THE LAIR TRUST

Portion 13 of Farm Orange Falls 16, Augrabies

TECHNICAL REPORT

Water Use License Application

A requirement in terms of
section 21
of the

National Water Act (36 of 1998)

September 2017

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1 Introduction

Lair Trust Farm is located at Augrabies along the Lower Orange River and belongs to the Fox family. The farming operation is exclusively focused on high quality table grapes for the export market.

The first impression of the farm is very much one of farming excellence and razor-sharp business acumen. This is an extremely neat and well-run operation that befits the top end quality of the product that is grown here to satisfy the most discerning consumer abroad.

There are already existing vineyards on the farm, of which 5ha were developed in 2010, 2.5ha in 2012 and another 2.5ha in 2016. These vineyards, when planted, were in the flow path of a number of drainage lines, which are nothing more than dry water courses that only run during a heavy thunder storm. Developing agriculture through drainage lines are unfortunately not in line with current environmental legislation. Hence Lair Trust was issued with a S24G. This was a notice from the Northern Cape Provincial Department of Nature Conservation (DENC) to conduct an Environmental Impact Assessment (EIA) in accordance to Section 24G of the National Environmental Management Act (NEMA, 107 of 1998).

Subsequently Enviro Africa (Pty) Ltd of Somerset West in the Western Cape was appointed to conduct the required EIA.

The Water Use License Application (WULA) is an integral part of the EIA. WATSAN Africa was appointed to deal with the WULA on behalf of Lair Trust. The WULA requires a Technical Report in accordance with Government Notice 267 of 24 March 2017 in terms of Section 21 (c) and (i) of the National Water Act (36 of 1998). This then is the required document.

2 Expansion of Vineyards

In addition to the EIA requirements, the Fox family wants to expand the current 10 hectares of vineyard on the property with another 2 blocks. The one is going to be 2.5 hectares and the larger one 5 hectares.

The block of 5 hectares can be located on either one of two alternatives. This is further discussed on p 9.

As for the destruction of drainage lines, the 2.5-hectare block won't need a WULA, as there are no drainage lines. For both alternatives of the 5-hectare block, drainage lines will have to be ploughed over, for which a WULA is required.

3 Lair Trust Farm

- Lair Trust Farm is Portion 13 of Orange Falls Farm 19, Augrabies.
- It is located at 28°39'30.16" S and 20°20'28.81" E
- The cadastral number is C036000000000016000191.

- It is in the D53J quaternary catchment.
- The vegetation is listed as Bushmanland Arid Grassland (Least Threatened, Botes 2017).
- A permanent work force of 40 people is employed on the farm and a seasonal number of an additional 80.
- Wastewater and solid waste is collected and transported by the Kai!Garib Municipality
- A clean-up kit is kept on the premises ready for use in case of a fuel spill.

4 Lower Orange River Grape Producing Area

The grape producing area in the Lower Orange River Water Management Area stretches from the Boegoeberg Weir in the east to Augrabies in the west. It stretches over approximately 260 km, following the curve of the Orange River.

The vineyards are in the Orange River Valley, much of it in the actual flood plain (Figure 1). This is high intensity farming with an obvious environmental impact on the Orange River.

Figure 1 Vineyards in the Orange River Valley near Augrabies.

Figure 1 illustrates only a small section of the agricultural activities in the Lower Orange River and gives an impression of the massive scale of the overall operation. Yet new vineyards are perpetually established on a grand scale.

This perspective is necessary to illustrate that the existing as well as the envisaged vineyards at Lair Trust Farm is negligible if compared to what already is present on the ground.

According to the then Department of Water Affairs (2004) the water demand for the Lower Orange River was 1 130 million m^3 per year and it will grow to 1 174 million m^3 per year in 2025. This includes the water demand for the 4000 hectares of new vineyards that are to be established for previously disadvantaged farmers.

5 Drainage Lines

The Lower Orange River is lined with vineyards. These vineyards often cut off the flow from the numerous water courses that enter the Orange River. These are small tributaries that only flow during the occasional summer time heavy thunder storm. These tributaries are mostly dry drainage lines. Scouring and erosion are obvious in these drainage lines and closer to the confluence with the Orange River, some of these are deeply incised.

Water velocity down these small water courses can be quite fast and hence the erosion potential is great. If allowed to cross a vineyard, it stands to reason that the damage can be extensive. For this reason, these small water courses and even there bigger reaches lower down have been straightened and canalised since the onset of the table grape industry in the Lower Orange River valley many years ago.

The drainage lines have been cut off with berms and trenches to divert their flow around blocks of vineyards. Some of these trenches are substantial and the network of cut-offs extensive.

These storm water diversions have been constructed long before the promulgation of current environmental legislation.

