SOL PLAATJIE MUNICIPALITY

WATER USE LICENSE APPLICATION FOR THE EXTENSION OF LETHABO PARK KIMBERLEY, NORTHERN CAPE

FRESH WATER REPORT

A REQUIREMENT IN TERMS OF SECTION 21 OF THE NATIONAL WATER ACT
May 2019

KIMBERLEY

Index

Abbreviations

Critical Biodiversity Area	CBA
Department of Water and Sanitation	DWA
Ecological Importance	EI
Ecological Sensitivity	ES
Ecological Support Area	ESA
Environmental Impact Assessment	EIA
Electronic Water Use License Application (on-line)	eWULAA
Government Notice	GN
Metres Above Sea Level	masl
National Environmental Management Act (107 of 1998)	NEMA
National Freshwater Environment Priority Area	NFEPA
National Water Act (36 of 1998)	NWA
Present Ecological State	PES
South Africa National Biodiversity Institute	SANBI
Water Use License Application	WULA

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1 Introduction

The Sol Plaatjie Municipality appointed Macroplan of Upington to coordinate the planning of a new urban area in Kimberley in the Northern Cape. The proposed development is to be an extension to the existing Lethabo Park in the north of the city.

Macroplan, in turn, appointed several contractors to bring this plan to its final stages. Reneilwe Consulting of Roodepoort was appointed to assess the urban infrastructure that would be required for the extension. Enviro Africa of Somerset West was appointed to conduct the environmental impact assessment.

In among the thorn trees on the site are faint drainage lines. This is the upper end of a small sub-catchment area in a low rainfall area where geomorphological structure of aquatic habitat is ill defined. The lower end of the sub-catchment is defined by mostly dry, small pans. Aquatic habitat is scant, one notch above absent. These features, however, are without a doubt adequate to draw the DWS's attention and to demand (legally enforceable and bureaucratically correct) a S21 (c) and (i) WULA.

Hence Enviro Africa appointed WATSAN Africa of Cape Town to deal with the WULA.

A Fresh Water Report, now called the Technical Report, is required to supplement the WULA. The report has to include the Risk Matrix, as published on the DWS webpage, as well as a number of other assessments. The report is to be submitted along with the required application forms to the DWS for consideration and approval. The application is to be recorded on the national eWULAA computerised system.

To compound the situation, the Impact Assessment showed that mitigation measures are not effective to save the scant aquatic habitat from destruction. The Risk Matrix indicate a no-go scenario, as the urban development would entirely displace any viable aquatic habitat.

This is the anomaly, the difficulty, of this particular WULA, the almost non-existing aquatic habitat against the prescribed assessments that indicate high environmental risks.

This Fresh Water Report and the concomitant requirements transpired to be necessities to pass the legal requirements, rather than to protect aquatic habitat.

The site visit was conducted on Friday 17 May 2019, along with Mr Olebogeng Marwane of the Sol Plaatjie Municipality. The security situation prevented free movement and curtailed the site visit.

2 Legal Framework

The envisaged urban development "triggers" sections of the National Water Act. These are the following:

S21 (c) *Impeding or diverting the flow of a water course*

The proposed development straddles drainage lines, albeit entirely altered drainage lines. The drainage lines would be further altered, should the development go ahead.

S21 (i) *Altering the bed, bank, course of characteristics of a water course.*

The proposed development will be along drainage lines, albeit entirely altered drainage lines. The proposed development would further alter the characteristics of the banks of the drainage lines.

Government Notice 267 of 24 March 2017

Government Notice 1180 of 2002. *Risk Matrix.*

The Risk Matrix as published on the DWS official webpage must be completed and submitted along with the Water Use Licence Application (WULA). The outcome of this risk assessment determines if a letter of consent, a General Authorization or a License is required.

Government Notice 509 of 26 August 2016

An extensive set of regulations that apply to any development in a water course is listed in this government notice in terms of Section 24 of the NWA. No development take place within the 1:100 year-flood line without the consent of the DWS. If the 1:100-year flood line flood line is not known, no development may take place within a 100m from a water course without the consent of the DWS.

No development may take place without the consent of the DWS within 500m of a wetland. The proposed development is adjacent to a wetland, albeit a greatly altered wetland.

Likewise, the pipelines trigger a part of the National Environmental Management Act, NEMA, 107 of 1998).

The EIA Regulations of 2014 No.1 Activity 12 states that no development may take place within 32 m of a water course without the consent of the Department of Environmental Affairs and its provincial representatives. The proposed development is along drainage lines and through the bed of drainage lines, albeit greatly altered drainage lines. Consequently, this regulation is relevant to this application.

This Fresh Water Report is exclusively focussed in S21 (c) and (i) of the NWA.

S27 of the NWA.

This section refers to the beneficial use of water resources in the public interest and redressing the injustices of the past. It will be dealt with separate paragraphs in this Fresh Water Report.

The WULA should include the following aspects:

- Redressing past discrimination
- Efficient use of the water in public interest
- The socio-economic impact of the water use
- Catchment management strategies
- Effect on the water resource
- Effect on other water users
- Investments already made with regard to this WULA
- Meeting the requirements of the Ecological Reserve
- Duration of the undertaking

3 Quaternary Catchment

Lethabo Park is in the C91E quaternary catchment. The drainage is in the general direction of the Vaal River, which is only 11km away, as the crow flies.

4 Vegetation

According to the BGIS maps on the SANBI webpage, Kimberley Thornveld is the indicated vegetation type. Further to the west of Lethabo Park, the vegetation type is listed as Vaalbos Rocky Shrubland.

None of these vegetation types are endangered in any way.

The wetlands (Pans 1 to 5) are not listed as NFEPA's.

No CBA's are listed for the area of concern.

The main exotic invasive plant was *Prosopis* sp, of which there were many.

5 Climate Kimberley

https://www.google.com/search?q=climate+kimberley+south+africa&rlz=1C1CHZL_enZA722ZA722&oq=climate+kimberley&aqs=chrome.0.69i59j69i60j69i57j0l3.6199j0j7&sourceid=chrome&ie=UTF-8

Kimberley normally receives about 283mm of rain per year, with most rainfall occurring mainly during summer. The chart below (Figure 1, lower left) shows the average rainfall values for Kimberley per month. It receives the lowest rainfall (0mm) in July and the highest (59mm) in March. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Kimberley range from 18°C in June to 32°C in January. The region is the coldest during July when the mercury drops to 0.3°C on average during the night.

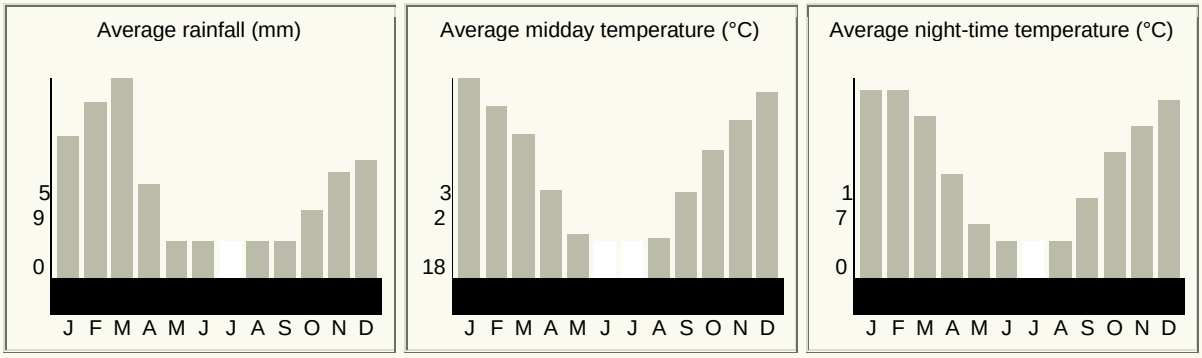

Figure 1 Climate Kimberley

The rainfall is somewhat above as what can be described as semi-arid. This is a dry region. Nevertheless, rainfall is highly variable, with long periods of drought and with sudden downpours of perhaps 40 or 50 mm in a day. These intense thunderstorms put a huge demand on urban storm water systems, the design of which is larger than is suggested by the mean annual rainfall. These thunderstorms mobilise the sandy sediments and can cause erosion Lethabo Park's dirt roads, carving out preferential flow paths.

