

DRAFT BASIC ASSESSMENT REPORT

**DEVELOPMENT OF 2 IN-STREAM WEIRS AND ASSOCIATED INFRASTRUCTURE
ON REMAINING EXTENT OF THE FARM NOSILLA 27 JU
WHITE RIVER AREA, MPUMALANGA.**

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1. EXECUTIVE SUMMARY

- **Two In-stream Weirs**: This initial phase of the **Environmental Investigation Process** was conducted over a period of 6 months in the White River area. The proposed construction of two instream-channel weirs for irrigation purposes using the water allocated to the farm will enable the applicant to supply agricultural water to orchards during the drier months of the year and thus ensure a long-term sustainable approach to the farm's business activities.
- **Public Participation**: The public participation process was advertised locally and regionally in the printed media and on site. The immediate neighbours of the property were contacted specifically via e mail and requested to attend the Site Meeting. Government officials and representatives from the Irrigation Board were also invited to the on-site meetings and discussions.
- **Reports**: Hard copies of the Draft Basic Assessment Report is made available for comment at the Nosilla Farm Office, the White River Library, the offices of the Planning Division at White River Municipality, all individuals and Government Departments listed in the distribution list and those that registered and or attended the Public Site Meeting.
- **Issues and Responses Report**: Comments and contributions received from Interested and Affected Parties were included in **Appendix 2** (Issues and Responses Report) and were listed for consideration during the impact assessment phase of the project.
- **The Assessment Process**: This study and evaluation have looked at the various aspects that could be affected by the implementation of such a proposal. Experience gleaned from similar projects in the valley was sourced for additional input.
- The **Impact Assessment** investigated the **significance** of impacts, **alternative** options and **mitigation** measures where applicable. The report includes amongst others an **Environmental Management Programme (EMPr)**, **Specialist Studies** on the terrestrial- and aquatic ecology of the designated project site; a **Heritage Impact Assessment (HIA)** and **Engineering Reports** pertaining to the **hydrology** of the area and the **design specifications** of the dam. The Draft BAR is submitted to the Interested and Affected Parties for comments and input.
- The evaluation process did not reveal any fatal flaws and this document is also submitted to the Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA) for consideration.
- **The Specialist Study on Biodiversity and Ecology** followed the step-by-step guidelines described in the Mpumalanga Biodiversity Sector Handbook (MBSP) as compiled by Dr. Mervyn Lötter *et al.*
- **Additional key issues include:**
 - The applicant has access to **adequate water** as per entitlements and lawful water use.
 - The soils on the cleared forestry areas are **suited for orchard purposes.**
 - The soils and geology at the **weir sites are stable** for the construction of the two weirs.

- **Heritage Aspects:** It is recommended that an Environmental Control Officer (ECO) oversee the implementation of the development phase and the handling procedure of any finds is described in the Environmental Management Programme (EMPr).
- An accredited archaeologist must oversee and monitor the initial clearing of the weir development site/s.
- Should any artefact, or historical site be incidentally discovered during excavations for foundations as well as in future, all works must cease with immediate effect. The find must be reported to the Project Manager for the development and the ECO for the project.
- These representatives will initiate an Action Plan in conjunction with SAHRA and the developer to address the management and handling of the find.
- **Weir Management:** The following control measures must be implemented to ensure that the allocations and abstraction volumes remain within the approved entitlements:
 - Measure water pumped into the dams from the weirs. (daily volumes).
 - Record the water released downstream from the weirs.
 - Record rainfall.
 - Record evaporation.
- **Yield Analysis:**
 - The Ecological Water Requirement (EWR) was determined at 31% of run-off or rather 1.3 million m³/annum The EWR is not a constant flow and has to be adapted to the seasons of the area.
 - For the Nosilla system to abide by this required water allocation the EWR is simplified to monthly values equivalent to the 80 percentile of the EWR requirement as follows:

Ecological Water Requirement per month in m³

Month	Weir 2	Weir 1
Jan	6000	19 011
Feb	6967	21 134
Mar	7071	21 936
Apr	6843	21 228
May	6642	20 474
Jun	6013	18 398
Jul	5571	17 549
Aug	5143	16 086
Sep	4769	14 152
Oct	4500	13 893
Nov	4769	14 152
Dec	5143	16 086

- **Maintaining the EWR**: The estimated yield of the scheme is 170 000 m³/annum at 80% assurance with an average long-term supply of 153 000 m³/annum.
- The proposed water allocation and long-term supply after taking into account droughts and water restrictions will result in a net increase of flow **exiting the farm downstream of approximately 25 900 m³/annum**.
- As an additional safeguard to secure low flow a minimum of 11 litres per second must be released out of the lower weir. All these releases must be metered by the applicant.
- Construction of the weirs will occur in the months from April to October. It is not expected that river diversion will be a major issue in this time.
- Depending on the flow of the stream the construction team will make use of a cofferdam to contain water with a 400mm diameter outlet pipe to manage the flow in the stream.
- Provision will also be made to release the EWR from an outlet pipe as per the quantities described in the EWR table above.
- **Water Meters**: Measuring devices will be installed upstream and downstream of the proposed weirs. The local Irrigation Board will have access to this data on request.
- **Fatal Flaw**: The evaluation process did not reveal any **fatal flaws** during the investigation process.