Lower down closer to the Orange River these once natural tributaries have lost all their riverine characteristics and ecological function. This, however, is the trade-off that must be made for having a table grape industry. The drainage lines are dense over the landscape, despite of the semi-desert conditions and it cannot be avoided not to divert them when blocks of vines are planted, along with the access roads, irrigation and other infrastructure.

The drainage lines at the Lair Trust vineyards are not any different. The top end of these vineyards is marked by cut -off trenches (Figure 1). However, it is alleged that at least some of the vineyards were planted after the NEMA came into being and hence an EIA is now called for.

6 Agricultural Return Flow

For successful table grape farming it is most essential that vineyards are drained properly. Standing water and too much moist in the soil is detrimental. For this reason, typically a system of trenches is constructed around blocks of vineyards (Figure 2).

Most of this water derives from irrigation. Some of course is from the rainfall, which can be significant during intense thunder storms, but mostly has a small contribution

because of the semi-arid nature of the Lower Orange River valley. The runoff from the vineyards are better described as agricultural return flow.

Likewise, the Lair Trust Vineyards have been provided with a similar drainage system and the envisaged addition will have a similar arrangement.

A less intrusive and visually more pleasing drainage system is the modern sub-surface pipes that have been introduced to the farming practice. The pipes are porous and let

Figure 2 Drainage trench between blocks of newly established vineyards

in ground water, while keeping out soil. This omits the need for gullies and trenches. Excess ground water is let out downhill from the vineyards to eventually enter the Orange River as agricultural return flow.

Such a modern system of sub-surface drains has been installed at the Lair Trust vineyards.

Figures as to how much of the irrigated water ends up as agricultural return flow are scarce and differ in various localities. It depends on a vastness of factors, which are out of the scope of this report and will not be discussed any further, but it is estimated at roughly 30%.

Agricultural return flow contains nutrients and dissolved salts, which are generally most detrimental to the receiving aquatic environment. It is widely held responsible for the salination and eutrophication of the Lower Orange River.

New vineyards are perpetually established in the region and nationally on a massive scale, with resulting increase in agricultural return flow. This calls for future innovative farming methods and technology. The existing and new vineyards at Lair Trust does not and would not make a noticeable difference to the overall nutrient and dissolved

salt budget of the region. This is a national problem and to single out vineyards as culprits would not be helpful.

7 Brabeesmond Catchment

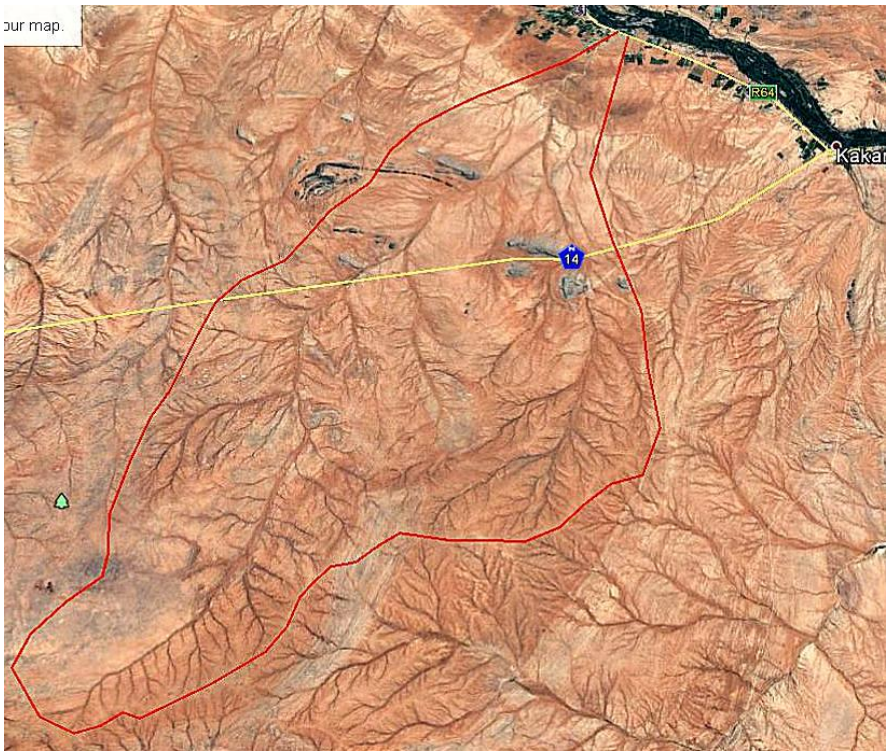

Figure 3 Brabeesmond Catchment

The Lair Trust Farm is located in a sub-catchment of a stream locally known as the Brabeesmond. The Brabeesmond is not really a river, but more fits the description of a mostly dry drainage line. Figure 3 is a rough outline (red line) of the sub-catchment as delineated with the path function of Google Earth Pro.

