reduce the weight. This partly composted material can be then moved closer to where we need it and then further distributed by hand.

The advantages and potential problems of this proposal are

- reed material will not grow in the dry environment of the sand dunes
- we need to avoid the seeds of the invasive species material, not too difficult to do
- we are adding a mulch layer to the sand
- the mulch contains many nutrients for this extremely low nutrient environment
- we are providing a better seed bed for existing seeds to germinate
- we are adding organic matter which will increase the water holding capacity of the top soil
- we will offset the high transport costs against spreading this mulch
- the material would have been chipped anyway
- we are providing jobs and benefits to many unemployed people
- we are providing immediate stability to the sand dune area
- we are promoting a more stable environment west of the Paddavlei system
- we may need to seed some of these areas and have a better chance of seedlings surviving

3.3.3 East of Paddavlei/Skilpadsvlei below R43

Much of the area between Hawston and Fisherhaven does drain into the Paddavlei Skilpadsvlei system and is very seriously invaded by exotics. The area between the R43 and the road linking Hawston and Fisherhaven from Church Street, needs to have fire as the first tool for clearing with continued manual follows ups. Most of this area will in time become an urban or suburban development as per the long term approved development plans (Overstrand, 2016).

Within this area green belts are planned and Fynbos needs to be re-established in these areas in particular, and in the whole area in general to assist the re-establishment of these areas before development occurs. The complete expansion of the suburban area may take considerable time. The northern section of this area has a reasonable Fynbos cover and manual clearing of exotics will be preformed.

3.3.4 East of Paddavlei/Skilpadsvlei above the R43

The area above the R43 from Hawston to Fisherhaven is to be used for further expansion of Hawston and Fisherhaven, in a narrow band adjacent to the R43. This area is mostly severely invaded by exotics. This land is still in private ownership. A big section of this was recently burnt and provides an ideal fire break to stop any fire within the Hawston area from spreading any further. The rest of the severely invaded area should be burnt as a first step in clearing, with proper follow-up clearing.

The area above the recommended expansion of Hawston/Fisherhaven is not severely invaded but needs to be cleared as much of this supplies seepage water to the Paddavlei /Skilpadsvlei system. The rest drains into the Afdaks River or directly into the Bot River Lagoon. It is not being used as agricultural land and, as the major watershed area; it should be protected as an indigenous vegetation area and protected from any further development.

F EIA

Most of the proposed work recommended in this report, is the repair of damage done to the wetland and the environment by the discontinued plan to drain the water out of the Paddevlei system, such as:

- blocking the drainage pipeline
- removing the extra drain pipe and temporary roadway
- removing the temporary road and re-establishing an open drain for storm water
- closing the drainage ditch and re-establishing the flow of water to the Skilpadsvlei
- removing the rubbish tip and sewer which extend into the wetland
- halting the input of contaminated water from the sewage farm directly into the vlei
- removing the rubbish dump on the border of the lagoon
- stopping or reducing the input of plastics, bottles etc into the wetland from storm water from the built up area
- removing and policing of dumping of rubble and rubbish into the wetland

The removal of invasive species throughout the catchment, including the wetland itself will be simply applying the law and correcting work that should have been ongoing for years. This will be done in terms of the NEMBA and CARA guidelines.

Reversing the massive encroachment of reeds into the system, this has occurred in only the last eight years. It is uncertain why this has only happened in the last eight years, but a major cause is pollution of the wetland and reduced water flow.

All these actions will increase the flow of clean water back to what it was historically; the only potential problem is the potential for flooding in the vicinity of George Viljoen Road

and a cheap and functional alternative has been proposed where the temporary road has to be removed anyway. This may require a bigger drain under George Viljoen to avoid occasional flooding across the tarred road.

G Community involvement

The project originates from the Hawston residents and appears to have very good support. Certain aspects of the project have been long standing issues with members of the Hawston community. No or little progress has been made in the past. This is the first time that an integrated environmental approach has been made, and expectations and support of the proposal are very high.

The project will use local labour, will be integrated with the local community in all aspects and will be aimed at involving locals in all aspects, especially the youth. The project is seen by Hawston residents as a catalyst for general development.

H SWOT Analysis

| | |
|--|---|
| <p>Strengths <i>Led by civil society members in a volunteer capacity wetland is resilient in the fynbos area there is commitment from the community and authorities there is accessible input from knowledgeable stakeholders the Paddavlei ecosystem is isolated from other ecosystems project will generate publicity for the ecological cause and the Ward 8 area</i></p> | <p>Weaknesses <i>the fact that intervention is needed urgently: can't wait for long bureaucratic processes to happen community still needs to be educated about the clearing requirements and about conservation lack of finances at present the project is exploring new territory so there is little to base the process on</i></p> |
| <p>Opportunities <i>expanding the project to greater Bot River area initial funding will encourage other funding Government maintenance funds will be available if some work already been done income from jobs / training of / opportunities for locals catalyst for consolidating interested persons and bodies catalyst for expansion and development in the area opportunity for healthy recreational usage of revamped Paddavlei area for community</i></p> | <p>Threats <i>possible funding delays/ shortages depleted interest due to slow process interference from OSM due to a lack of understanding of the PEG objectives delayed/ non-existent/ negative inputs from stakeholders diversion of funds into other projects adverse climatic conditions</i></p> |

I Conclusions

Timing has become critical for the urgent implementation of a plan of action for this project especially in view of the fact that measures were put into place to completely destroy the wetland. We can still recover the situation without major effects on the wetland itself.

However, the actions in the last 40 years of ignoring or actively working against the environment do become accumulative and we are very close to reaching a tipping point for this wetland system. Many species have been lost from the system. A few years ago a group of students searched for a unique frog species to the Paddavlei and were unable to find any. Many of the bird species no longer frequent the Paddavlei and Skilpadsvlei seems to be

devoid of most birds. The control measures that are to be put into place will probably result in the total loss of other species. However, not doing anything will guarantee the complete change in the system where we are unlikely to be able to recover it even with much higher costs.

As we are so close to a tipping point in this system, we cannot afford to start doing it piecemeal. Wetlands have a great buffering capacity and the Paddavlei and Skilpadsvlei have demonstrated this in that they are still alive even though we have done so much to destroy them. The development of Hawston right on top of the Paddavlei is something we cannot reverse, but the quicker we can demonstrate positive results, the quicker we can get the community to participate in minimising the inevitable harm that they cause to the system.

The management of the whole ecosystem becomes even more critical because of the unique proximity of the built-up area and the history of destruction. It is important to note that the Hawston community has for most of its existence been ignored in terms of development. In every discussion with most members of the community, they have expressed that they feel left out. This initiative grew from within Hawston, is extremely well-supported from within Hawston and is viewed as putting right many of the wrongs of the past, real or perceived. There is very strong support from ex-members of Hawston who have moved out (especially to Fisherhaven). This initiative is seen as a start of more development in the area. To quote Dr Claudia Ituarte Lima: United Nations Human Rights Council 2017:

People most vulnerable to loss of access and degradation of ecosystems are indigenous peoples, minority groups and the poor who all depend more directly on ecosystems for their food, water and culture.