The evaporation rate is several times higher than the annual precipitation. Hence Pans 1 to 5 are dry most of the time and only contains water during and shortly after larger rainfall events.

6 Proposed Development

The proposed development, the areas and the sizes in hectares, is depicted in Figure 2. This was made available by the company BVi in Upington.

A part of the existing Lethabo Park has economic houses of brick and mortar and with tar roads. Much of suburban area has serviced plots, meaning that electricity, potable water and a sewage connecting (Figure 3) are provided, but the construction of informal houses (Figure 4) are left to the new settlers, as is so evident as urbanisation of South Africa's population proceeds. Lethabo Parks prosed development will reportedly be of the informal type.

Figure 2 Proposed Development (BVi)

Figure 3 Sewage Connection

Image 4 Informal Settlement

7 Drainage Lines

The natural drainage lines (blue lines, Figure 5) on the new developments, if ever there were any, have been replaced by a dirt road (Figure 6). The road stretches from the railway line to the south west into Pan 1 (Figure 5). At last some of the drainage is cut off by the ditch along Hamerkop Street, along which storm water runs to the north west into Pan 1.

The dirt road is densely overgrown with thorn bushes (*Acacia hebeclada*, but there were others as well), among which the drainage lines are very faint (Figure 7). There are signs that sediments has been eroded from the surface right down to the underlying calcrete, to be deposited lower down the catchment.

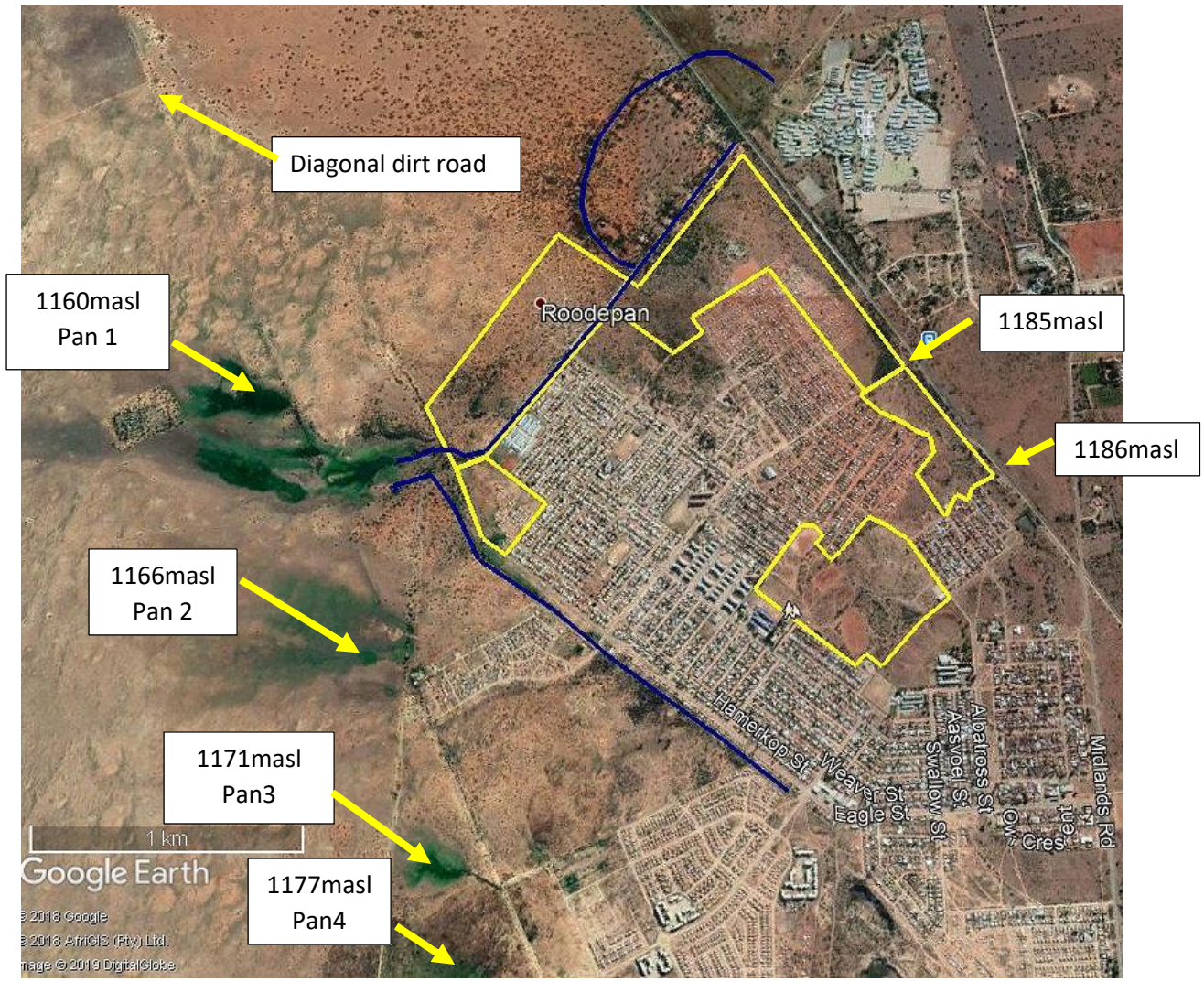

Figure 5 Drainage Lines

Figure 6 Dirt Road

Figure 7 Faint Drainage Line

8 Pan 1 to 4

The 4 pans to the west are important features of Lethabo Park's drainage landscape (Figure 5). The name Roodepan on the Google Earth map indicates that one or more of these pans are natural and probably have been there long before Lethabo Park was developed. Careful observation reveals that the top end of these pans always is located along diagonal dirt road to the west of Lethabo Park. From here the pans spread towards the west of north west. Water dissipates into the sandy soil and mostly evaporates, leaving the pans dry most of the time.

It is surmised that these pans have considerably grown in size because of the storm water runoff from Lethabo Park. The time during which the pans are wet, dubbed the hydroperiod, has increased because of urban storm water runoff.

9 Flow Direction

The elevation of the highest point along the railway line in the Lethabo Park area of concern (Figure 5) is 1186masl. The elevation at Pan1 is 1160masl. This indicates a mean slope of only 0,9, or a drop of less than a metre in every 100 horizontal metres. This is a very even slope. The area is flat to such an extent that it is difficult to determine where the storm water is flowing during heavy rainfall events. The streets are oriented in a south westerly direction, as well as perpendicular in north westerly direction. Storm water probably works its way in a zig-zag fashion down the streets towards the pans.

Figure 8 Street side drain

Lethabo Park's formalised part is provided with an underground storm water system (Figure 8). This system essentially conveys storm water in the same direction and

storm water outfalls at the down-hill ends of main roads contribute towards the formation of the pans. However, the storm water system is blocked in places, leaving the streets as the main conduit (Figure 8). Leaky pipes contribute to the situation, some of which have been there for a long time, with wetland indicator plants such as sedges, rushes and reeds growing (Figure 9).

Most of the urban storm water ends up in Pan 1. A section of Pan 1 is located right against the boundary of the proposed development. The bigger section is located against the diagonal road, from which it receives storm water as well. It is expected that Pan 1 will grow as the proposed development takes root. As the informal settlement is replaced with larger, permanent houses and tar roads, the pans will predictably and considerably grow larger in size.