The sub-catchment is about 67 km long and 30 km wide at its wides point. It has a circumference of approximately 159 km and a surface area of approximately 1200km.

8 Drainage

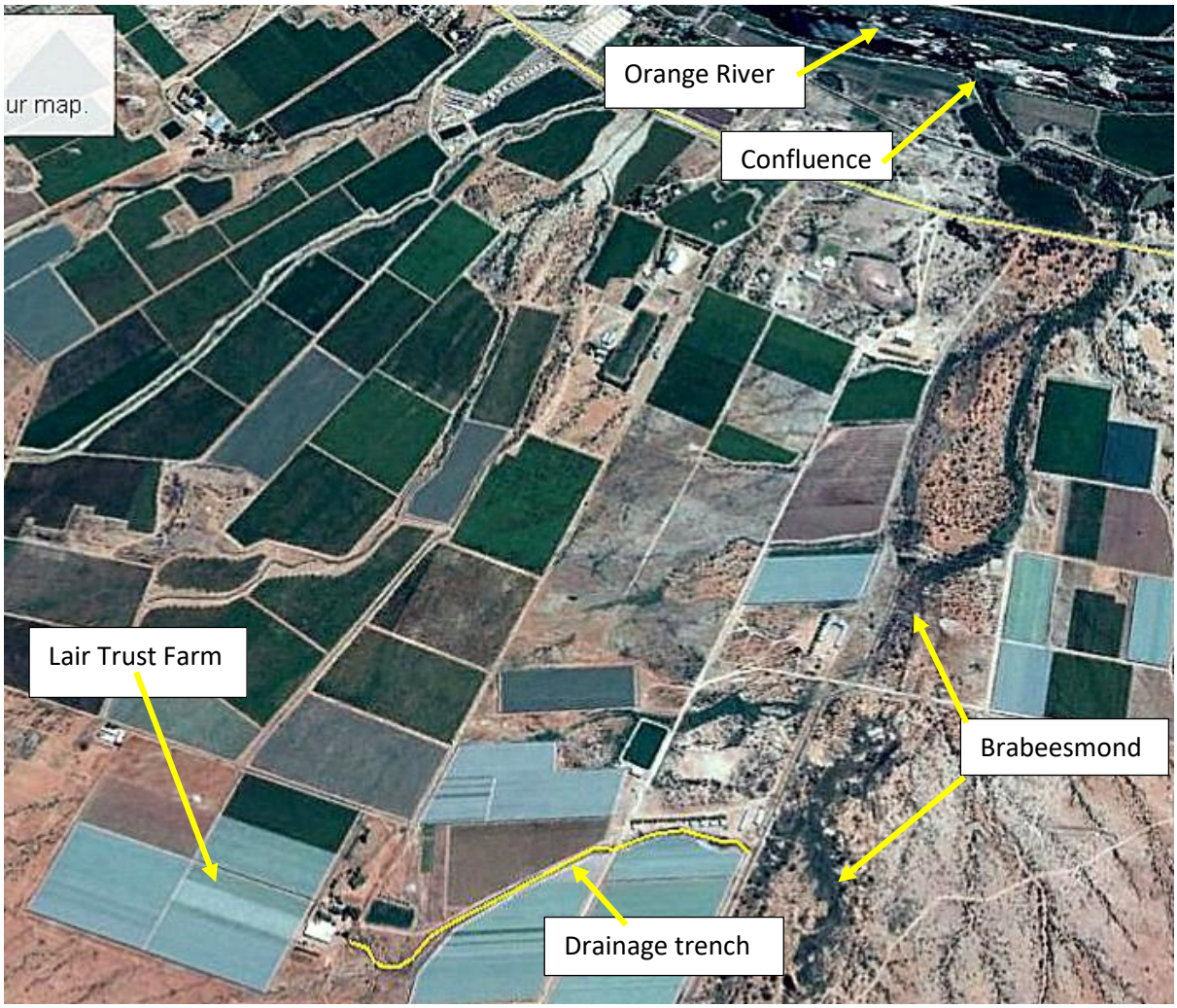

Figure 4 Brabeesmond Confluence

The runoff from the Lair Trust Farm was channelled through a constructed drainage channel to the Brabeesmond from where it flowed into the Orange River over a distance of approximately 3.3 km. The top end of this channel was still fairly natural, but the part indicated by the yellow line on Figure 4 was highly modified.

The confluence of the Brabees and Orange is at:

28°38’44.87” E
20°21’44.81” S

Most of the drainage lines in the area have been straightened and engineered into ditches for least flow resistance and optimal drainage. However, the Brabees has escaped this and it still in a morphologically natural state.

In most places, it is heavily overgrown with *Phragmitis* reeds.

The site visit in September was during the driest period of the year and it could be expected that the Brabees should be dry and without any flow at all. However, closer to the confluence there was a constant flow of between 5 and 10 $l s^{-1}$. This was possibly agricultural return flow, with no contribution from rainfall.