J Summary of Procedures

| Table 2: Summary of procedures with objectives, outcome, verification and critical assumptions | | | | | |
|---|---|--|---|---|---|
| Issue | Objectives | Expected outcome | Verifiable indicators | Means of verification | Critical assumptions |
| Remedial Engineering | | | | | |
| Close the pipeline | Increase the seepage to Milkwoods | Milkwoods not stressed | More leaf and not showing signs of water stress | Monitor stress levels | Trees have access to seepage water |
| | Extend open water of Paddavlei | Help return to former size | Increased size | Measure | Have enough water from other actions |
| Remove drain pipe and roadway/footpath | Decreases water draining from the Paddavlei | Increase in size of Paddavlei | Increased size | Measure | Have enough water from other actions |
| Remove section of Chapel Street Extension | Re-establish wetland | Increase seepage to Milkwood stands | Growth of wetland species | Observation and Photographs | Use as a roadway stopped |
| Re-establish drainage | Handle flood waters | Easy dispersal of flood water | Flood water moves through easily | Observation when raining | Kept clear of impediments to water flow |
| Close ditch between Marine Drive & Pig farm | Return water flow to northerly direction | Re-establish water into the Skilpadsvlei | Flood water moves through; less seepage into 'Lange Erwe' | Decrease in water logging on 'Lange Erwe' | Natural seepage gets re-established |
| Remove the closer across the wetland at Pig farm end of ditch | Return water flow to northerly direction | Re-establish water into the Skilpadsvlei | Flood water moves through | Observation when raining | No damming of water |
| Remove rubbish tip site and dumping of sewage by tankers | Reduce pollution directly into the wetland | Re-establish wetland; reduction of pollution | Less vigorous growth of reeds | Photographs | None |

| | | | | | |
|---|---|---|---|------------------------------|--|
| | | directly into wetland | | | |
| Issue | Objectives | Expected outcome | Verifiable indicators | Means of verification | Critical assumptions |
| Remove drains from the sewer farm directly into the Skilpadsvlei | Reduce pollution directly into the wetland | Reduction of pollution directly into wetland | Less vigorous growth of reeds at existing outlet points | Photographs | None |
| Instal a drain for clean water drainage above the sewer farm | Less contaminated water next to sewer farm | Clean water to enter the wetland | Observation | Photographs | None |
| Instal an area of 2-3ha below the sewer farm to irrigate with water from the sewer farm | Reduce pollution directly into the wetland | Reduction of polluted water directly into the wetland | Observation | Photographs | Seepage from the sewer farm under the road is not a problem |
| Instal a drain across the road below irrigated area | Does not allow polluted water directly into the Skilpadsvlei; cleaner water entering the lagoon | Much cleaner water entering the water course; will be further filtered before reaching the lagoon | Check pollution levels | Water tests | Seepage from the sewer farm does not pollute the drainage water on the east side of the road |
| Remove rubbish tip adjacent to the lagoon and the access road to the tip | Reduce pollution directly into the lagoon | Reduced pollution directly into the lagoon | Observation | Photographs | Fynbos re-establishes on the road |
| Removal of all rubble, rubbish and other material dumped into the wetland areas | Clean up the environment | Less pollution and cleaner environment | Observation | Photographs | Further dumping does not occur |

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|--|---|---|------------------------------|------------------------------|--|
| Construction of two storm water catchment pits on the east side of the Paddavlei | To trap rubbish, plastic, bottles, etc before they enter the wetland | Reduction of pollutants into the Paddavlei | Observation | Photographs | They are cleaned regularly |
| Issue | Objectives | Expected outcome | Verifiable indicators | Means of verification | Critical assumptions |
| Spreaders on the catchment pits | Spreading of the storm water through reed beds to absorb other pollutants before they enter the Paddavlei | Reduction of pollutants into the Paddavlei | Observation | Photographs | That the reeds do not get flattened by storm water |
| Reed removal | | | | | |
| Remove reeds and accumulated silt from the Paddavlei open water | Return the size of the open water to what it was 10 years ago; re-establish open water body and wetland surround; remove pollutants in the accumulated silt | Increased seepage to the Milkwood forest on the west bank; return of water birds and numerous other species that make up an ecologically sound water body; reduction in pollution in the water body | Measure and observe | Photographs; do bird counts | Reeds do not immediately re-grow; the Paddavlei retains its size; reduced pollution into the Paddavlei open water body |

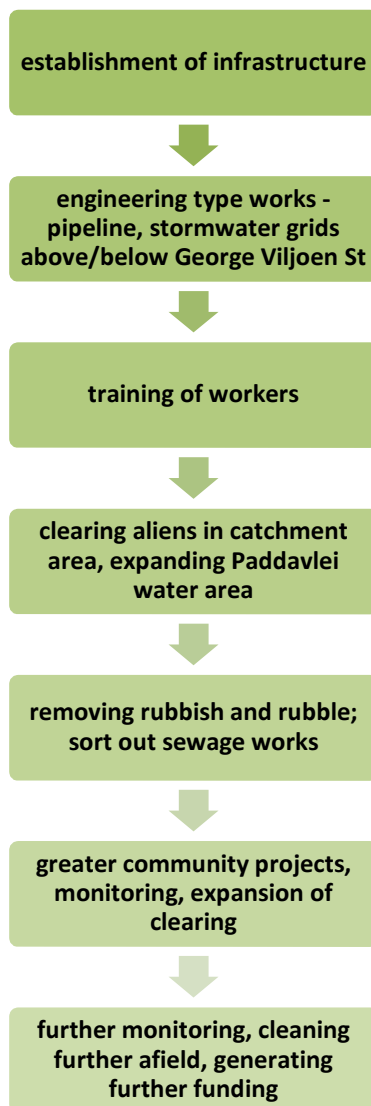
| | | | | | |
|---|--|--|---|--|--|
| Remove the reeds from the Skilpadsvlei and re-establish the periodically-flooded area below the Skilpadsvlei | Open up the Skilpadsvlei to what it was 10 years ago; re-establish the shallow, periodically-flooded area below Skilpadsvlei | Return of water birds and numerous other species that make up an ecologically sound water body; return of periodic wader bird species to the area below Skilpadsvlei | Bird count numbers increase; number of bird species increase | Do bird counts | Pollution is sufficiently reduced for a healthy system to prevail |
| Issue | Objectives | Expected outcome | Verifiable indicators | Means of verification | Critical assumptions |
| Cutting of reeds where they are excessively vigorous around and between the open water bodies; removal of this material from the system | To reduce the accumulated pollutants in the system | Cleaner water in the wetland system | Long term reduction in reeds Less vigorous growth of reeds and less reed invasion into the open water bodies | Photographs and documentation in the longer term | Pollution entering the system is sufficiently reduced |
| Reeds cut back and controlled; removal of exotics on declared erven bordering the wetland area | To minimize invasion into the wetland; investigate why reed growth is so prolific | Reduces seed entering the wetland; increases clean water into the wetland | Once cut back further investigations can be made for prolific growth of reeds | Photographs and documentation of findings | May need repairs to reduce pollution and simple drainage installed |
| Exotic Plant Removal | | | | | |
| Removal of exotic plants from within the wetland | To remove the competition of the exotic plants; to increase water supply to the system | Increase the clean water flowing through the system; reduction of pollution levels Better flow of storm water | Increases in the growth of indigenous species | Repeated photographs and documentation of plant counts | Re-invasion from accumulated seed bank of exotics |