Conclusion and Environmental Statement: The project satisfies the requirements of sustainable integrated environmental management. Provided the developer implements the recommendations and conditions of this report, and the mitigation measures proposed, especially in terms of biodiversity management, it is recommended that the development of the two weirs are approved.

2. ABBREVIATIONS

ASAP	As Soon As Possible
Asl	Above sea level
BEE	Black Economic Empowerment
CBA	Critical Biodiversity Area
cm	centimetre
DAFF	Department of Agriculture, Forestry and Fisheries
DARDLEA	Department of Agriculture, Rural Development, Land and Environment Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ER	Ecological Reserve
ESA	Ecological Support Area
ESKOM	Electricity Supply Commission
EWR	Ecological Water Requirement
GPS	Geographical Positioning System
ha	Hectare
HIA	Heritage Impact Assessment
I&AP's	Interested and Affected Parties
IEM	Integrated Environmental Management
IUCMA	Inkomati Usuthu Catchment Management Agency
kPa	kilopascal
LFIS	Low Flow Irrigation System
LUDS	Land Use Decision Support Tool
m	metre
mm	millimetre
MTPA	Mpumalanga Tourism and Parks Agency
m/s	metre per second

NA	Not Applicable
NHBRC	National Housing Building Regulations Council
NIS	Nut In Shell
OHASA	Occupational Health and Safety Act
OMPr	Operational Management Programme
ONA	Other Natural Areas
PDI	Previously Disadvantaged Individual
PES	Present Ecological State
PPP	Public Participation Process
RES	Rhengu Environmental Services
SFRA	Steam Flow Reduction Activity
SABS	South African Bureau of Standards
SAHRA	South African Heritage Resources Agency
SCF	Saint Cloud Farm
sqm	square metre

3. LEGISLATION APPLICABLE TO THE PROPOSED PROJECT

Legislation and guidelines that are being considered for the environmental impact assessment process are as follows:

3.1. Constitution of the Republic of South Africa (No.108, 1996):

The Constitution is the supreme law of South Africa, against which all other laws are measured. It sets out several fundamental environmental rights, which include:

The Environmental Clause:

Section 24 of the Constitution outlines the basic framework for all environmental policy and legislation:

It states that everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic- and social development.

Access to Information:

Section 32 of the Constitution provides that everyone has the right of access to any information held by the State or another juristic person and that is required for the exercise or protection of any rights.

Fair Administrative Action:

Section 33 of the Constitution provides for the right to lawful, reasonable and procedurally fair administrative action.

Enforcement of Rights and Administrative Review:

Section 38 of the Constitution guarantees the right to approach a court of law and to seek legal relief in the case where any of the rights that are entrenched in the Bill of Rights are infringed or threatened.

3.2. National Environmental Management Act (No. 107, 1998):

The National Environmental Management Act (NEMA) is South Africa's overarching environmental legislation. The Act gives meaning to the right to an environment that is not harmful to health or well-being, entrenched in Section 24 of the Constitution of the Republic of South Africa, Act 108 of 1996. The National Environmental Management Act (NEMA, Act No. 107 of 1998) establishes a set of principles which all authorities (organs of State) must consider when exercising their powers, for example, during the granting of permits. These include the following:

- Development must be sustainable.
- Pollution must be avoided or minimised and remedied.
- Waste must be avoided or minimised, reused or recycled.
- Negative impacts must be minimised.
- Responsibility for the environmental consequences of a policy, project, product or service applies throughout its life cycle.

NEMA further provides for an equitable access to natural resources, environmental protection and the formulation of environmental management frameworks. The Act is underpinned by the global concept of sustainable development.

The interpretation, administration and application of NEMA are guided by fundamental principles of sustainable development, provided in Chapter 1 of the Act. "Development must be socially, environmentally and economically sustainable" (s 2(3)) and requires the consideration of all relevant factors, which are elaborated by eight sub-principles".

These principles include:

- The polluter pays principle (s 2(4) (p)).
- The public trust doctrine (s2(4)(o)).
- The equitable access to natural resources (s 2(4)(d)).

Section 24 of the Act states that all activities that may significantly affect the environment and require authorisation by law must be assessed prior to their approval.

The Act goes on to list the requirements for an assessment. These include:

- The environment likely to be affected by the activity and viable alternatives.
- Cumulative effects and their potential significance.
- Mitigation measures including the "no go" option.

Section 28(1) states that "every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring".

If such degradation/pollution cannot be prevented, then appropriate measures must be taken to minimise or rectify such pollution. These measures may include:

- Assessing the impact on the environment.
- Informing and educating employees about the environmental risks of their work and ways of minimising these risks.
- Ceasing, modifying or controlling actions which cause pollution/degradation.
- Containing pollutants or preventing movement of pollutants.
- Eliminating the source of pollution.
- Remedying the effects of the pollution.