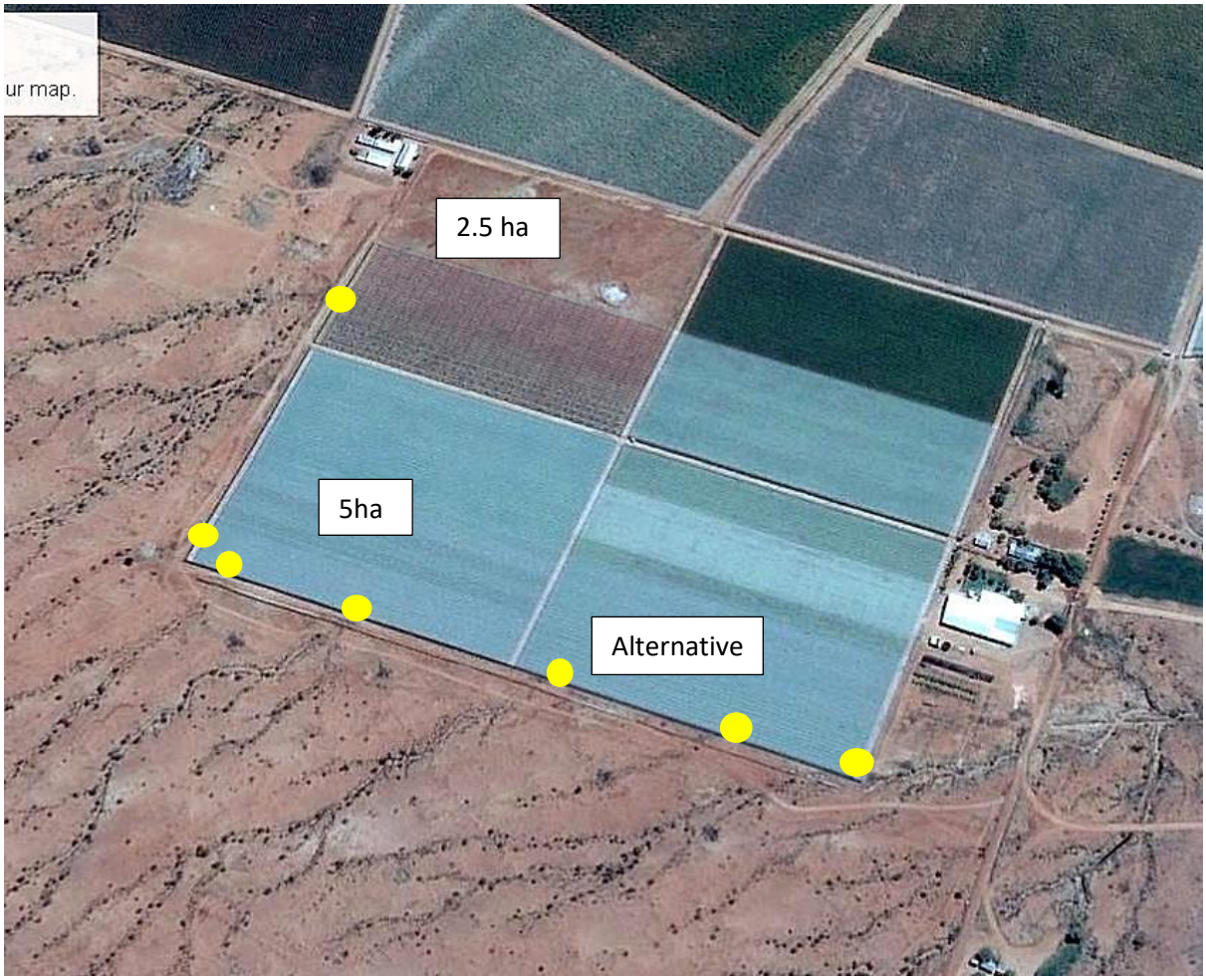

Figure 5 Drainage Lines Intersections

Figure 5 shows the drainage lines that intersect the current vineyards at Lair Trust Farm. There are at least 7 such intersections, as indicated by the yellow dots on Figure 1.

Drainage lines are depicted in Figure 6.

From these points, the flow has been interrupted and channelled around the vineyards with cut-off trenches (Figure 7).

Figure 6 Natural drainage lines adjacent to the vineyards

It is precisely this requirement of contemporary viticulture that rebels against current environmental legislation. It is now required that such environmental infarctions should be motivated by EIA's and WULA's.

The impact is local, on the spot where the drainage lines are diverted. It is not foreseen that that the current impact or the planting of the envisaged additional vineyard would make a noticeable hydrological difference to the existing situation in the Brabees or the Orange River.