| | | | | | |
|--|--|---|---|---|--|
| | | through the wetland | | | |
| Removal of exotic plants from the catchment area of the wetland, south east and west | To remove the competition of the exotic plants To increase water supply to the system | Increase the clean water flowing through the system; reduction of pollution levels | Increases in the growth of indigenous species | Repeated photographs and documentation of plant counts and increased water flow | Re-invasion from accumulated seed bank of exotics |
| Issue | Objectives | Expected outcome | Verifiable indicators | Means of verification | Critical assumptions |
| Follow up clearing of exotics in cleared areas especially where prolific germination of exotics occurs | Reduction of the massive accumulated seed bank of exotics | Re-establish a good Fynbos cover which can compete with exotics; a substantial reduction in fire loads with its attendant risks to infrastructure | Increases in the growth of indigenous species | Repeated photographs and documentation of plant counts and increased water flow into the system | Further funding for the long term |
| Education of Hawston residents | | | | | |
| Workshops and involvement of all residents especially the youth | Involvement of the greater community of Hawston; generating a feeling of pride and involvement | Reduce pollution entering the wetland | Less rubbish being collected by storm water grids | Photographs and documentation | Maintenance of long term interest in a clean, stable ecosystem |

| | | | | | |
|--|--------------------------|--|--|--|--|
| | in restoring the wetland | | | | |
|--|--------------------------|--|--|--|--|

K Program

Procedure of project:



L Acknowledgements

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N Appendices

PEG documents

A Founding Document PEG

HAWSTON DEVELOPMENT ASSOCIATION

PADDAVLEI AND SURROUNDS REHABILITATION DOCUMENT

Further to the meeting with Hawston Development Association, Western Cape Government Department of Environmental Affairs and Development Planning, Overberg District Municipality and Overstrand Local Municipality on 22 September 2016; specifically Agenda point 8: - **Rehabilitation of Paddavlei's 1 & 2 and possibility of accessing EPWP funding.**

As a consequence of the aforementioned meeting, at which the Hawston Development Association, hereafter the (HDA), undertook to create an environmental body, as per request and requirement of Western Cape Government Department of Environmental Affairs and Planning;

- The body was formally constituted on Friday, the 7th of October 2016 and shall henceforth be known as the Paddavlei Eco Group, aka (PEG),
- At this meeting it was also decided to create a Youth Wing within PEG, to be called Paddavlei Eco Warriors, aka, (PEW)
- The committee shall be chaired by Mrs. Florrie Carolissen, a longtime environmental campaigner, and well known in the OSM region, having served amongst others on the Bot River Estuary Forum, aka BREF,
- Vice-Chair is Chief Margie Arries, of the Griqua National Council, descendants of the First Peoples of South Africa, San & Khoi, residents in the OSM / Walker Bay area for over 125,000 years,
- Additional members are, Mr. Neville Johnson, senior citizen and longtime resident of Hawston, supplying valuable historical and cultural background material,
- Mr. Jonathan "Trompie" Williams, as above lifelong Hawston resident and fount of useful information regarding Paddavlei and witness to its desecration and destruction, promoter of scenic walk and bird hides for future tourist and bird watching potential for Paddavlei, thus creating income prospective for Hawston residents,

- Ms Marlene Mars, recent arrival in Ward 8, Fisherhaven, and passionate environmental and restitutorial campaigner, and,
- Lastly, Anton Meyer, Fisherhaven resident, campaigner for public access to Sonesta, and preservation of the stupendous natural beauty of Ward 8, encompassing the villages of Fisherhaven and Hawston.

The HDA wishes to thank the Western Cape Dept of Environmental Affairs and Planning for the public support that has been given to the communities of Hawston and Fisherhaven in their quest to address the deteriorating state of the wetlands and Bot River Lagoon / Estuary, and guidance received thus far,

Especial thanks and gratitude goes to Mr. Pieter de Villiers, **Programme Manager** | Coastal Programme, **Co-ordinator** | Western Cape Estuaries Programme, who at very short notice was able to attend a meeting with the aforementioned civil activists, and supplied valuable insight and advice on the way forward, greatly appreciated!

BACKGROUND ON PADDAVLEI SYSTEM:

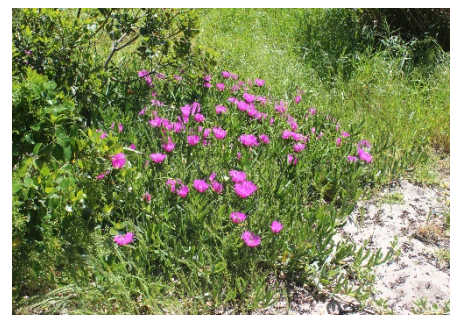
“The Paddavlei plays an important part in the history of Hawston. This is where the youngsters of the good old days built their own “boats” and spent many exciting hours on the water of the Paddavlei. This is also where the women of Hawston did their washing at “Die Pompie” on Mondays, also spreading the washing to dry on the bushes while listening to the news of the past week not forgetting the latest juicy piece of gossip.” (Hawston: Tussen Berg en See)



This beautiful place is slowly degenerating and becoming a hub for crime. Residents living close to the Paddavlei, have on several occasions broken down huts erected by those who used it as drug dens and criminal hideouts.

The rehabilitation of Paddavlei is our duty; the wetland is in dire need of urgent intervention, the removal and elimination of especially the invader, non-endemic reed species.

The Paddavlei together with our Milkwood Forest (that borders the Paddavlei) forms a unique ecosystem for our local flora and fauna. Not to mention a sorely needed Green Lung! This area can and must be turned into a tourism attraction; its uniqueness is without compare in the Western Cape. The Paddavlei has different plant species; is home to a number of interesting bird species; 225 at last count, as well as fish and frog species;





with bird-hides for locals and strongly suggested that these in line with the declared provincial income streams, concomitant with employment creation, upliftment of the local workforce!