Figure 9 Leaky Pipes

10 Pan 5

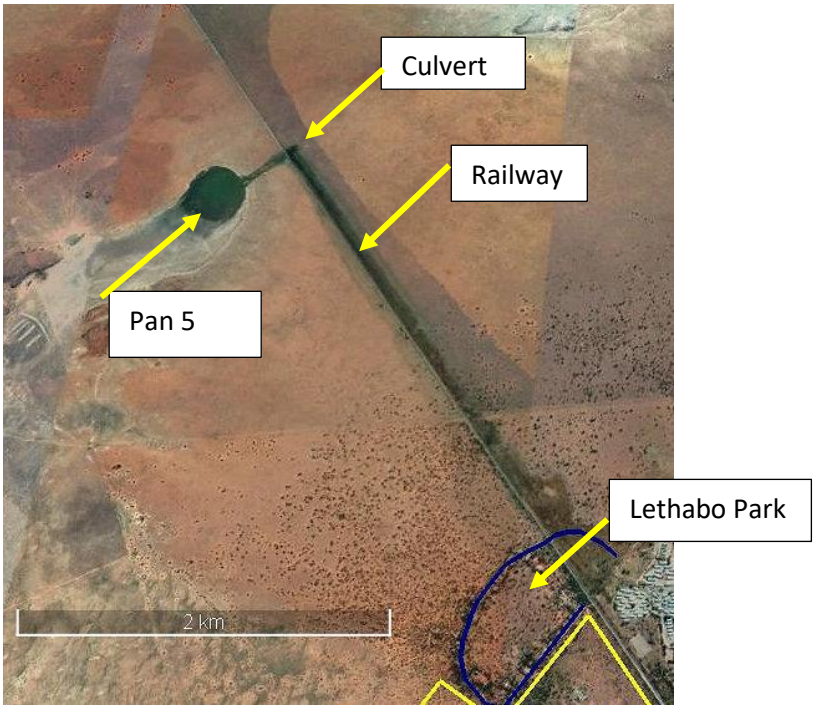

Figure 10 Railway & Pan 5

The formation of pans is not unique to Lethabo Park. The northern suburban area of Kimberley drains to the east of the railway line in a north westerly direction along the railway line, then finds its way through a culvert underneath the railway and into a pan (Figure 10), dubbed Pan 5 for the purpose of this description.

The railway line (Figure 11) cuts off any storm water from the northern suburban areas. Storm water from here does not add to that of Lethabo Park. There probably was a mostly dry natural drainage line (Figure 5), where the railway line is today, but no longer feeds its flow to Pan 1.

Figure 11 Railway

11 Kamfersdam

Kamfersdam (Figure 12) is probably Kimberley's most prominent aquatic feature and one of only a couple of locations where the lesser flamingo breeds. It is in the news because of the wrong reasons, mainly because of sewage leaks into the dam that threatens these flamingos. Decision-makers will most likely ask about the likelihood of Lethabo Park storm water ending up in Kamfersdam.

The slope is to the north west, away from Kamfersdam and it is unlikely that Lethabo Park storm water will end up in Kamfersdam.

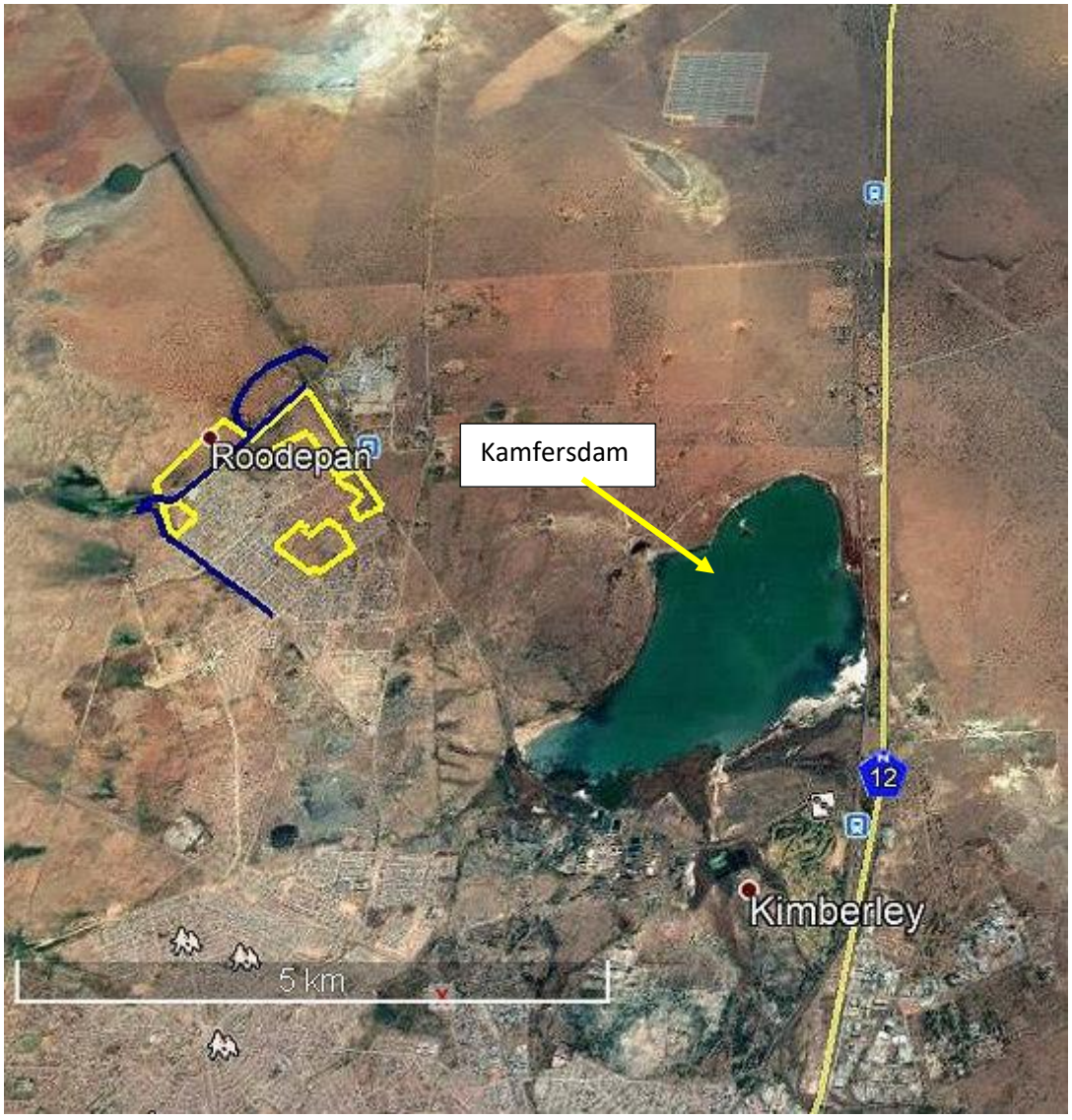

Figure 12 Kamfersdam

12 Litter

Around Lethabo Park a large volume of litter, building rubble and all sorts of disposed trash has been deposited (Figure 13). This is the result of illegal dumping, but the failure of municipal waste collection and removal service probably has much to do with this regrettable state of affairs.

The area along the railway line as well as down the dirt road (Figure 6) were the most effected during the site visit.

The foot print of the new development would be much larger than the space indicated on the map (Figure 5) because of the litter.

This is not only a threat to the aquatic environment, but to the local environment at large. For the DWS to execute their legal mandate, it is probably indicated that this mess is to be cleaned up before permission is granted to carry on the proposed development. On top of this there should be a functional waste management system in Lethabo Park.