3.3. National Water Act (No. 36, 1998):

The Act details the management of South Africa's water resources in terms of utilisation and duty of care to prevent water pollution. The act further details the legislation pertaining to the pollution of water reserves (surface and ground water) and the remediation/rehabilitation thereof.

3.4. Mpumalanga Nature Conservation Act (No. 10, 1998):

An Act to consolidate and amend the laws relating to nature conservation within the Province and to provide for matters connected therewith. This Act makes provision with respect to nature conservation in the Mpumalanga Province. It provides for, among other things, protection of wildlife, hunting, fisheries, protection of endangered fauna and flora as listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the control of harmful animals, freshwater pollution and enforcement. The Mpumalanga Parks Board (now MTPA), established by section 2 of the Eastern Transvaal Parks Board Act, 1995, shall be responsible for the administration of the Act.

3.5. Conservation of Agricultural Resources Act (No. 43, 1983):

This Act provides for control over the utilisation of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combatting of weeds and invader plants and for matters connected therewith.

3.6. National Environmental Management: Biodiversity Act (No.10, 2004):

To provide for, inter alia, the management and conservation of South Africa's biodiversity, to protect species and ecosystems. The Act also covers alien- and invasive species and genetically modified organisms that pose a threat to biodiversity.

The objectives of this Act are to within the framework of the National Environmental Management Act provide for:

- The management and conservation of biological diversity within the Republic and of the components of such biological diversity.
- The use of indigenous biological resources in a sustainable manner.
- The fair and equitable sharing among stakeholders of benefits arising.
- To give effect to ratified international agreements relating to biodiversity.
- To provide for co-operative governance in biodiversity management and conservation.
- To provide for a South African National Biodiversity Institute to assist in achieving these objectives of this act.

3.7. National Environmental Management: Protected Areas Act (No. 57, 2003) as amended by the National Environmental Management: Protected Areas Amendment Act (No 31 of 2004):

To provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for inter-governmental co-operation and public consultation in matters concerning protected areas and for matters in connection therewith.

3.8. National Environment Conservation Act (No 73, 1989):

The purpose of the Act is to provide for the effective protection and controlled utilisation of the environment and for matters incidental thereto. It embodies the concept of control of activities which may have detrimental effects on the environment which may be:

- Land use and transformation.
- Water use and disposal.
- Resource removal, including natural living resources.
- Resource renewal and,
- Agricultural processes.

The Act also provides for the control of Environmental Pollution through:

- Prohibition of littering.
- Removal of litter.
- Waste management.

In addition to the above the Act provides for the regulations regarding waste management such as:

- The classification of different types of waste and the handling, storage, transport and disposal of waste.
- Reduction of waste.
- Utilisation of waste by way of recovery, re-use or processing of waste.
- Location, planning and design of disposal sites and the site used for waste disposal.
- Administrative arrangements for the effective disposal of waste.
- Dissemination of information to the public on effective waste disposal.
- Control over the import and export of waste, etc.

3.9. National Heritage Resources Act (No. 25, 1999):

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act (Act No. 25 of 1999). The enforcing authority for this act is the South African National Heritage Resources Agency (SAHRA). In terms of the Act, historically important features such as graves, trees, archaeology and fossil beds are protected. Similarly, culturally significant symbols, spaces and landscapes are also afforded protection.

In terms of Section 38 of the National Heritage Resources Act, SAHRA can call for a Heritage Impact Assessment (HIA) where certain categories of development are proposed. The Act also makes provision for the assessment of heritage impacts as part of an EIA process and indicates that if such an assessment is deemed adequate, a separate HIA is not required.

According to the National Heritage Resources Act (Section 38(8)), such an assessment must meet the requirements of the relevant heritage authority. The following requires the approval of SAHRA:

- Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised.
- The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length.
- Any development or other activity which will change the character of a site - exceeding 5 000 m² in extent; or involving three or more erven or divisions thereof which have been consolidated within the past five years.
- The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority.
- The re-zoning of a site exceeding 10 000 m² in extent.
- Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

3.10. Occupational Health and Safety Act (No. 85, 1993):

To provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety and to provide for matters connected therewith.

3.11. Promotion of Access to Information Act (No 2, 2000):

To give effect to the constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights and to provide for matters connected therewith.

3.12. National Environment Management: Waste Act, 2008 (No 59 of 2008):

To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.

- To provide for institutional arrangements and planning matters.
- To provide for national norms and standards for regulating the management of waste by all spheres of government.
- To provide for specific waste management measures.
- To provide for the licensing and control of waste management activities.
- To provide for the remediation of contaminated land.
- To provide for the national waste information system.
- To provide for compliance and enforcement.
- To provide for matters connected therewith.

Section 24 of the National Environmental Management Act (1998) requires that activities that require authorisation or permission by law which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorising, permitting, or otherwise allowing the implementation of an activity. The EIA process is the tool used to apply for authorisation from the regulating authority for the relevant activities identified that may impact on the environment.

3.13. National Forests Act, 1998 (Act No. 84 of 1998):

No person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated.