Paddavlei is one of the few places in Hawston that can be rehabilitated, retained, and returned to its natural beautiful state! While some attempts have been made in the past to beautify Paddavlei, they have all come to naught! It included a board-walk tourists to view birds, and it is constructive ideas are realised, aim of diversifying tourist and

Hindsight is historical, and a punitive weapon if applied without due consideration, but in this case the Paddavlei Eco Group is convinced that the Hermanus Municipality, responsible for the municipal area of Ward 8, inclusive of Hawston, ignored every legal precept, statutory



provision and common sense to visit this travesty on the residents of Hawston, again to what end and purpose!

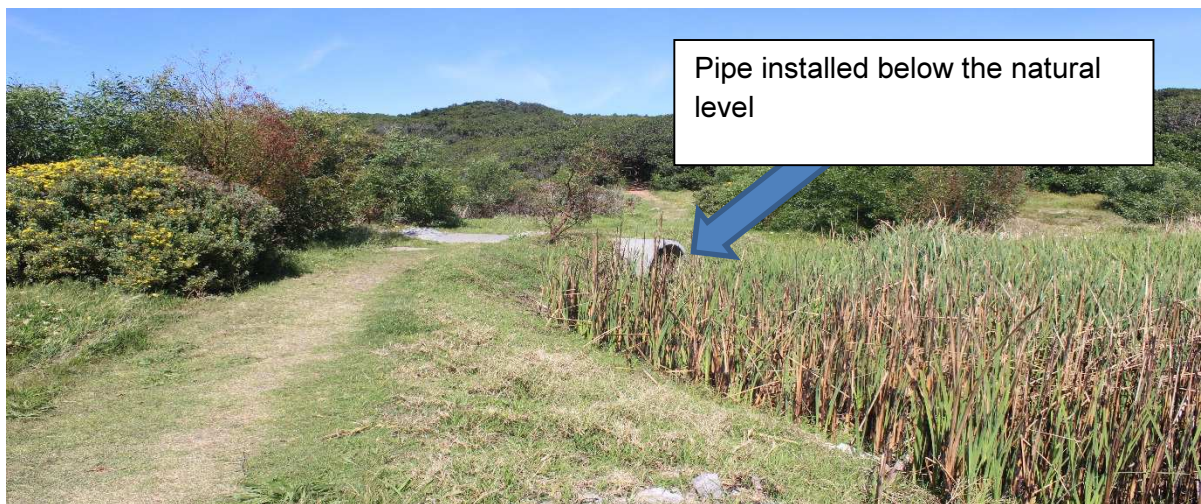


PEG PROPOSAL

It is proposed that the rehabilitation of Paddavlei 1, to be followed-up by continuing the process into Paddavlei 2, aka known as Skilpadsvei colloquially in Hawston, forward and onwards and into the Bot, Swart and Afdaks rivers system, the lagoon and upstream into the source/s of all three rivers, as far as the N2 highway!



The good news is that Paddavlei can be returned to some semblance of its previous glory, removal of the earthen weir / dam wall, pipes and blocking off the present outflow, to redirect the outflow on its millennial path, which can be seen in aforementioned aerial photograph!



Required therefore, is co-ordinated effort by the following:

1. Western Cape Government, Dept. of Environmental Affairs and Planning, inclusive WCP Expanded Public Works Programmes, (EPWP)
2. Overstrand District and Local Municipalities Ecological / Environmental Departments,
3. National Department of Water Affairs, via the Working for Water programme,
4. National Department of Environmental Affairs, Wetland Rehabilitation Programme,
5. Expanded Public Works programme (EPWP), OSM, Department of Water Affairs, (See point 6 below)
6. The expanded public works programmes via OSM Local Economic Development office is nominated as co-coordinator, aided and or in conjunction by PEG and Cape Nature, supplying labour and interested persons, as the programme will run for many a year as eradication of alien and invader species takes at least three (3) – five (5) years,
7. Cape Nature and National and Provincial Departments of Environmental Affairs and Tourism, as all aforementioned have oversight and interest in retention and rehabilitation of water bodies, lagoons and estuaries,

The suggestion is that present capacity within local and provincial spheres of government be employed in conjunction or collaboration with civic society organisations in Ward 8, (See

below) such civic organisation and initiatives are well known to the Ward 8 Council committee, upon which HDA is duly democratically elected member.

Such rehabilitation and development will be a great source of learning for learners of both local schools and Church organisations; See below!

Further interested parties,

- Hawston Primary School
- Hawston Secondary School
- Whale Coast Conservation
- Ward 8 Development Committee,
- Friends of the Bot River Lagoon
- Cape Nature
- Overberg Education Department
- Local businesses and future developers,
- Realty and property sales, economic development etc.

Potential Beneficiation Projects/Off-sets:

1. Youth education and further learning opportunities,
2. Gainful Employment, EPWP, Cleaning (removing dirt as well as alien vegetation)
3. Involving local learners to visit the previous generations to get all the stories of yesteryear with regard to the Paddavlei and surrounds and recording it in a book, together with past photos, as part of our Hawston Heritage.
4. Involving local learners to come up with ideas of beautifying Hawston and surrounds maintaining its unique cultural and historical identity! Encouraging them to put down their ideas through drawings or models. This can be done in a form of a competition.
5. In an attempt to promote nature conservation, learners can be used as “eco-worriers”. They will be encouraged to take owner-ship, of the defense team of Paddavlei.
6. Creating a tourist attraction with boardwalks and bird-hides (using the ideas of the learners) (This can be a job-creating opportunity for locals)

Further to the inaugural meeting of PEG of 7th October 2016 and agreed upon principles;

1. That Pierre de Villiers, of Cape Nature to serve as link between HDA / PEG, National Dept. of Environmental Affairs, Dept of Agriculture, Forestry and Fisheries, and Dept of Water affairs and Sanitation, (Working for Water Project)
2. That the Hawston wetlands, Hawston “Die Kraal”, and Bot River Lagoon / Estuary be declared national Heritage sites!
3. Rehabilitation of fresh water sources, (See attached: The Freshwater Consulting Group; Hoek Van De Berg, Hermanus Environmental Impact Assessment Wetlands Component Report, dated September 2012; PDF file pages 7 to 26)
4. That the present Municipal Dump Site be moved out of the Skilpadvlei / Paddavlei 2 wetland, to above the present sewerage plant, to in future be part of upgraded sewage system for the whole of Ward8 complete with proposed bio-gas plant, recycling of water, preventing of subsoil leaching of sewage effluent soonest.