Figure 13 Litter

13 Present Ecological State

The PES and EIS are protocols that have been produced by Dr Neels Kleynhans (Table 1 and 2) in 1999 of the then DWAF to assess river reaches. The scores given are solely that of the practitioner and are based on expert opinion.

The Lethabo Park assessment poses difficulties. The very faint drainage lines among the thorn trees are, apart from the litter, are not heavily impacted. If there ever was a larger drainage line, it is now replaced with a road, as well as a line of goat and cattle pens in the area next to the railway line. The flow has been cut off by the railway line and directed elsewhere. The natural system has been heavily impacted.

Likewise, the pans that have developed and expanded because of urbanisation are all but natural.

It was decided to lump all of the above together in a single assessment. This seemed like the most practical and sensible way to handle the assessment, even though wetlands (pans) are usually assessed separately from drainage lines.

Table 1 Habitat Integrity according to Kleynhans, 1999

Category	Description	% of maximum score
A	Unmodified, natural	90 – 100
B	Largely natural with few modifications. A small change in natural habitats and biota, but the ecosystem function is unchanged	80 – 89
C	Moderately modified. A loss and change of the natural habitat and biota, but the ecosystem function is predominantly unchanged	60 – 79
D	Largely modified. A significant loss of natural habitat, biota and ecosystem function.	40 – 59
E	Extensive modified with loss of habitat, biota and ecosystem function	20 – 39
F	Critically modified with almost complete loss of habitat, biota and ecosystem function. In worse cases ecosystem function has been destroyed and changes are irreversible	0 - 19

The instream has been extensively modified with a loss of ecological functioning, with an E classification. The riparian habitat has been largely modified, with a D classification.

It is fully expected that when the streets are constructed and the houses are built that the classification for both instream and riparian would be decreased to a F, with a complete loss of ecological functioning, which is not uncommon when urban settlements are developed.

It is expected that the pans will expand, as surfaces are hardened, with a larger runoff. The pans would probably develop an ecology of its own, different from what it is today.

Table 2 Present Ecological State of the Drainage Lines and Pans Combined

Instream				
	Score	Weight	Product	Maximum score
Water abstraction	24	14	336	350
Flow modification	4	13	52	325
Bed modification	5	13	65	325
Channel modification	4	13	52	325
Water quality	11	14	154	350
Inundation	4	10	40	250
Exotic macrophytes	10	9	90	225
Exotic fauna	8	8	64	200
Solid waste disposal	1	6	6	150
Total		100	859	2500
% of total			34.4	
Class			E	
Riparian				
Water abstraction	24	13	312	325
Inundation	4	11	44	275
Flow modification	5	12	60	300
Water quality	11	13	143	325
Indigenous vegetation removal	19	13	247	325
Exotic vegetation encroachment	10	12	120	300
Bank erosion	5	14	70	350
Channel modification	4	12	48	300
Total			1044	2500
% of total			41.8	
Class			D	

14 Ecological Importance

The Ecological Importance (EI) is based on the presence of especially fish species that are endangered on a local, regional or national level (Table 3).

There are no fish either in the drainage lines nor the pans, as there is no permanent water. According to this assessment, which is prescribed for WULA's, the drainage lines and the pans are not important.

Table 3 Ecological Importance according to endangered organisms (Kleynhans,1999).

Category	Description
1	One species or taxon are endangered on a local scale
2	More than one species or taxon are rare or endangered on a local scale
3	More than one species or taxon are rare or endangered on a provincial or regional scale
4	One or more species or taxa are rare or endangered on a national scale (Red Data)

15 Ecological Sensitivity

Ecological Sensitivity (ES) is often described as the ability of aquatic habitat to assimilate impacts. It is not sensitive if it remains the same despite of the onslaught of impacts. Put differently, sensitive habitat changes substantially, even under the pressure of slight impacts.

The Ecological Sensitivity also refers to the potential of aquatic habitat to bounce back to an ecological condition closer to the situation prior to human impact. If it recovers, it is not regarded as sensitive.

The drainage lines and the pans will predictably not recover to anything resembling their original, un-impacted state, despite the housing development being removed. Once developed, it is most unlikely that the houses and streets will ever be removed.

From this perspective, the aquatic environment and its surrounds can be regarded as ecologically sensitive.

16 Possible Impacts

Most of the natural aquatic environment within the demarcated area of the new development has already been impacted upon. The only bit that remains is the very faint drainage lines in the upper part of the site. These would entirely disappear to make way for streets and houses.

The main threat to the aquatic environment, apart from direct habitat destruction, is the movement of sediments down the catchment during large rainfall events. This would have been of major concern if there were any aquatic habitat to conserve, which is hardly the case with Lethabo Park.

17 Mitigating Measures

There are no mitigating measures available for the new area that is to be developed for housing. Anything that could possibly be defined as aquatic habitat would make way for urban development.

The pans will predictably grow in size as urban surfaces harden. For this there are no mitigation measures either. The pans will be mostly dry as evaporation is high.

It would help, though, to upgrade dirt roads to paved streets with an undergrounds drainage system, as money becomes available. This would prevent movement of sediments down the catchment during rainfall events. It would, however, increase the rate of increase of Pan 1 to 4.

The litter remains a cause of concern. Downstream habitat, aquatic or otherwise, will be heavily polluted if the current situation is allowed to continue. Grids and other infrastructure to prevent litter washing down further downstream must be installed. A proper municipal waste management system is necessary.

18 Impact Assessment

Some of the decision-making authorities prescribe an impact assessment according to a premeditated methodology (Table 26.1, Appendix).

The main benefit of this exercise is that it allows for the evaluation of mitigation measures. Later follows the Risk Matrix. This is different from the Impact Assessment as it does not attempt to weigh the success of mitigation measures.

The results of the impact assessment are given in Table 4.

Like with most urban developments, the impact on the aquatic environment is definite and severe. In this case mitigation measures are not about to make a difference.

Environmental authorities will have to decide if the little and degraded aquatic habitat that was and probably still is available on the site is worth saving, instead of giving the go-ahead for the proposed development.

It is surmised that the aquatic habitat that consists of only very faint and already degraded drainage lines and 4 small mostly dry pans do not have adequate conservation value prevent the proposed urban development. The inefficiency of mitigation should therefore not be a consideration.

Table 4 Impact Assessment

Description of impact Clearing of the site Construction of roads Trenching of potable water supply and sewage lines Trenching of electricity supply Construction of houses Landscaping of terrain Removal of vegetation Destruction of aquatic habitat, drainage lines **Mitigation measures** Do not disturb any land outside of designated site Construct outside of rainy season Upgrade roads with paved surfaces Construct underground storm water system.								
Type Nature	Spatial Extent	Severity	Duration	Significance	Probability	Confidence	Reversibility	Irreplaceability
Without mitigation								
Direct	Local	High	Permanent	High	Definite	Certain	Irreversible	Irreplaceable
With mitigation measures								
Direct	Local	High	Permanent	High	Definite	Certain	Irreversible	Irreplaceable

19 Risk Matrix

The assessment was carried out according to the interactive Excel table that is available on the DWS webpage. Table 9 is a replica of the Excel spreadsheet that has been adapted to fit the format of this report.

The purpose of the Risk Matrix is to determine if a General Authorisation of a License is applicable.

The methodology is set out in the Appendix. It has been copied directly out of the DWS webpage.

For the frequency of activity and the frequency of the impact, it can be reasoned that the impact happens only once, only during the development phase. It can be reasoned that the diversion of flow only happens during rainfall events, during the operational phase, post-construction, of the development. This would not reflect the actual situation on the ground, as the impacts are permanent and would last in perpetuity. Hence the impacts have been rated as 5.

The Risk Matrix rate the risks as “Moderate”, for which a Licence is indicated.