Figure 7 Cut-off Trench

9 Climate

http://www.saexplorer.co.za/south-africa/climate/kakamas_climate.asp

Kakamas normally receives about 62mm of rain per year, with most rainfall occurring mainly during autumn. The chart below (lower left) shows the average rainfall values for Kakamas per month. It receives the lowest rainfall (0mm) in June and the highest (19mm) in March. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Kakamas range from 20°C in July to 33°C in January. The region is the coldest during July when the mercury drops to 3.1°C on average during the night. Consult the chart below (lower right) for an indication of the monthly variation of average minimum daily temperatures.

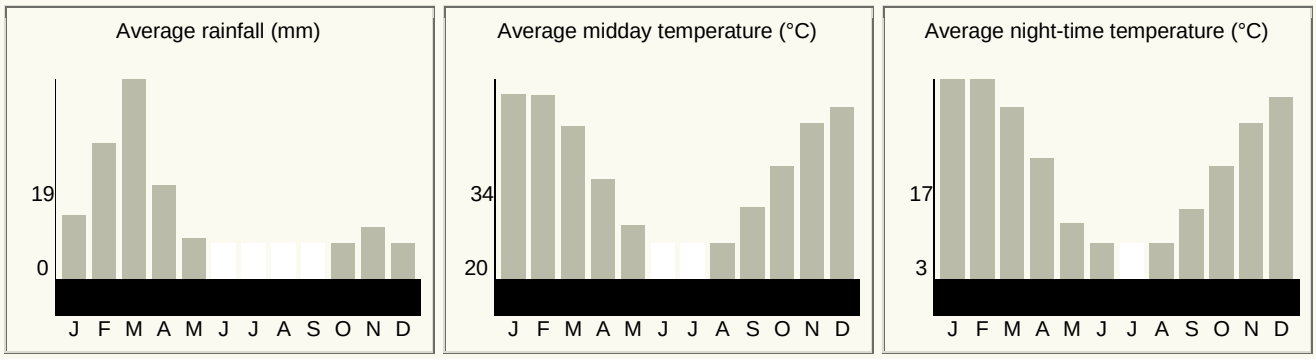

Figure 8 Climate Kakamas

The evaporation rate measured with a Symons Pan amounts to 2781 mm per year.

www.droughtsandfloods.com/Chapter%203%20Analytical%20methods.pdf

It is most obvious that this is an arid region with a huge water deficit. The table grape industry relies entirely on irrigation and not on rainfall at all.

It is hard to believe that marked drainage lines as are evident in the area can exist with such a low rainfall. The more prominent ones show prominent scouring by flowing water. There must be daily rainfall events of 40mm and higher at very low frequencies that shape the landscape and necessitates the construction of cut-off trenches around vineyards.

As the part of the catchment directly above the Lair Tryst vineyards amounts so approximately 75 hectares, at this rainfall the cut-off trenches and berms must have a design capacity to withstand a flow rate of 30 000 litres a day.

10 **Sampling Point Orange River** (Figure 9)

Figure 9 Sampling Point

The banks of the Orange River in the area is densely overgrown with Spaanse Riet (*Arundo donax*). This is classified as an aggressive and exotic invasive plant, which effectively prevents access to the river.

Moreover, the river banks have been built up with large berms to keep flood water out of adjacent agricultural land. This has denaturalised the riparian zone.

A strip of reeds is kept clean to accommodate pipes that connect the pumps on a raft in the river to a small reservoir some 100 meters away from the river. This infrastructure is for the irrigation of the extensive vineyards along the Orange River. This strip was the only access to a sampling point close to the study area.

The habitat is monotonous as the entire bank was taken over by reeds. Up the river was bedrock that could be sampled, if a boat and a launching ramp was available. Perhaps, somewhere close by, was sandy bottom that could be sampled, if a boat was available.

The reeds along the banks was only available habitat to be sampled, as well as a cluster of submerged vegetation, parrot's feather, *Myriophylum*. This is another invasive plant that does not naturally belong in the Orange River.

The sampling point thus was highly impoverished and denaturalised.

11 Biomonitoring

The only macroinvertebrate taxa that were encountered during SASS5 sampling were the following:

Atyidae shrimps (many of them)
Pleidae back swimmers (a couple)
Chironomidae midges
Coenagrionidae damsel flies

This resulted in a SASS5 score of only 18 and an ASPT of 4,5.

The scores are poor and indicate that the aquatic environment at the sampling point has been seriously impacted upon, with significant loss of ecological functioning.

At the time of sampling large barbels *Clarias gariepinus* were observed swimming close to the surface. There was a tadpole in the sampling net. A wide range of avifuana was observed.

12 Sampling Point Brabeesmond (Figure 10)

A sampling point in the Brabees was chosen because it allowed for the opportunity to investigate the agricultural return flow. Since the water sample was taken during the driest time of the year the flow in the Brabees was solely agricultural return flow at the time.