5. That the proposed siting of the Industrial Node be seriously reconsidered by OSM Town Planning, as PEG considers such proximity to the wetland shortsighted and potentially damaging. Alternative sites are next to the newly approved shopping centre



6. That initial investigations for the rehabilitation of Paddavlei & Skilpadvlei be completed by all parties by the end of November 2016, in time for governmental processes. These investigations to include the so-called "Lang Erwe", adjacent to the previous millennial flow of the wetland.
7. Non-negotiable is the negotiation with the Griqua People, who were and are severely disadvantaged by the rerouting of their millennial water flow, the water was used for their vegetable and fruit gardens for decades, if not centuries.

The HDA / PEG wish-list!

1. That all government bodies that have concern with the environment, (See point 1) above, act in concert with haste to resolve the present crisis within Ward 8, of the OSM Municipality,
2. That the continuance of treated effluent discharge into Paddavlei / Skilpadsvlei cease immediately, this issue has been raised at many and varied fora, repeatedly falling on deaf ears, if not speedily addressed,
3. PEG has undertaken to pursue alternative avenues for natural justice for mother earth, it is our God given duty, Amen.
4. In concurrence of the presentation by Ms Marlene Laros, on 22 September 2016, of the WCP DEA & DP, we wish to incorporate the “green and blue” concept as espoused and that further guidance would be appreciated and what would be required of PEG to be considered as an equitable, worthy partner,
5. As in point (4) above, the Hawston Harbour be considered for, (1) Re-registration, (2) funds be sought to create a breakwater with the “dollosse” on the southern side, facing Walker Bay, the extension 30 – 40 metres, making entry and exit safer for Hawston fisher folk, adding and retaining the villages



unique coastal ambience.

6. The Phakisa initiative to be publicized in the Overstrand Municipality in conjunction with HDA / PEG, as per the Mission and Vision of the Hawston Development Association, for example Aquaculture, Ranching etc.
7. That as a consequence of the nascent partnership between HDA / PEG and WCP / National Departments establish a path for higher learning for the youth of Hawston,

B Thusong Hall Meeting 22 December 2016



Fisherhaven Developers Pty Ltd

Creative Sustainability

No 2 Keurboom Street,
Fisherhaven, 7201,
Western Cape.
Email: fishdevptyltd@gmail.com
Contact No: +27 (0) 74 265 3962
Skype: antoahmeyer
Registration No 2012/122636/07

Friday, 23 December 2016

To: Western Cape Department of Planning & Environmental Affairs.

For Attention: Mr Piet Van Zyl;

Re: Paddavlei Eco-Group – Meeting with DEA and Cape Nature, 22/12/2016.

Dear Sir,

As previously communicated, herewith an update;

The above-mentioned parties had a very informative and instructive meeting at the Thusong Hall in Hawston starting at 10h00.

The following person/s, groups and bodies were represented,

- Hawston Development Association,
- Paddavlei Eco-group,
- Department of Environmental Affairs, National,
- Cape Nature, and,
- Messieurs' Austin and Wessels.

The following timetable – action plan with target dates was agreed upon,

1. That the Paddavlei is worth rehabilitating, as it addresses all 3 primary issues of concern,
2. The DEA template / action plan document complete with interim report to be available for perusal by 15 January 2017,
3. For comment / changes and or addition/s to be completed by 20 January 2017, by all parties,
4. And the final Draft Plan to be presented to your good office by 30 January 2017, for approval and financing thereof, to start and continue the required research and verification of, amongst others, biodiversity of flora, fynbos et al, the aquatic population, amphibians and fishes, and finally birdlife, how badly affected by the illegal and irrational draining of Paddavlei,

C Letter from DET Pretoria

Notes on Paddavlei wetland visit: 22 December 2016

The Department of Environmental Affairs' NRM (DEA-NRM) branch was requested to meet with the members of the Paddavlei Eco Group (PEG, created by the Hawston Development Agency) and Mr Pierre de Villiers from CapeNature in Hawston, Western Cape on 22 December 2016.

The PEG developed "PADDAVLEI AND SURROUNDS REHABILITATION DOCUMENT" which includes a proposal for the rehabilitation of the so called Paddavlei and Skilpadsvlei and to the system downstream flowing out to the Bot river estuary.

DEA-NRM supports the initiative to rehabilitate the wetland. The rehabilitation of Paddvlei wetland holds cultural, functional and biodiversity value to the system. Based on rehabilitation objectives as described by the PEG, the following recommendations are made for your consideration. Reference to areas of concern are referenced in point form to the map in figure 1:

1.A phased approach should be taken for the rehabilitation of the system from Paddavlei to the Bot river estuary.

2.Focus initial rehabilitation efforts on Paddavlei (point 1) by implementing interventions that does not require any Environmental Authorisations such as the removal of Alien invasive species (including kikuyu grass) and the removal of building rubble within the wetland. Refer to figure 1 to 3 for examples of successful removal of kikuyu and revegetation of a wetland within the City of Cape Town. This will minimise competition for indigenous vegetation to be re-established on the edge and within the limited buffer zone of the wetland. A written Rehabilitation plan with planned deliverables, time of the year for activities to take place and budget required will be a positive start to the project.

3.Establish the rehabilitation objectives for the remainder of the wetland system as identified in the PEG rehabilitation proposal: what is the rehabilitation potential, biodiversity value and functional value that will be added to the system should the identified rehabilitation activities be implemented.

4.It is advisable to appoint a Professional Esturine Ecologist to perform a comprehensive Wetland assessment as to guide the rehabilitation through a better understanding of its original condition, flow regime and functionality. This will likely improve the outcome of any final decisions to remove earth berms or lifting of water tables at the culvert at the lower end of Paddavlei.

5.It is advisable to confirm the elevation profile of the entire profile as the slope is very low towards the Bot river estuary which shows a clear topographical rise between Paddavlei and Skilpadsvlei (point 2). The expected surface flow, as suggested in the proposed rehabilitation interventions, may not be possible as a result of this rise. The section between

Paddavlei en Skilpadsvlei is likely connected via seepage and occasional seasonal surface water. This needs to be confirmed by a comprehensive wetland assessment.

6. Earth berm splitting Paddavlei in two sections (point 3): The removal of the earth berm will require an Environmental authorisation. It is recommended that and a Professional wetland Ecologist and an Engineer assess the proposed rehabilitation intervention.



7. Culvert at lower end of Paddavlei (point 4): Consult the local Municipality on what the design rationale behind the culvert depth was. Should the raising of the culvert be supported by all parties it is recommended a survey be completed to establish the correct height based on calculated back flooding. Unfortunately the wetland is within a residential area and risks to flooding should be taken note of.

Figure 1. Map of Paddavlei with references in point form.

Figure 2. Kikuyu infested wetland before. Figure 3. Kikuyu infested wetland during.



Figure 4. Kikuyu infested wetland after revegetation with indigenous wetland plants.

Meaningful intervention in the lower reaches towards the Bot river estuary, such as the management of woody alien species should not be missed. The removal of alien invasive species within wetland have significant positive impact on flow and the improvement of biodiversity.