The urban development inevitably results in the destruction of the aquatic habitat. The Risk Matrix is designed to rate such an event as significant, for which a License is required and perhaps even a no-go decision. Given the insignificance of the aquatic habitat on the site, this should not apply. In fact, a DWS letter of consent should suffice to get the development of the ground.

As has been stated before, this Risk Matrix is necessary to fulfil legal requirements, rather than to save aquatic habitat.

For this reason, the Risk Matrix has limited value and has been abbreviated. Possible impacts have been lumped in 2 points (Table 5).

Table 5 Risk Matrix

No.	Activity	Aspect	Impact	Significance	Risk Rating
1	Clearing of the site Construction of roads Trenching of potable water supply and sewage lines Trenching of electricity supply Construction of houses Landscaping of terrain	Remove vegetation Mobilise sediments	Aquatic habitat destruction	172	Moderate
2	Hardening of urban surfaces	Alter flow	Increase pans	148	Moderate

Table 5 Continued Risk Rating

No	Flow	Water Quality	Habitat	Biota	Severity	Spatial scale	Duration	Conse-quence
1 2	5 4	4 4	5 3	5 2	4.75 3.25	1 1	5 5	10.75 9.25

No	Frequency of activity	Frequency of impact	Legal issues	Detection	Likelihood	Significance	Risk Rating
1 2	5 5	5 5	5 5	1 1	16 16	172 148	Moderate Moderate

20 Resource Economics

The goods and services delivered by the environment, in this case the drainage lines, the 4 pans, is a Resource Economics concept as adapted by Kotze *et al* (2009). The methodology was designed for the assessments of wetlands, but in the case of these environments, the goods and services delivered are particularly applicable, hence it was decided to include it in the report.

The diagram (Figure 14 and 15) is an accepted manner to visually illustrate the resource economic footprint the drainage line, from the data in Table 6. The size of the star shape is important. Large star shape will attract the attention of the decision-making authorities.

Table 6. Goods and Services

Goods & Services	Drainage Lines	Pans
Flood attenuation	3	5
Stream flow regulation	3	5
Sediment trapping	1	5
Phosphate trapping	1	1
Nitrate removal	1	1
Toxicant removal	1	1
Erosion control	3	5
Carbon storage	2	0
Biodiversity maintenance	3	1
Water supply for human use	0	0
Natural resources	0	0
Cultivated food	1	0
Cultural significance	0	0
Tourism and recreation	0	0
Education and research	1	1

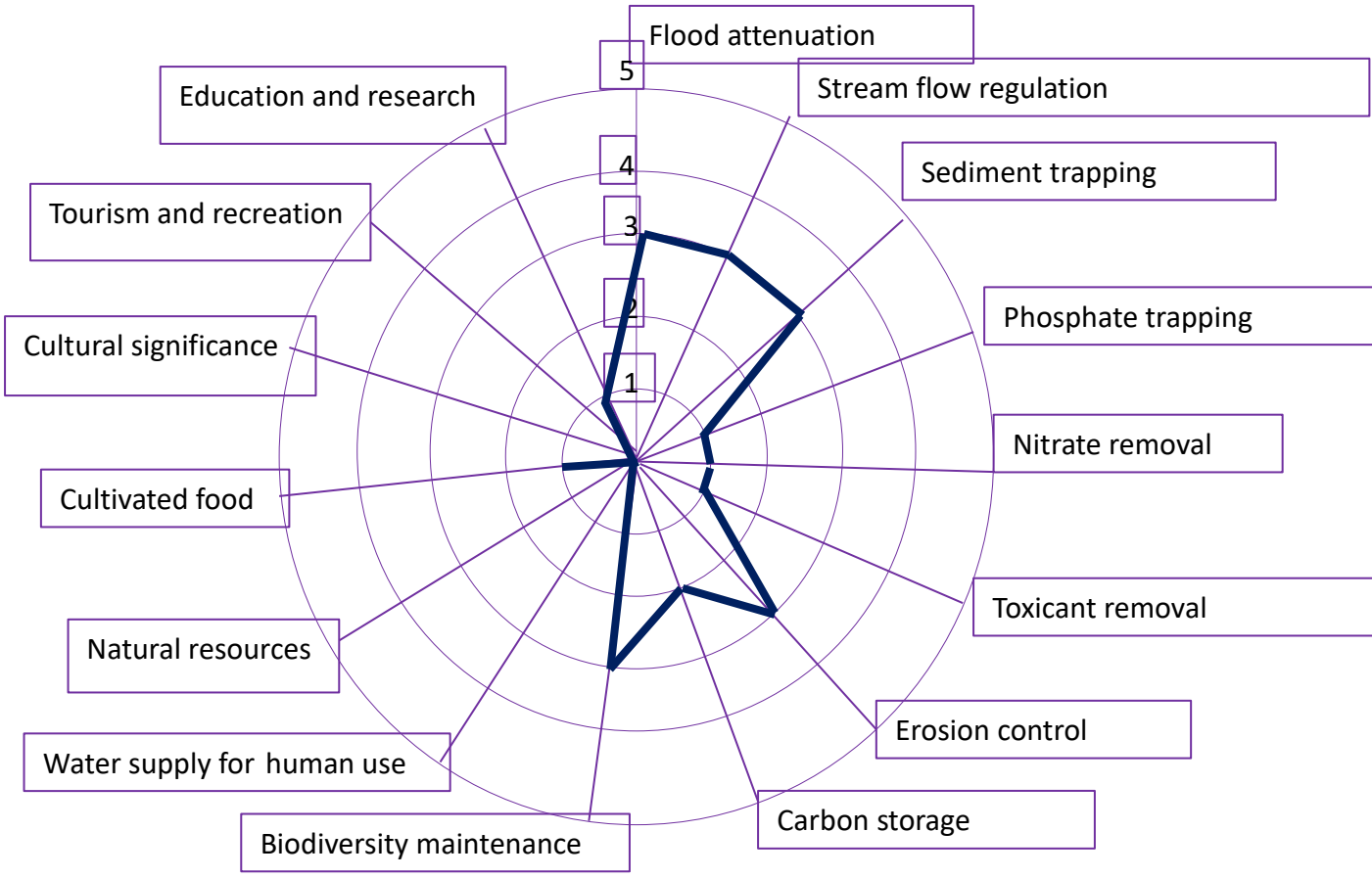

Figure 14. Resource Economics Footprint of the Drainage Lines

The star shape is rather small. From a resource economics point of view the drainage lines have limited value. Once the streets have been constructed, the star shape would decrease more, with a loss of ecological goods and services. This loss would not be significant, as the goods and services currently rendered are limited.