3.14. ACTIVITY NUMBER LISTED UNDER NEMA

This assessment considered the following listed activities:

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per the detailed project description:	Extent of each Activity
Government Notice R983 amended as Government Notice: No: 327 of 7 April 2017 Gazette Number: 40772:	12	The development of-(v) weirs, where the weir infrastructure and water surface area exceeds 100sqm in size, where such development occurs- (a) within a water course or (c) ...within 32m of a water course.	Weir Heights: 3m. Width varies from 28m (Weir 1) to 46m (Weir two). Weir 1 will cover 0.11ha of vegetation when full and weir 2 will cover 0.15ha. The spillway width at weir 1 will cover 20m of vegetation (width) with a depth of 0.8m. Spillway dimensions for weir 2 are 13m wide and 0.5m deep. When applicable in future the applicant will have to construct a pump house close to each weir. This may affect a maximum of 50sqm of vegetation near each weir facility.
Government Notice R983 amended as Government Notice: No: 327 of 7 April 2017 Gazette Number: 40772:	19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock, of more than 10 cubic metres from-(i) a watercourse.	Patch gravelling for the access road and or foundations for each pump house will require approximately 25 tons (5 truckloads) of all-weather gravel.
Government Notice R985 as amended as Government Notice: No: 324 of 7 April 2017 Gazette Number: 40772:	12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.	Approximately 100sqm of vegetation will be cleared for the two pump house and 0.26ha will be affected by the water stored in the two weirs. The two spillways will affect an additional 33m of vegetation.

<p>Government Notice R985 as amended as Government Notice: No: 324 of 7 April 2017 Gazette Number: 40772:</p>	14	<p>The development of-</p> <p>(i) dams or weirs.....and infrastructure exceeding 10sqm in size or</p> <p>(ii) infrastructure or structures with a physical footprint of 10sqm or more</p> <p>Where such development occurs- (a)within a water course or (c) ...within 32m of a water course.</p>	<p>Weir Heights: 3m. Width varies from 28m (Weir 1) to 46m (Weir two). Weir 1 will cover 0.11ha of vegetation when full and weir 2 will cover 0.15ha. The spillway width at weir 1 will cover 20m of vegetation (width) with a depth of 0.8m. Spillway dimensions for weir 2 are 13m wide and 0.5m deep. When applicable in future the applicant will have to construct a pump house close to each weir. This may affect a maximum of 50sqm of vegetation near each weir facility.</p>
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Note: A **Water Use Licence Application** (WULA) will be submitted to the Inkomati Usuthu Catchment Management Agency (IUCMA) as part of the requirements of the National Water Act. The WULA process has been initiated and is running concurrently with the EIA process.

- 3 off channel storage dams will also be constructed during the farming operations. These dams are below the threshold as described in the regulations and will be developed on cleared blue gum plant stations.

4. NEEDS AND DESIRABILITY OF THE PROPOSED ACTIVITY: DEVELOPMENT OF TWO INSTREAM IRRIGATION/STORAGE WEIRS FOR CROP PRODUCTION.

- **Introduction:** Development proposals should always follow an **integrated approach** to project planning.
- With this in mind, the project must make economic sense, whilst at the same time environmental damage and impact must be kept to a minimum and or mitigated fully.
- Finally, the needs and aspirations of society must be met with the view to producing the best long-term product for the community (internal- and external community) at large.
- Developers risk and spend significant sums of hard-earned money to ensure the financial viability of each proposed project. Due to this they are obliged to thoroughly investigate and plan before budgeting funds towards a specific project – it is ultimately not in their interest to commence with a project without having assessed all the risks involved. They, along with society, are keen to see that the project is a long-term sustainable success.
- **Background:** Farm Nosilla borders Saint Cloud Farm (SCF), which has been an Agricultural farm since 1981. Saint Cloud Farming produces macadamias, blueberries and ginger. Passion Fruit is also planted from time to time. Nosilla, which is a timber property came up for sale in early 2020 and being the neighbouring property, it made good business sense for the owners of SCF to acquire the property to integrate with their current operations.
- It is envisaged to develop Nosilla to produce mainly macadamias and about 10-15 ha of blueberries. ginger will be planted annually as a cash crop prior to the establishment of the Macadamias.
- **Strategic International- and Regional Importance and Potential:**
- With a global population that is increasing exponentially, so does the need for healthy, sustainable food sources.
- The climate of Nosilla, as part of the Lowveld Region in South Africa, suits itself perfectly to the cultivation of the aforementioned crops. Macadamias are sold worldwide and are considered a healthy source of protein and vitamins. Blueberries are one of the Super Foods, and not only very healthy to eat, but it is a creator of employment.
- SCF currently employs over 250 staff during the blueberry picking season, which will increase to 500 staff with the additional plantings that are envisaged for Nosilla. Ginger, also a Super Food, high in antioxidants has played a crucial role in keeping global populations healthy during the Covid epidemic for the last two years.
- Ginger requires a moderate sub-tropical climate and is therefore also ideally suited to Nosilla. Ginger is planted and harvested manually and therefore also a significant creator of employment in the White River area. All the above-mentioned commodities require water to grow successfully and therefore the need to build weirs to ensure a sustainable water supply especially during dry periods remains critical.
- **The proposed construction of the weirs:**
- With the proposed construction of the weirs and utilising the water within the criteria as set out by the project, it will enable Nosilla to store water in the off-channel storage dams for irrigating the crops during winter and as needed during the remainder of the year.