The DEA-NRM which the PEG the best success with their efforts in attempt to rehabilitate the Paddavlei wetland system. The DEA-NRM will provide advice where possible.

Best Regards, Heidi Nieuwoudt

D PAIA application



Fisherhaven Developers Pty Ltd

Creative Sustainability

No 2 Keurboom Street,
Fisherhaven, 7201,
Western Cape.
Email: fishdevptyltd@gmail.com
Contact No: +27 (0) 74 265 3962
Skype: antonbmeyer
Registration No 2012/122636/07

Tuesday, 07 March 2017

Dear Paddavlei Eco-Group Members,

Draft Public Access to Information Document in terms of PAIA Act No 2 of 2000.

Overview;

The access to information concerns the wilful and deliberate desecration of the Paddavlei wetland system by the Overstrand Municipality during the Council Term of 2006 – 2011,

The following information / clarification is sought;

- Copies of Public participation notices to publicise discuss Paddavlei, and planned actions, in concert with below,
- Dates and Venues of such Public Participation meetings, complete with Minutes of such meetings, (Certified as true and correct) and accepted as such at subsequent meeting/s,
- The notice of application of the National Environmental Management Act, No 107 of 1998, with regards to Paddavlei,
- Application or lack thereof of Water Act, No 36 of 1998,
- The issuing of Environmental Impact Assessment as per applicable Statutory and Legislative precepts,
- Flora and Fauna Surveys, with regards to rare and possibly endangered frog species, residing in Paddavlei, (See below)
- Application or lack thereof of Heritage Act, No 25 of 1999
- Hydrological survey, as required by any or all of above,
- Engineering survey, as required by any or all of above
- Open Tender request to do Engineering works as occurred at Paddavlei,
- Minutes of the Council meeting authorising the destruction of Paddavlei, inclusive of Voting Record of each and every Councillor, in final decision
- Date of Tender Award – Company Appointed,
- Value of Tender Award – Compliance with Municipal Finance Management Act, No 56 of 2003,
- Compliance with King Report 2 & 3, in terms of MFMA, No 56 of 2003,

Dear Members, please feel free to add any other points you consider worthy of inclusion, by return email please!

Regards,

E PAIA report back

Wednesday 29, March 2017

PAIA – Paddavlei Report Back – HDA – PEG.

Responses received and Verified; *In Italics and in Bold Below!*

1. Legality – Licence – ***Fact licence was granted in Terms of NEMA Act, No 107 of 1998,***
2. Parsimonious – Facts, ***OSM was however, parsimonious with facts and consequences of the actions to destroy and or desecrate Paddavlei and by extension, Skilpadsvlei and the Bot River Lagoon / Estuary by logical extension, (See 3 below)***
3. Wilful and Deliberate Non-Disclosure of (2) during Public Participation process and Notification to Authorities for NEMA application,, ***By non-disclosure of the fact that the Freshwater Supply, (Millennial) would be diverted to end at or on the boundary of Remainder3 of 566, the proposed Golf Course site,***
4. Dept of Water Affairs & Forestry, ***The investigators of HDA / PEG, did not find any reference to the National Water Act, No 36 of 1998, and or any correspondence to DWAF informing them of plans to alter modify / change a freshwater body such as a Wetland, viz. Padda & Skilpadsvlei. It is the considered opinion of the authors that the Overstrand Municipality failed, utterly and completely to apply the Spirit and Letter of the National Water Act, No 36 of 1998, which clearly mentions Wetlands as a National / Regional / Local economic resource!***
5. Heritage Board: ***Again as above, we lament the lack of critical Oversight by this Statutory body, other than a platitudinous writing about Human remains and or Archaeological finds, completely ignoring the fact that the Paddavlei wetland is millennia old, thousands and thousands years old, thus automatically a Heritage Site.***
6. Cape Nature; The correspondence viewed, emanating from Cape Nature, while being more specific than the Heritage Commission, also lacked a critical tone, in pre-action oversight and post action audits mentioned in the writing/s did not occur, alternatively not in the correspondence file as viewed!
7. Seeming Reliance on lack of Critical Oversight by the three aforementioned bodies; ***In the spirit of Fairness the following must be stated, whether by an Act or Omission, OSM received a Licence / Permission to proceed with destruction of Paddavlei and consequentially Skilpadsvlei and the Bot River Eco-system, by providing Information that bolstered their case, under the guise of a Storm water management system, with a Public Participation process and via the Ward8 Committee, the case made.***
8. ***The following are now however, undisputed facts! (See Drawings M06019/01 – M06019/03)***
9. Applied for approval Plans, Contract No: M06019, Drawing No's: M06019/01 & M06019/02, M06019/03.
10. ***Again Please Note! The photocopied copies received from OSM Town Planning Dept, all state, "For Approval" The investigators did not have***

site of approved OF plans, and have no idea from whom approval would be obtained and or required!

11. Destruction of the Wetland to create Dam / Reservoir to supply freshwater to Rem. 3 of 566 – abortive Golf Course – Hawston Sports Fields....., (**Map M06019/01**) **Further to increase both depth and size from 1.85Ha to 2.35Ha,**
12. Destruction / Draining of Paddavlei Wetland freshwater supply to Skilpadsvlei to divert create / supply Freshwater to Rem. 3 of 566 – abortive Golf Course – Hawston Sports Fields.....,
13. Thus clear, deliberate and wilful intent in destroying both Wetlands / Vleis in Hawston, (**See Drawings M06019/01 – M06019/03**)
14. Successful in Paddavlei destruction, diverted seepage fresh water to Skilpadsvlei into or onto vacant, unused land, Hawston Growth Management Strategy Document, published October 2010, refers to the same Land, Rem. 3 / 566, as Planning Unit 1, (One),
15. Construction and Tarring of George Viljoen Road to Marine Drive, Hawston to supply possible Access to Rem. 3/566,
16. Total Hectare size, 206.90Ha, Rupert's Purchase Price R22, 500,000.00 (Twenty-Two and a half a Million Rand).
17. OSM has repaid R20, 000,000.00 (Twenty Million Rand) to the Rupert Conglomerate..... The remainder of R2.5 million Rand was apparently donated to OSM for "Costs Incurred"?????
18. Wasteful and Fruitless Expenditure +- R8 million Rand – Total Contract Value!!!! (**As far as HDA / PEG investigators could ascertain**)
19. Hawston Growth Management Strategy Document, published October 2010, refers to the same Land, Rem. 3 / 566, as Planning Unit 1, (One), obviously this information is patently false, as it had been "sold" to the Rupert's Golf Course Company, in the meantime. The total area in above document is quoted at 215.5Ha,

The report from here onwards will exclusively concentrate on the deductions made from examining the plans as received and enumerated above, and are as follows;