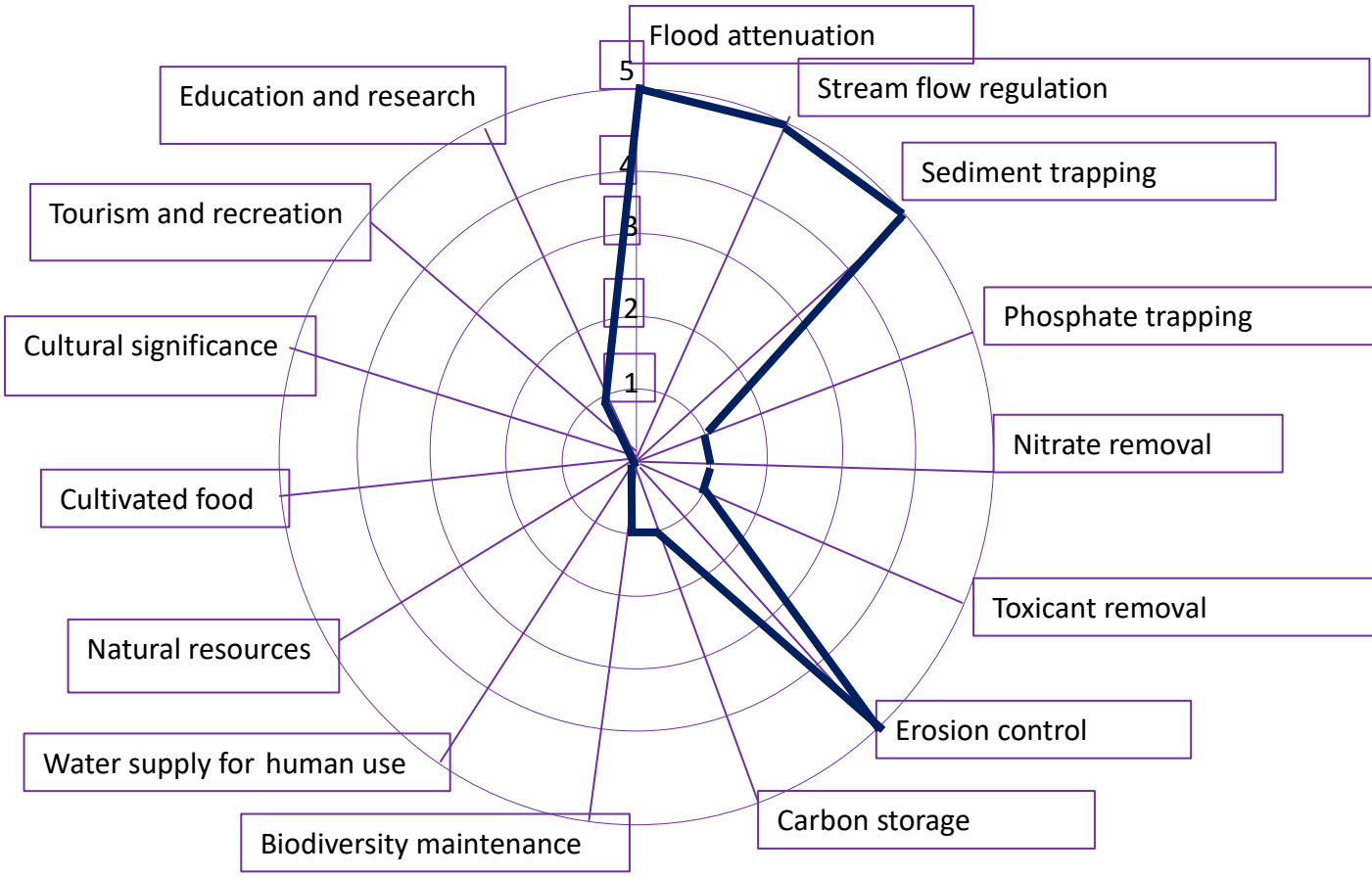

Figure 15. Resource Economics Footprint of the Pans

Because of the pending environmental impact, the star shape will increase, as the pans expand and the flood attenuation, stream flow regulation and sediment trapping increase, together with the increment in nutrient trapping. The pans will increase in value because of its ability to protect the catchment lower down from impacts out of the proposed urban development. Urban runoff would be retained instead of letting it run down drainage lines.

21 Section 27

Redressing Past Discrimination

The proposed development at Lethabo Park will have a total of 5370 stands, according to the Reneilwe report. This represents only 8.8% of the total number of stands in Kimberley.

The average number of persons per household in Kimberley demands to 3.9. According to this ratio 20943 people will be eventually reside in the new development.

The new development is required for the population growth, which has been 2.04% in Kimberley over the past 10 years. The population growth does not only consist of the births among the existing local population, but a large part is the result of influx from the rural areas. Urbanisation has been and still is an integral feature of the South African demography.

The larger part of these people is from the local coloured population. Black people from all over the province and the country are looking for a better life in Kimberley, although a few of minority groups will also seek a dwelling in Lethabo Park.

A large portion (31.9%) of the population is unemployed. Lethabo Park, with its serviced stands, offers a livelihood to these people, a stand, a dwelling, albeit an informal one and hopefully a foothold for a better life.

Efficient water use

The Reneilwe report puts the daily domestic water use per person as 20 litres. This demands to 153 megalitres a year.

However, this is not the water use that is under discussion for the WULA. The water use refers to the sacrifice of drainage lines for urban development. As has been explained, in the case of the Lethabo Park extension, the change can be regarded as an efficient use of a water resource, as water resources in Lethabo Park are scant.

Catchment Management Strategy

The "*Orange River Integrated Water Resources Management Plan*" and the "*Internal Strategic Perspective Lower Orange River Water Management Area*" has been devised. Kimberley and surrounds fall within the area covered by these reports.

However, the re-allocation of the water resource comprising of a drainage line and 4 pans are obviously not addressed in large regional water management strategies. It rather falls within the ambit of the Sol Plaatjie Municipality Integrated Development Plan.

Effect on the Water Resource

The water resource, a drainage line, will have to make way for an urban development. This is not a valuable water resource, since it is small and already impacted. Hence this change along with the loss is not considered as important.

Effect on other water users

Currently the drainage line is used for grazing and as a dumping site for illegal waste disposal. It would be advantageous if the dumping site could be replaced by an urban development.

Investment in terms of the WULA

Service providers and consultants already sent out a number of invoices, which have been subsequently paid. These amounts were for the account of the Sol Plaatjie Municipality.

Ecological Reserve

The ecological reserve for the drainage line has obviously not been determined.

22 Conclusions

An anthropogenic activity can impact on any of the ecosystem drivers or responses and this can have a knock-on effect on all of the other drivers and responses. This, in turn, will predictably impact on the ecosystem services (Figure 16). The WULA and the EAI must provide mitigation measured for these impacts.

Figure 15 has been adapted from one of the most recent DWS policy documents.

The driver of the mostly dry drainage lines is the occasional flood that follows sudden and intense rainfall events. This is followed by prolonged droughts and intense summer heat that prevents the development of any viable aquatic habitat. This is apart from shallow ground water that explains the growth of vegetation along the drainage lines.

However, the drainage lines on the site of the proposed development are faint. The slope is even and the rainfall low. This is not conducive to the development of geomorphologically distinct drainage lines. Hence the drainage lines can hardly be considered as viable aquatic habitat. The loss of these drainage lines is not considered to be significant.

The 4 pans are worthy of some level of protection, as they retain poor quality urban runoff to prevent it from running further down the catchment. As viable aquatic habitat, the pans have little value, as they are small and mostly dry.