- Constructing the weirs and the off-channel storage dams will allow the applicant to continue to **maintain and expand their orchards** and remain fully operational during times of low water availability or drought. Growing, processing, sales and exporting of macadamia and other products will thus continue as per the economic vision described above. This approach will also ensure **more job security** for the staff on the farms especially during drought events.
- Without the development of the dams and weirs, Nosilla would not be able to be an economically viable project in the long term.
- **Do we need new irrigation weirs?**
- Yes. The farm needs to extract water from the weirs to pump to off-channel storage facilities. The water extracted from the weirs would comply to the annual legal water use allowance registered against the farm.
- Having water in storage dams available would enable the farmer to distribute water to orchards during the dry seasons and allow for sustainable irrigation. The weirs are seasonal and water would only be pumped during the wet season.
- The removal of many hectares of blue gum forests will enhance the availability of water in the environment. See Specialist Study in **Appendix 4.4.2** for detail.
- In this way the farm remains economically viable throughout the year.
- **What are the benefits of having new weirs?**
- During summer, normal rainfall events ensures that less water is used for irrigation. Water is then utilised to be pumped from weirs to off channel dams for storage and use during the winter months.
- The water stored in the off-channel dams would then enable Nosilla to irrigate during winter months, and successfully cultivate the crops envisaged. This would ensure an economically viable project, creating jobs and ensuring a sustainable agricultural business in the White River area.
- Finally, this will also enable the property owners and managers to irrigate during the drier winter months and prevent loss of production and orchards due to severe water shortages such as was the case during the **2015/2017** drought.
- **Will the weirs affect the neighbours negatively?**
- No, no neighbours would be negatively affected. The removal of the timber and the land use change to agricultural crops will consume less water, and therefore make more water available to the surrounding area. The **Ecological Water Requirement** recommendations (EWR) as described in **Appendix 4.4.2** will also ensure that additional water is released back into the riparian environment.
- **Will the dam/weirs be beneficial to the community at large?**
- Yes, it will create more employment, more food security for South Africa and ensure less job losses due to the sustainable water supply during droughts.
- **What are the economic benefits of the new weirs?**
- Storing the water will ensure that the irrigation of orchards during periods of low water availability, or severe droughts, will continue and this will prevent orchards being abandoned or scaled back which could result in a loss of income or job opportunities both on the property as well as in the local fruit processing facilities.
- **What will the development of the weirs and off-channel storage dams cost?**
- The construction of the weirs is estimated in the region of R 300 000.00 per weir, with the building of the 120000m³ off-channel dams to be in the region of R 500 000.00.

- **Neighbouring land uses compatibility:**
- The Project is surrounded by Agriculture and a diversity of similar, compatible farming operations which include macadamia-, blueberry- and ginger production. To date no objections to the project proposal (development of in-stream weirs for irrigation purposes) have been submitted by any of the neighbours.
- **Financial Viability and Agricultural Potential of the Property:**
- The property has the potential to produce the aforementioned crops successfully and viably. These crops have been farmed for years in the area and neighbouring farms. The financial success and sustainable use would however greatly depend on the ability to store water for the purpose of irrigation.
- **Land Claims:** No Land Claims has been lodged against the Property. See **Appendix 4.2.**
- **Industry Growth:**
- **Blueberry Demand:** The demand for blueberries has never been so high as it has recently been classified as one of the “Super Foods”. Total 2016 annual world production of blueberries from both high- and low bush varieties was just over 860,000 metric tons (from 60,000 ha). Over the past 100 years, the blueberry market has been dominated almost exclusively by North American production. More recently plantings outside of North America have gained momentum. Currently the Northern Hemisphere accounts for 80% of production with 20% of relatively new production in the Southern Hemisphere.
- With “super food” status, blueberry demand worldwide is increasing rapidly especially in the UK, Europe, China and India where access to fresh blueberries has been relatively restricted in past years. There exists a gap to supply these regions in their out of season period when Northern Hemisphere production has tailed off. These Northern hemisphere markets are “empty” for six months and they rely entirely on South America and more recently South Africa for their supply. South American production is traditionally exported to the vast USA market whilst UK and Europe is left empty with little supply.
- Over the past three years, South African production has grown rapidly to take advantage of this supply window. In 2017 RSA export production reached a record level of 6,000 tons from 350ha. This volume represents a drop in the ocean making up only 0.5% of world production. Significantly the shortfall demand from the UK and EU during the RSA season is in the order of 100,000-1500,000 metric tons which equates to 5000 ha of production. Significantly too, there is a rapidly increasing demand in the middle east, India, and the far east especially China. Taking all these markets into account, Southern Africa could comfortably plant and market over 8000 ha of blueberries. Southern Africa is perfectly positioned to fill this northern hemisphere gap especially to the UK and EU where existing long term fruit trade routes and trading relationships are well established.
- **Macadamias:** According to the latest tree sales data received from nurseries for 2019, the macadamia industry is still growing rapidly. In 2019 the Southern African **Macadamia Industry** planted 5 962 new hectares of macadamias.
- KwaZulu-Natal remained for a second year the Province that established the most hectares, followed by Mpumalanga and then Limpopo. In terms of new hectares macadamias established, KwaZulu-Natal planted 2 348 new hectares in 2019.