The sampling point was right next to the irrigation canal alongside the Orange River. At this point the canal dips into a large pipe underneath the bed of the Brabees, to re-surface on the downstream side and to continue as a canal.

Most of the Brabees was thoroughly overgrown with reeds. The water was very clear and no algal growth was observed.

Obviously, this experiment would not isolate the return flow from Lair Trust farm, but is rather aimed at giving an idea of what the return flow was like for all of the farms in the Brabees sub-catchment.

Figure 10 Brabees sampling point

13 Water Quality

Parameter		Orange River	Brabees
pH		7.6	8.1
Electrical conductivity	mSm^{-1}	49	228
Ammonia	mgl^{-1}	0.08	0.19
Nitrite	mgl^{-1}	0.02	0.02
Nitrate	mgl^{-1}	>0.36	>0.36
Total nitrogen	mgl^{-1}	7	10
Total phosphorus	mgl^{-1}	>0.01	0.04

Table 1 Water quality of the Orange River and Brabees sampling points

The Water of the Orange River seems to be quite fit for use by the aquatic environment. The ammonia input from agriculture and animal husbandry gets effectively transformed through the process of nitrification, as the nitrite and nitrate

concentrations are low. However, the total nitrogen concentration is high, which is characteristic of surface water in agricultural areas, because of the presence of fertilisers in return flow.

Phosphorus added in fertilisers readily binds with the soil and is not leached out easily, hence the rather low concentration. However, a concentration such as encountered in the sample is enough to explain the prolific growth of reeds on the river banks.

The parameters measured do not explain the impoverished biodiversity as illustrated by the SASS5 score. Perhaps the monotonous habitat is responsible for this, rather than the water quality.

The salt load as illustrated by the electrical conductivity from the Brabees is significant. The p H is slightly elevated. It shows that the water in the Brabees is impacted upon, probably the same as many of similar tributaries in the area. The Orange River obviously dilutes these impacts to the levels shown by the values of the water analyses.

There is a significant impact because of the elevated nitrogen concentration in the Brabees.

It cannot be said that these impacts are from the vineyards, as some if it may be from the undisturbed sub-catchment of the Brabees.

On the other hand, the impacts may be masked by a leaking canal as it dips under the Brabees just upstream and adjacent to the sampling point. This is quite possible, as the Brabees upstream of the road bridge was stagnant, with no obvious release downstream towards the sampling point, but with a strong flow downstream of the canal. Much more research is required throughout the growing season to explain the situation in the Brabees catchment.

14 Present Ecological State (PES)

The PES and EIS are protocols that have been produced by Dr Neels Kleynhans 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.

Table 2 Lower Orange River Habitat Integrity

Instream	score	weight	Product	Maximum Score	Remark
Water Abstraction	11	14	154	350	
Flow modification	10	13	130	325	
Bed modification	4	13	52	325	
Channel modification	8	13	104	325	
Water quality	5	14	70	350	
Inundation	12	10	120	250	
Exotic macrophytes	22	9	198	225	
Exotic fauna	22	8	176	200	
Solid waste disposal	1	6	6	150	
max score		100	1010	2500	
% of total			40		
Inverse			60		
Class			**C**		Moderately modified
Riperian Zone					
Water abstraction	12	13	156	325	
Inundation	12	11	132	275	
Flow modification	12	12	144	300	
Water quality	5	13	65	325	
Indigenous vegetation removal	22	13	286	325	
Exotic vegetation encroachment	22	12	264	300	
Bank erosion	5	14	70	350	
Channel modification	22	12	264	300	
		100	1381	2500	
% of total			55		
Inverse			45		
Class			**D**		Largely modified

Table 3 Present Ecological Status

Table 3 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

15 Ecological Importance and Sensitivity (EIS)

The EIS is based on the presence of especially fish species that are endangered on a local, regional or national level.

Table 4. Ecological Importance and Sensitivity Categories (EISC) 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)

According to Skelton (1993) 11 species of fish occur in the Lower Orange River. These are the following:

Barbus trimaculatus
B paludinosus
Labeobarbus kimberleyensis (Near threatened)
L aenus
Labeo umbratus
L capensis
Cyprinus carpio
Austroglanis sclateri (Widespread elsewhere)
Clarias gariepinus
Pseudocrenilabrus philander (Threatened locally but abundant elsewhere)
Tilapia sparrmanii

Those in blue are endangered to some extent. However, the only one that causes real concern in the largemouth yellow fish *Labeobarbus kimberleyensis*. It is endemic to the Orange River system and hence is threatened not only on a local scale, but on a national scale as well. This puts the Lower Orange in category 4.

This yellow fish is artificially cultured and hence is not in any real danger of extinction. This renders the Orange River as important.

16 Impact Assessment

Some of the decision-making authorities prescribe an impact assessment according to a premeditated methodology.