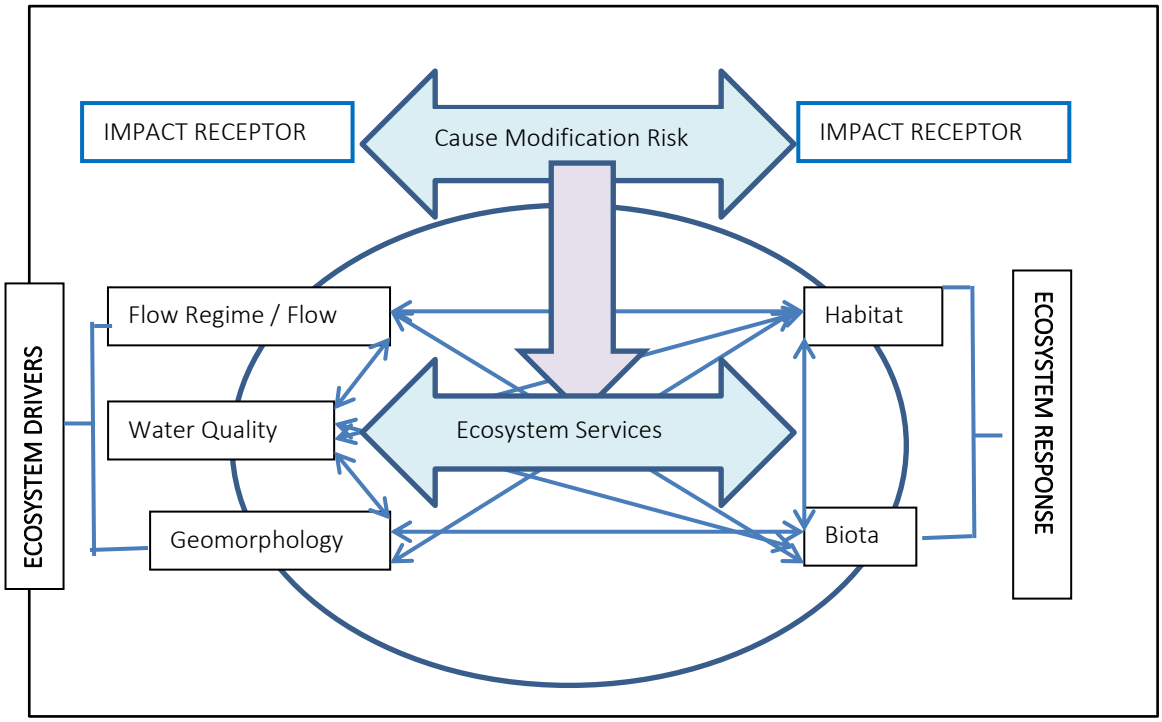

Figure 16 Minimum Requirements for a S21(c) and (i) Application

The proposed urban development will entirely alter the drainage lines. The lines would be replaced with streets and houses. As the aquatic habitat is insignificant, this does not indicate a loss of aquatic ecosystem functioning.

As has been explained before, the aquatic habitat is scant and hardly warrants a WULA. Aquatic habitat, however scant and insignificant, legally requires a S21 (c) and (i) WULA.

A DWS 'letter of consent' would suffice for the approval of the proposed development. A General Authorisation seems an 'overkill' in this particular instance. This is despite of the Risk Matrix that came out as "Moderate".

23 References

Anonymous. 2019. Draft Scoping Report: Lethabo Park. Enviro Africa, Somerset West.

Kleynhans, C.J. 1999. *Assessment of Ecological Importance and Sensitivity*. Department of Water Affairs and Forestry. Pretoria.

Kotze, G., G. Marneweck, A. Batchelor, D. Lindley & Nacelle Collins. 2009. *A technique for rapidly assessing ecosystem services supplied by wetlands.* Water Research Commission, Pretoria.

Randari, R. 2019. *Infrastructure Capacity Assessment Report, Lethabo Park Extension*. Reneilwe Consultants and Planners, Roodepoort.

24 Declaration of Independence

I, Dirk van Driel, as the appointed independent specialist hereby declare that I:

- Act/ed as the independent specialist in this application
- Regard the information contained in this report as it relates to my specialist input/study to be true and correct and;
- Do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management act;
- Have and will not have vested interest in the proposed activity;
- Have disclosed to the applicant, EAP and competent authority any material information have or may have to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the environmental Impact Assessment Regulations, 2010 and any specific environmental management act.
- Am fully aware and meet the responsibilities in terms of the NEMA, the Environmental Impacts Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R543) and any specific environmental management act and that failure to comply with these requirements may constitute and result in disqualification;
- Have ensured that information containing all relevant facts on respect of the specialist input / study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties facilitated in such a manner that all interested and affected parties were provided with reasonable opportunity to participate and to provide comments on the specialist input / study;
- Have ensured that all the comments of all the interested and affected parties on the specialist input were considered, recorded and submitted to the competent authority in respect of the application;
- Have ensured that the names of all the interested and affected parties that participated in terms of the specialist input / study were recorded in the register of interested and affected parties who participated in the public participation process;
- Have provided the competent authority with access to all information at my disposal regarding the application, weather such information is favourable or not and;
- Am aware that a false declaration is an offence in terms of regulation 71 of GN No. R543.

Signature of the specialist:  30 May 2019

25 Résumé

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Water Scientist

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Experience

WATSAN Africa, Cape Town. Scientist **2011 - present**

USAID/RTI, ICMA & Chemonics. Iraq & Afghanistan **2007 -2011**
Program manager.

City of Cape Town **1999-2007**
Acting Head: Scientific Services, Manager: Hydrobiology.

Department of Water & Sanitation, South Africa **1989 – 1999**
Senior Scientist

Tshwane University of Technology, Pretoria **1979 – 1998**
Head of Department

University of Western Cape and Stellenbosch University 1994- 1998 part-time

- Lectured post-graduate courses in Water Management and Environmental Management to under-graduate civil engineering students
- Served as external dissertation and thesis examiner

Service Positions

- Project Leader, initiator, member and participator: Water Research Commission (WRC), Pretoria.
- Director: UNESCO West Coast Biosphere, South Africa
- Director (Deputy Chairperson): Grotto Bay Home Owner's Association
- Member Dassen Island Protected Area Association (PAAC)

Membership of Professional Societies

- South African Council for Scientific Professions. Registered Scientist No. 400041/96
- Water Institute of South Africa. Member

Reports and Water Use License Applications

- Process Review Kathu Wastewater Treatment Works
- Effluent Irrigation Report Tydstroom Abattoir Durbanville
- River Rehabilitation Report Slangkop Farm, Yzerfontein
- Fresh Water and Estuary Report Erf 77 Elands Bay
- Ground Water Revision, Moorreesburg Cemetery
- Fresh Water Report Delaire Graff Estate, Stellenbosch
- Fresh Water Report Quantum Foods (Pty) Ltd. Moredou Poultry Farm, Tulbagh
- Fresh Water Report Revision, De Hoop Development, Malmesbury
- Fresh Water Report, Idas Valley Development Erf 10866, Stellenbosch
- Wetland Delineation Idas Valley Development Erf 10866, Stellenbosch
- Fresh Water Report, Idas Valley Development Erf 11330, Stellenbosch
- Fresh Water Report, La Motte Development, Franschhoek
- Ground Water Peer Review, Elandsfontein Exploration & Mining
- Fresh Water Report Woodlands Sand Mine Malmesbury
- Fresh Water Report Brakke Kuyl Sand Mine, Cape Town
- Wetland Delineation, Ingwe Housing Development, Somerset West
- Fresh Water Report, Suurbraak Wastewater Treatment Works, Swellendam
- Wetland Delineation, Zandbergfontein Sand Mine, Robertson
- Storm Water Management Plan, Smalblaar Quarry, Rawsonville
- Storm Water Management Plan, Riverside Quarry
- Water Quality Irrigation Dams Report, Langebaan Country Estate
- Wetland Delineation Farm Eenzaamheid, Langebaan
- Wetland Delineation Erf 599, Betty's Bay
- Technical Report Bloodhound Land Speed Record, Hakskeenpan
- Technical Report Harkerville Sand Mine, Plettenberg Bay
- Technical Report Doring Rivier Sand Mine, Vanrhynsdorp
- Rehabilitation Plan Roodefontein Dam, Plettenberg Bay
- Technical Report Groenvlei Crusher, Worcester
- Technical Report Wiedouw Sand Mine, Vanrhynsdorp
- Technical Report Lair Trust Farm, Augrabies
- Technical Report Schouwtoneel Sand Mine, Vredenburg
- Technical Report Waboomsrivier Weir Wolseley
- Technical Report Doornkraal Sand Mine Malmesbury
- Technical Report Berg-en-Dal Sand Mine Malmesbury
- Wetland Demarcation, Osdrif Farm, Worcester
- Technical Report Driefontein Dam, Farm Agterfontein, Ceres
- Technical Report Oewerzicht Farm Dam, Greyton
- Technical Report Glen Lossie Sand Mine, Malmesbury
- Preliminary Report Stellenbosch Cemeteries
- Technical Report Toeka & Harmony Dams, Houdenbek Farm, Koue Bokkeveld
- Technical Report Kluitjieskraal Sand & Gravel Mine, Swellendam
- Fresh Water Report Urban Development Witteklip Vredenburg
- Fresh Water Report Groblershoop Resort, Northern Cape
- Fresh Water Report CA Bruwer Quarry Kakamas, Northern Cape
- Fresh Water Report, CA Bruwer Sand Mine, Kakamas, Northern Cape
- Fresh Water Report, Triple D Farms, Agri Development, Kakamas
- Fresh Water Report, Keren Energy Photovoltaic Plant Kakamas
- Fresh Water Report, Keren Energy Photovoltaic Plant Hopetown
- Fresh Water Report Hopetown Sewer
- Fresh Water Report Hoogland Farm Agricultural Development, Touws River
- Fresh Water Report Klaarstroom Waste Water Treatment Works