- When the growth by the number of trees sold is taken into consideration, there are approximately 44 775 hectares established in South Africa. Macadamia production in South Africa has increased exponentially and the rate of production is expected to increase even more in the near future due to an exponential increase in new plantings annually.
- More than 98% of South Africa's macadamia produce is exported. According to corrected figures received from the South African Revenue Service, the total value of macadamia exports in 2019 was R4.8 billion.
- Exported macadamia kernel totalled to 30 991 tons when converted to an in-shell basis at 32% crack out, which was approximately 52% of the total exported macadamia crop in 2019.
- **Nut in shell (NIS):** Nut in shell (NIS) macadamia exports totalled to 28 059 tons, which was approximately 48% of the total export quota that was destined mainly for East Asia and Southeast Asia.
- **Kernel:** Total exports for kernel was 9 917 tons. Approximately 41% were exported to North America, 47% to Europe Union (including UK), 2% to Southeast Asia (China) and 7% to the Middle East.
- The weighted average price for kernel was R261.11 per kg and for NIS R74.13 per kg.
- The financial model for these properties based on crop production is thus dependent on a reliable supply of irrigation water. To this end the proposal makes economic sense as crop production is a long-term project and will ensure that production is not stifled during drought events. This security of water supply also provides the landowner an opportunity to remain financially competitive in an ever changing and diverse business market.
- **Social Commitment and Job Creation:**
- With the successful implementation of this project, many sectors would be positively affected. With the additional development approximately 500 seasonal jobs would be created for both skilled- and unskilled labour segments. This would create a significant relief for unemployment in the local area.
- Skills transfer and uplifting of unskilled labour would be at a highest priority. There would also be permanent jobs created throughout the management structures of the proposed project. These jobs would entail tractor drivers, supervisors, packhouse personnel, quality assurance officers and packhouse managers. These industries would employ people across the employment equity spectrum and would therefore create employment for men and woman on an equal level.
- The operation also complies to SIZA, which is an International Social Audit body to ensure that staff are treated equally, that the company complies to labour laws, and that no unfair labour relations are being harboured by the company.
- Furthermore, several business sectors and community members will benefit if this project is successful. The property owners and their families will benefit financially in the long term. In the short to medium term however the development node will require substantial capital to construct the dams and weirs and install services (pump houses, irrigation pipework and electrical connections).
- The Lowveld region and outlying rural areas have been classified as one of the poorest in South Africa. Conservative estimates list unemployment figures in the region of 30%, HIV infections just under 40% and many job seeking immigrants from neighbouring countries migrate to this area and add to the challenges faced by rural communities.

- The Covid 19 Pandemic has also resulted in additional job losses across the various industries and associated businesses.
- A construction company will be tasked with building the dams and weirs and associated infrastructure – this will provide work opportunities (an estimated 15 persons) for both skilled and unskilled labour (machinery operators, bricklayers and general labour). Unskilled labour will earn in the region of R3500/month.
- The opportunities listed above do not include the addition to subsidiary services such as vehicle maintenance; retail needs; medical facilities and building materials. This development will as a result, benefit businesses in White River and Mbombela.
- **Location:** Is this the correct location for the project? Four alternatives were assessed during this survey and all options were evaluated during the course of this investigation. Please refer to the Project Maps in the appendices for more detail.
- The preferred options do not affect neighbouring properties (flooding into neighbouring properties) and makes economic sense in terms of storage capacity versus development costs.
- The project site is fixed and the proponents do not own similar land elsewhere. In terms of compatibility of land uses this development will fit in with current agricultural developments in the area and surrounding farms. The location is thus regarded as ideal. The project site is surrounded in all wind directions with similar land uses.
- **Environmental (Ecological) Implications/Limitations:** An assessment of the prevailing fauna and flora has not revealed any threats to species/habitat or highlighted any critical limitations to the development which can be of ecological significance, or which cannot be mitigated to ensure sustainability of the environment.
- **Detailed studies** were however commissioned to ensure that impacts on the environment are clearly understood and the results are included in the specialist reports on biodiversity in the **Basic Assessment Report**.
- **Positive Impacts:** Job creation and the prevention of job losses is regarded as a significant impact which will spill over into the well-being of several families in the local community.
- Additionally, the financial viability of the project will translate into further economic growth for the investors and the local White River/Mbombela area, albeit in the medium to long term. The growth in agricultural production together with the improvement in the sustainability of the properties will result in higher incomes and ensure food/crop security.
- **Access Roads:** The access to the property is from the R40 Provincial Road between White River and Hazyview. The access road to the farm is functional and does not require any changes or upgrade. Construction vehicles will have unhindered access to the project site.
- **Timing:** Is this the right time to implement such a development? The recent drought (2015-2018) has highlighted the fact that crop producers must anticipate drought events to remain sustainably competitive. Access to reliable water for irrigation within the framework of allocated entitlements is possible on the properties and the applicant is planning ahead in anticipation of unavoidable drought-cycles occurring in the future.
- In terms of the need for more blueberries and macadamia the figures listed above speak for themselves. The economic impact of the Covid pandemic has highlighted the fact that agriculture can be a reliable vehicle to enhance industrial and socio-economic growth during this very challenging period.