- Work plans of the changes to the Paddavlei and diversion of the water from its natural course to the Skilpadsvlei and eventually to the Bot River estuary / lagoon.
- The scheme was clearly designed to expand the open water surface and the depth of water considerably, creating an artificial water reservoir storage to be used in an area aside from Hawston.
- The open water surface at the new 6m contour required considerable earth moving which would have resulted in the destruction of the wetland which had historically existed as the Paddavlei with its associated wetland.
- Even the oldest maps, photographs and discussions with the oldest residents of Hawston showed a much smaller body of open water, approximately 25% of the new reservoir area.
- This considerable change also puts the 100 year potential flood area much closer to the existing erven and houses of Hawston. Therefore a much greater risk of flooding around the Paddavlei would have been introduced. (**Therefore seriously challenging the rationale behind the original Storm Water NEMA application!**)

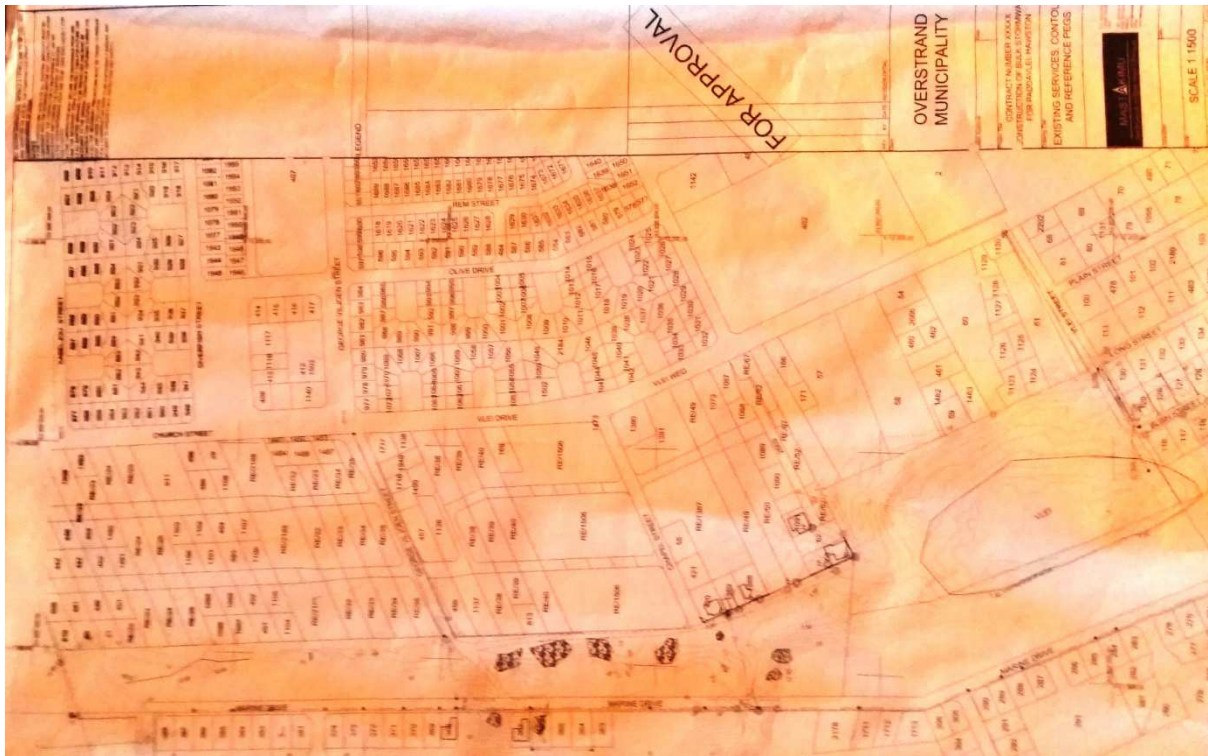
- In fact some of the erven were to be raised by as much as 2m to try and reduce flooding even in normal years. The net result would have been the complete destruction of the Paddavlei wetland and substituting it with large storage reservoir of water.
- The Paddavlei has always had a steepish bank on the west side, adjacent to the bulk of the Milkwood forest which is supported by seepage from the Paddavlei. The proposed new water reservoir extended the open water considerably on the north, east and south side with steepish banks down to the open water. This will have resulted in the destruction of the reeds on the north, east and south sides of the Paddavlei, destroying a natural filter of the water entering the Paddavlei. The net result would have been the complete destruction of the Paddavlei wetland and substituting it with large storage reservoir of water.
- The quality of water in the Paddavlei would have been significantly altered with the construction of the reservoir, leading to significant changes to the whole ecosystem of the Paddavlei with the destruction of the natural fish population and to a complete change to the flora and fauna as regards birds, mammals, frogs and the thousands of other micro-organisms which inhabit a natural wetland and open water body.
- ***The net result of this was the complete destruction of the ecosystem.***
- ***The bulk of the Milkwood forest bordering the west side of the Paddavlei is not even shown on the drawings and an assessment of the new water reservoir on the Milkwood forest has not been considered.***
- The great deal of excavation for the new reservoir may have severely affected the Milkwood forest.
- ***The few Milkwood stands below George Viljoen were marked on the map and where the new pipeline which was to have been constructed leading the water from the sports fields in a northerly direction, opposite to the natural flow would have severely affected these Milkwood stands and may have lead to their death.***
- The potential flooding beyond George Viljoen Street would have been reduced as all the water from the Paddavlei extended catchment area would have been diverted under Marine drive towards the proposed golf estate and directly towards the sea.
- ***This would have destroyed the Skilpadsvlei and the traditional run of water into the Bot River estuary.***
- ***The catchment area of the of the entry into the Bot River estuary via Skilpadsvlei would have been reduced by 78% in all years except maybe the 1 in 100 year storm.***
- The net result would have been the complete destruction of the Skilpadsvlei wetland and removal of water entering the Bot River estuary.
- Clearly the object of the exercise was to create a large water reservoir in place of the Paddavlei, and to divert the water entering this reservoir and water from the south of the Paddavlei, through the pipeline to be used in the proposed golf estate.
- This would have lead to the destruction of the Paddavlei wetland, the Skilpadsvlei wetland and would have had a serious if not terminal impact on the Bot River estuary.

- Add to all of above, the reduction / termination of the Afdaks River freshwater supply to the Bot River Lagoon, in clear violation of Agreements OSM has signed in connection with The Kogelberg Bio-sphere in January 2010.