It is not clear at all what to what part of the river system the required impact assessment should be directed.

The drainage lines on the land where vineyards are established are destroyed. If accepted criteria were to be applied a no-go decision would automatically follow. If the decision-making authorities were not willing to sacrifice these drainage lines, very view vineyards will ever be established in the Lower Orange River valley. Yet new vineyards are established at a grand scale, for which official approval have been granted. Hence lost drainage lines seemingly do not govern decision-making. The significance of this impact is regarded as low.

Likewise, the impact of large-scale commercial viticulture has an enormous impact on the Orange River. The impacts are stream reduction, siltation, salination and eutrophication. If commercial viticulture was to be the deciding factor, no new vineyards would ever be planted. Yet new vineyards are springing up everywhere in the valley. These must have been approved and hence the scale of the overall operation cannot be the governing factor.

If the Lair Farm Trust application is eventually to be successful, the impact of only the envisaged new blocks of vineyards are to be assessed in isolation, separate from the already existing impacts. This assessment should be pointed at the downstream drainage lines and receiving aquatic environment. The impact assessment is therefore directed at the Brabees and the Orange River directly downstream of the Brabees confluence.

Table 5 Summary of possible impacts

Possible Impact		Extent	Duration	Intensity	Significance	Probability	Confidence
Removal of vegetation	Without mitigation	Local	Long term	High	Low	Probable	High
	With mitigation	Local	Long term	High	Low	Probable	High
Tilling, preparation of soil	Without mitigation	Local	Long term	High	Low	Probable	High
	With mitigation	Local	Long term	High	Low	Probable	High
Establish infra structure	Without mitigation	Local	Long term	High	Low	Probable	High
	With mitigation	Local	Long term	High	Low	Probable	High
Planting of vines	Without mitigation	Local	Long term	High	Low	Probable	High
	With mitigation	Local	Long term	High	Low	Probable	High
Irrigation of vineyard	Without mitigation	Regional	Long term	Medium	Medium	Medium	High
	With mitigation	Regional	Long term	Low	Low	Low	High
Re-planting of vineyard	Without mitigation	Local	Long term	High	Low	Probable	High
	With mitigation	Local	Long term	High	Low	Probable	High

- Local means at the site of the vineyard (Table 5).
- Regional means downstream beyond the boundary of the vineyard and down the Brabees and Orange River.
- Short term means the time during which the vineyard will be operational.
- Long term means the time following the rehabilitation of the vineyard, which is not foreseen.
- Probability is expressed with a 5-point scale: Improbable, Low, Medium, High, Probable.

- The Confidence Level can either be low, medium or high. The same applies to Intensity and Significance.

Above are the main steps in the life cycle of the block of vines that impact on the aquatic environment. It is not foreseen that the vineyard will even be rehabilitated and allowed to some state closer to the original prior to development, but that it would rather be re-planted after many years, once the vines become too old to be render the expected yield.

There is not much that can be done in the line of mitigation of the environmental impact when the soil is prepared and the vines planted. The only significant mitigation that can be implemented is to make sure that vineyards are not over-irrigated and that as little as possible agricultural return flow is created.

The impact of a couple of new blocks of vineyard is negligible and therefore should be given the go-ahead. This, however rebels against the desperate situation on the ground. Decision-making authorities are free to press on amendments to what is presented here.

17 Risk Assessment

The assessment was carried out according to the interactive Excel table that is available on the DWS webpage. Table 6 is a replica of the Excel spreadsheet that has been adapted to fit the format of this report. The numbers in Table 7 (continued) represent the same activities as in Table 7.

The original risk assessment as on the DWS webpage has been submitted on the included DVD.

The risk assessment is a requirement of Government Notice 1180 of 2002 in terms of the National Water Act (36 of 1998).

Table 6 Risk Assessment

No.	Activity	Aspect	Impact	Significance	Risk Rating
1	Removal of vegetation	Vegetation	Destroy drainage line	42	Low
2	Preparation of soil	Tilling	Silt in Brabees & Orange	24	Low
3	Infrastructure	Trellis, irrigation, Disturb soil	Silt	30	Low
4	Planting	Disturb soil	Silt	24	Low
5	Irrigation	Return flow	Water quality	24	Low
6	Re-planting	Disturb soil	Silt	24	Low

Table 6 Continued Risk Rating

No	Flow	Water Quality	Habitat	Biota	Severity	Spatial scale	Duration	Conse-quence
1	4	1	4	4	3.25	1	5	9.25
2	1	1	1	1	1	1	4	6
3	1	1	1	1	1	1	4	6
4	1	1	1	1	1	1	4	6
5	1	2	1	1	1.25	1	2	4,25
6	1	1	1	1	1	1	4	6

No	Frequency of activity	Frequency of impact	Legal issues	Detection	Likelihood	Significan-ce	Risk Rating
1	1	1	5	1	8	74	Medium
2	1	1	5	1	8	48	Low
3	1	1	5	1	8	48	Low
4	1	1	5	1	8	48	Low
5	3	3	5	2	13	55.25	Low
6	1	1	5	1	8	48	Low

The destroying of drainage lines comes out as a moderate impact that cannot be approved under a General Authorisation and requires a License. However, a small section of drainage line in an arid region is of little significance and does not warrant a License.