- Fresh Water Report Calvinia Sports Grounds Irrigation
- Fresh Water Report CA Bruwer Agricultural Development Kakamas
- Fresh Water Report Zwartfontein Farm Dam, Hermon
- Statement Delsma Farm Wetland, Hermon
- Fresh Water Report Lemoenshoek Farms Pipelines Bonnyvale
- Fresh Water Report Water Provision Pipeline Brandvlei

26 Appendix

26.1 Methodology used in determining significance of impacts

The methodology to be used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives is provided in the following tables:

Table 26.1.1 Nature and type of impact

Nature and type of impact	Description
Positive	An impact that is considered to represent an improvement to the baseline conditions or represents a positive change
Negative	An impact that is considered to represent an adverse change from the baseline or introduces a new negative factor
Direct	Impacts that result from the direct interaction between a planned project activity and the receiving environment / receptors
Indirect	Impacts that result from other activities that could take place as a consequence of the project (e.g. an influx of work seekers)
Cumulative	Impacts that act together with other impacts (including those from concurrent or planned future activities) to affect the same resources and / or receptors as the project

Table 26.1.2 Criteria for the assessment of impacts

Criteria	Rating	Description
Spatial extent of impact	National	Impacts that affect nationally important environmental resources or affect an area that is nationally important or have macro-economic consequences
	Regional	Impacts that affect regionally important environmental resources or are experienced on a regional scale as determined by administrative boundaries or habitat type / ecosystems
	Local	Within 2 km of the site
	Site specific	On site or within 100m of the site boundary
Consequence of impact/ Magnitude/ Severity	High	Natural and / or social functions and / or processes are severely altered
	Medium	Natural and / or social functions and / or processes are notably altered
	Low	Natural and / or social functions and / or processes are slightly altered
	Very Low	Natural and / or social functions and / or processes are negligibly altered
	Zero	Natural and / or social functions and / or processes remain unaltered
Duration of impact	Temporary	Impacts of short duration and /or occasional
	Short term	During the construction period
	Medium term	During part or all of the operational phase
	Long term	Beyond the operational phase, but not permanently
	Permanent	Mitigation will not occur in such a way or in such a time span that the impact can be considered transient (irreversible)

Table 26.1.3 Significance Rating

Significance Rating	Description
High	High consequence with a regional extent and long-term duration High consequence with either a regional extent and medium-term duration or a local extent and long-term duration Medium consequence with a regional extent and a long-term duration
Medium	High with a local extent and medium-term duration High consequence with a regional extent and short-term duration or a site-specific extent and long-term duration High consequence with either local extent and short-term duration or a site-specific extent with a medium-term duration Medium consequence with any combination of extent and duration except site-specific and short-term or regional and long term Low consequence with a regional extent and long-term duration
Low	High consequence with a site-specific extent and short-term duration Medium consequence with a site-specific extent and short-term duration Low consequence with any combination of extent and duration except site-specific and short-term Very low consequence with a regional extent and long-term duration
Very low	Low consequence with a site-specific extent and short-term duration Very low consequence with any combination of extent and duration except regional and long term
Neutral	Zero consequence with any combination of extent and duration

Table 26.1.4 Probability, confidence, reversibility and irreplaceability

Criteria	Rating	Description
Probability	Definite	>90% likelihood of the impact occurring
	Probable	70 – 90% likelihood of the impact occurring
	Possible	40 – 70% likelihood of the impact occurring
	Unlikely	<40% likelihood of the impact occurring
Confidence	Certain	Wealth of information on and sound understanding of the environmental factors potentially affecting the impact
	Sure	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact
	Unsure	Limited useful information on and understanding of the environmental factors potentially influencing this impact
Reversibility	Reversible	The impact is reversible within 2 years after the cause or stress is removed
	Irreversible	The activity will lead to an impact that is in all practical terms permanent
Irreplaceability	Replaceable	The resources lost can be replaced to a certain degree
	Irreplaceable	The activity will lead to a permanent loss of resources.

26.2 Risk Matrix Methodology

RISK ASSESSMENT KEY (Referenced from DWA RISK-BASED WATER USE AUTHORISATION APPROACH AND DELEGATION GUIDELINES)

Negative Rating

TABLE 1- SEVERITY

How severe does the aspects impact on the environment and resource quality characterisitics (flow regime, water quality, geomorfology, biota, habitat)

Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful and/or wetland(s) involved	5
Where "or wetland(s) are involved" it means	

TABLE 2 – SPATIAL SCALE

How big is the area that the aspect is impacting on?

Area specific (at impact site)	1
Whole site (entire surface right)	2
Regional / neighbouring areas (downstream within quaternary catch	3
National (impacting beyond seconday catchment or provinces)	4
Global (impacting beyond SA boundary)	5

TABLE 3 – DURATION

How long does the aspect impact on the environment and resource quality?

One day to one month, PES, EIS and/or REC not impacted
One month to one year, PES, EIS and/or REC impacted but no change in status
One year to 10 years, PES, EIS and/or REC impacted to a lower status but can be improved over this period through mitigation
Life of the activity, PES, EIS and/or REC permanently lowered
More than life of the organisation/facility, PES and EIS scores, a E or F

TABLE 4 – FREQUENCY OF THE ACTIVITY

How often do you do the specific activity?

Annually or less	1
6 monthly	2
Monthly	3
Weekly	4
Daily	5

TABLE 5 – FREQUENCY OF THE INCIDENT/IMPACT

How often does the activity impact on the environment?

Almost never / almost impossible / >20%	1
Very seldom / highly unlikely / >40%	2
Infrequent / unlikely / seldom / >60%	3
Often / regularly / likely / possible / >80%	4
Daily / highly likely / definitely / >100%	5

TABLE 6 – LEGAL ISSUES

How is the activity governed by legislation?

No legislation
Fully covered by legislation (wetlands are legally governed)
Located within the regulated areas

TABLE 7 – DETECTION	
How quickly can the impacts/risks of the activity be observed on the environment (water resourc	
Immediately	
Without much effort	
Need some effort	
Remote and difficult to observe	
Covered	

TABLE 8: RATING CLASSES		
RATING	**CLASS**	**MANAGEMENT DESCRIPTION**
1 – 55	(L) Low Risk	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated. Wetlands may be excluded.
56 – 169	M) Moderate Risk	Risk and impact on watercourses are notably and require mitigation measures on a higher level, which costs more and
170 – 300	(H) High Risk	Always involves wetlands. Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale
A low risk class must be obtained for all activities to be considered for a GA		

TABLE 9: CALCULATIONS

Consequence = Severity + Spatial Scale + Duration
Likelihood=Frequency of Activity + Frequency of Incident +Legal Issues + Detection
Significance \Risk= Consequence X Likelihood