- **Integrated Environmental Management**: The objective of integrated environmental management is to balance all interests towards sustainability. For many the word “sustainability” remains a ‘unicorn’ of environmental management – i.e., a myth that is often poorly defined and/or understood.
- As participants in environmental management, we can at best evaluate the project for its inherent advantages and disadvantages. With the help and input of the Public, Specialists and Project Consultants we endeavour to draw a clearer picture with which we all can associate and hopefully agree to, as well as support.
- **We raise the following questions, which include but are not limited to:** Is the proposed activity/development harmful to the environment? Did we ensure that all perceived impacts were mitigated adequately in favour of maintaining the environmental integrity? Will the local/regional/national community benefit from this development or is the development an improvement on an old or outdated concept? Did we ensure that the general public participated in this project from the day of advertisement till submission of documentation? Did we ensure that the economics of the activity were in place prior to project implementation? Is the project feasible? What are the alternatives? Have we considered the various Government role players with regards to sharing information and/or authorisation requirements of this project?
- The list goes on however the team associated with this proposal is confident that we have addressed all the issues to date and can answer in the positive to the questions listed above. In some cases, we have suggested measures of mitigation to soften the impact towards a degree of sustainability.
- **Need and Desirability of the Proposed Project**: In conclusion, it is the opinion of the EAP that the cumulative effect of the factors listed above will result in a positive contribution in the fields of economic benefit and social upliftment in the region with little, or at most manageable, impacts in the environmental arena.

5. GENERAL INFORMATION

Project Title	Basic Environmental Impact Assessment: Development of two in-stream weirs and associated infrastructure on Remaining Extent of the Farm Nosilla 27 JU: White River Area.
Name of Applicant	Mr. Pieter du Preez (Saint Cloud Farming CC).
Address	Postnet Suite 186, P/Bag X9910, White River 1240
Contact Person	Mr. Pieter du Preez.
Cell Number	084 451 1601
E Mail	roftie2@gmail.com
Environmental Assessment Practitioner (EAP)	Rhengu Environmental Services (RES)
Address	P. O. Box 1046 Malelane 1320
Contact Person	Ralf Kalwa
Telephone Number	082 414 7088
Fax Number	086 685 8003
Date of Report	October 2021
Date of Inspection/s and Site Meetings	1. 6 September 2021 : Public Meeting on site with Interested and Affected Parties (I&APs) and Government Officials. See Minutes attached in Appendix 2.

6. LOCALITY INFORMATION

Name of Place and Locality.	The development site is found on Remaining Extent of the Farm Nosilla 27 JU in the White River area. The project site is located approximately 15km north of White River next to the White River-Hazyview provincial road (R40). The property is bordered in all wind directions by farms practicing agricultural land uses.
Region/District	The property is found in the Mbombela Region of the Lowveld, between the towns of White River and Hazyview in Mpumalanga.
Title Deeds	See Appendix 4.1.
Size of Proposed Development	Approximately 0.5ha.
Magisterial District	Mbombela District Municipality.
Nearest Towns	White River
Nearest Main Road	R40 Provincial road. The farm is well serviced by all weather gravel roads.

Type of area where the proposed development will take place (mark all applicable blocks).

CBD		Rural	X	City		Recreational area	
Commercial		Agricultural	X	Town		Informal Settlement	
Industrial		Staff Housing		Township		Other:	
Tourism		Road	X	In a Building			

7. PROJECT DESCRIPTION

Current Status and Infrastructure:

- **Infrastructure:** The farm is **well serviced** with several homesteads, pump houses; storerooms, garages, staff housing and various access roads and service lines which include potable/irrigation water and power supply (Eskom).
- The property is partially **game fenced** for security purposes.
- **Access** to the proposed weirs is in place. No new roads will be developed to- and from the weir sites.
- **Road Access** for purposes of marketing and product sales is in place and functional.
- **No Property Alternatives:** The land earmarked for development is fixed and is part and parcel of existing farming operations. By virtue of its position, it links into all existing agricultural land uses.
- **Sustainability:** By optimising the potential of the proposed portion of the farm the applicant is confident that the weirs can continue to contribute sustainably to the agricultural business opportunities in- and around White River and Mbombela. No other property is available to be considered for an alternative.
- **Alternatives:** No additional alternative weir sites were evident which could be considered during the evaluation process.
- **Expertise:** All existing farming operations will remain the same. The farmer has access to all applicable expertise, experience, equipment and logistics to accommodate- and manage the operations of the weirs.