The only reason that the irrigation impact came out as low is because the volume is little that originates from a couple of blocks of vineyard. The impact of the viticulture irrigation on the Lower Orange River is immense. In the past, the DWS decided that the addition of a small block of vineyard hardly makes any difference to the already existing impact and hence allowed new developments under a General Authorisation.

18 Conclusions

Figure 13 has been adapted from one of the most recent DWS policy documents.

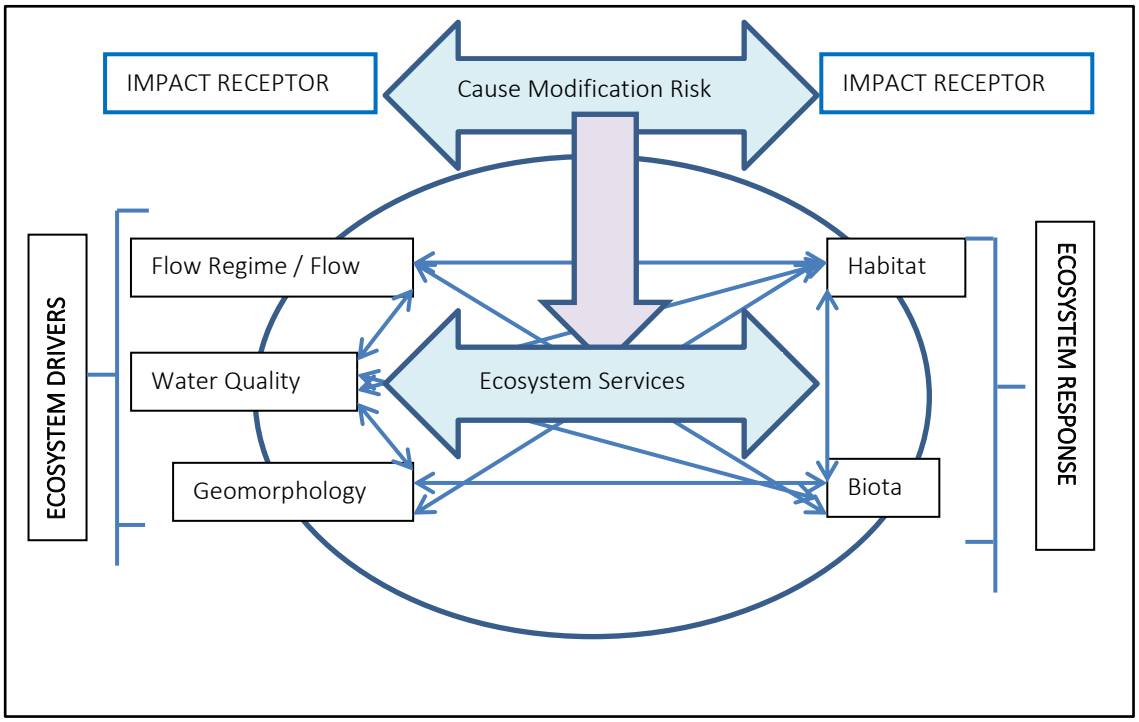

Figure 11 Minimum Requirements for a S21(c) and (i) Application.

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

The conclusions can be structured along the outline that is provided by Figure 11.

The main driver of the system is the water that comes from the Upper Orange River. The other determining factors are the water abstraction and the salination.

Agriculture has a marked deleterious impact on the Lower Orange River. This is weighed against the need for nourishment and economic benefit for the region as well as the country. Up to now the authorities could allow expansion of the industry, to the detriment of the aquatic environment. Obviously decision-making authorities have environmental quality objectives and once these are compromised, it can be expected that further expansion would be disallowed.

Considering the large expanse of existing vineyards as well as large scale establishment of new vineyards in the region, the two blocks of envisaged vineyards are entirely insignificant.

The addition of the two blocks of vineyards at The Lair Trust Farm should be permitted under a General Authorisation.

19 References

Botes, P. 2017. *Botanical Assessment. 24G application, The Lair Trust, Orange Falls Farm.* PB Consult, Bredasdorp

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

Skelton, P. 1993. *A Complete Guide to the Fresh Water Fishes of Southern Africa*. Tutorial Press, Harare.

20 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: D VAN DRIEL

Name of the company: WATSAN Africa Date: 15 September 2017