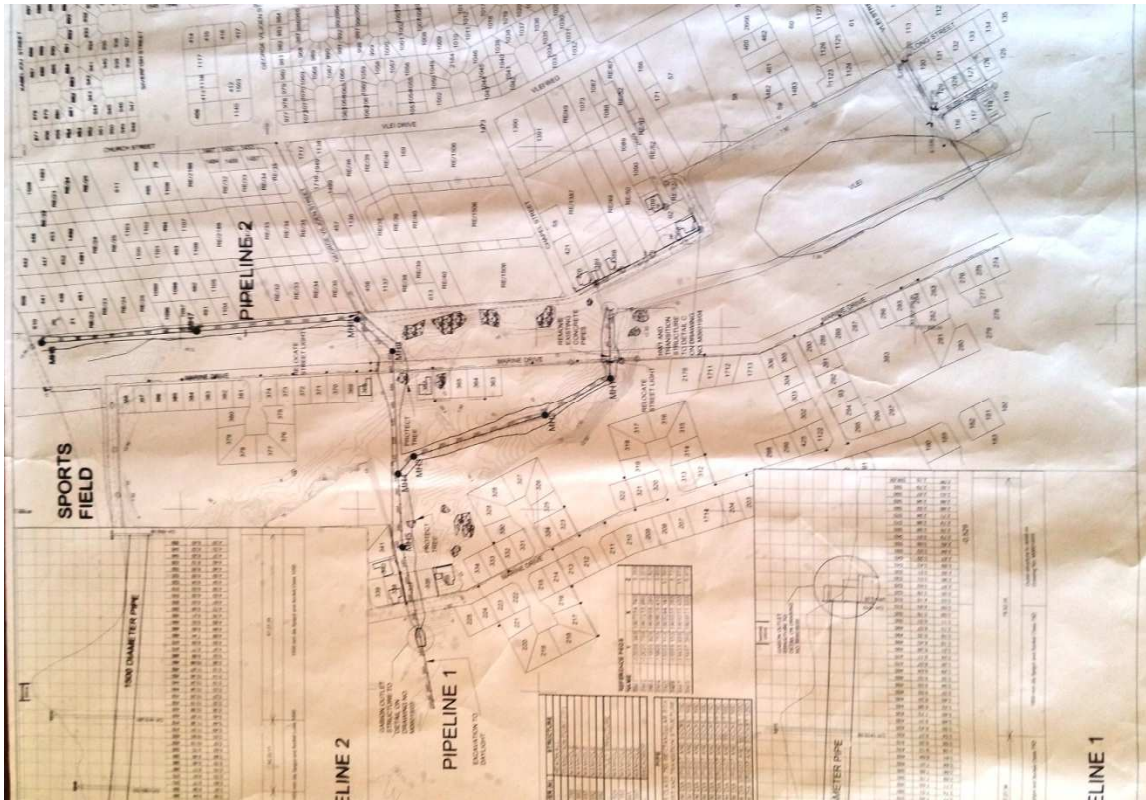
A number of issues were not addressed;

- Flora and Fauna Surveys, with regards to rare and possibly endangered frog species, residing in Paddavlei, (Scant remarks mentioned various flora and fauna, by mentioning a few species, (See Cape Nature follow-up or lack of above)
- Minutes of the Council meeting authorising the destruction of Paddavlei, inclusive of Voting Record of each and every Councillor, in final decision
- Date of Tender Award – Company Appointed,
- Value of Tender Award – Compliance with Municipal Finance Management Act, No 56 of 2003,
- Compliance with King Report 2 & 3, in terms of MFMA, No 56 of 2003,
- Noted is the lack of response to, of writings addressed to OSM and Charl Bruwer of Enviroserve Africa, EIA Applicant / Facilitator, from a Willemien Swanepoel and Shawn Johnston, who's letters / questions were not answered in 2009, mirroring HDA / PEG PAIA application questions in 2017?

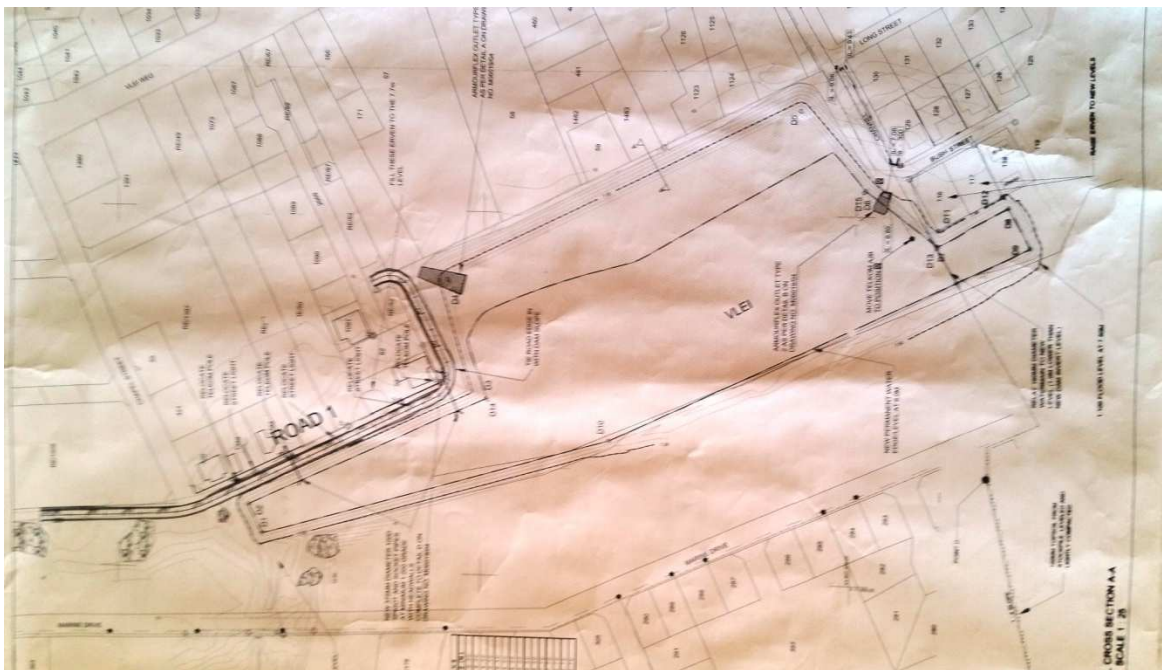
Report compiled by Anton Meyer, Mike Austin and Gilroy van der Ross, for and on behalf of HDA / PEG.



Map 1 Existing services, contours and reference pegs (Drawing M06019/01). General plan of the Paddavlei showing the contour lines and Paddavlei unusually large with no Milkwood forest and a few stands of Milkwoods lower down. Work proceeded with these plans (For approval only), as per OSM.



Map 2 Setting out details for stormwater pipeline 1 and 2. (Drawing M06019/02). Pipeline 1 draining the expanded water reservoir and pipeline 2 bringing water uphill from the pig farm and removing the water from the wetland.



Map 3 Setting out details for road 1 and dam earthworks (Drawing M06019/03). Expanded water reservoir with the new contour lines showing how the vlei was to be dug out completely to become a dam.

End of document