Planned/Proposed Activity:

- The applicant wishes to develop two storage weirs in an unnamed drainage line on the Farm Nosilla near White River.
- It is proposed to construct the weirs at GPS Weir Nr. 1: Latitude: 25° 9' 52.72" Longitude: 31° 17' 48". Weir Nr. 2: Latitude: 25° 9' 56.96" Longitude: 31° 1' 25.36".
- Dimensions of the proposed weirs: Wall Height 3m; Wall Length 28m-46m.
- Construction of two pump houses.
- Development costs will be in the region of R 5 million (Weirs, pump houses, pipelines, off channel dams and equipment).
- The development of this storage facility will allow the applicant/farmer to manage the water supply to the orchards in a sustainable manner reducing the risk of poor supply versus demand especially during the dry seasons.
- The water will be stored as per the existing entitlements registered against the farm.
- No new water will be used for this process.

8. DESCRIPTION OF NATURAL ENVIRONMENT (Mucina and Rutherford, 2006)

Topography	Mountain	Midslope	Flats	Valley Bottom	Wetland	River	Other
		X	X	X	X	X	
Geology	<ul style="list-style-type: none"> • Veld Type: SVI 9 Legogote Sour Bushveld: Mucina and Rutherford (2006). • Most of the area is underlain by gneiss and migmatite of the Nelspruit Suite, but the southern part occurs on the potassium-poor rocks of the Kaap Valley Tonalite (both Swazian Erathem). • The western parts of this land type occur on Pretoria Group shale and quartzite (Vaalian). Archaean granite plains with granite inselbergs and large granite boulders also occur in this land type. • Soils are Mispah, Glenrosa and Hutton forms. These soils vary from shallow to deep, sandy or gravelly and are well drained. Diabase intrusions are common, giving rise to Hutton soils. Erosion is low to moderate. 						
Climate	<ul style="list-style-type: none"> • Summer rainfall with dry winters. • The annual average for rainfall in the area is around 800 mm. • Generally, a frost-free region. • Mean annual maximum and minimum temperatures for Nelspruit are 35.7°C and 1.6°C for October and July respectively. 						
Stability	Buildings, e.g., pump houses, homesteads, workshops, roads etc., have been developed on these soils using normal construction methods and processes. Soils are considered as stable.						
Flora	<ul style="list-style-type: none"> • Note: Scientific names for plants and animals may change from time to time. The EAP has listed the plants below as per the reference material. • Tall Trees: <i>Pterocarpus angolensis</i> and <i>Sclerocarya birrea</i>. • Small Trees: <i>Acacia davyi</i>; <i>Acacia sieberiana</i>; <i>Combretum zeyheri</i>; <i>Erythrina latissima</i>; <i>Parinari curatellifolia</i>; <i>Terminalia sericea</i>; <i>Trichilia emetica</i>; <i>Vernonia amygdalina</i>; <i>Acacia caffra</i>; <i>Antidesma venosum</i>; <i>Erythroxylum emarginatum</i>; <i>Faurea rochetiana</i>; <i>Faurea saligna</i>; <i>Ficus burkei</i>; <i>Ficus glumosa</i>; <i>Ficus ingens</i>; <i>Ficus petersii</i>; <i>Heteropyxis natalensis</i>; <i>Peltophorum africanum</i>; <i>Piliostigma thonningii</i>; <i>Pterocarpus rotundifolius</i> and <i>Schotia brachypetala</i>. • Succulent Tree: <i>Euphorbia ingens</i>. • Tall Shrubs: <i>Diospyros lycioides</i>; <i>Erythroxylum delagoense</i>; <i>Olea europaea</i>; <i>Pachystigma macrocalyx</i>; <i>Pseudarthria hookeri</i> and <i>Rhus pentheri</i>. • Low Shrubs: <i>Diospyros galpinii</i>; <i>Flemingia grahamiana</i>; <i>Agathisanthemum bojeri</i>; <i>Eriosema psoraleoides</i>; <i>Gymnosporia heterophylla</i>; <i>Hemizygia punctata</i>; <i>Indigofera filipes</i>; <i>Myrothamnus flabellifolius</i> and <i>Rhus rogersii</i>. • Succulent Shrubs: <i>Aloe petricola</i>; <i>Euphorbia vandermerwei</i>; <i>Huernia kirkii</i>. • Woody Climbers: <i>Acacia ataxacantha</i>; <i>Bauhinia galpinii</i>; <i>Helinus integrifolius</i> and <i>Sphedamnocarpus pruriens</i>. 						

Conservation Status	<ul style="list-style-type: none"> This land type is considered as endangered and only about 2% is statutorily conserved mainly in the Bosbokrand- and Barberton Nature Reserves. A further 2% is conserved in private reserves including the Mbesan -, Kaapsehoop- and Mondi Cycad Reserves. It has been greatly transformed (50%) mainly by plantations, cultivated areas and urban development. Invasive plant infestations are found along drainage lines and riparian zones.
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Has the applicant proof of sufficient water for the proposed development?

Yes	No
X	

Comments:

Water rights are available for agriculture and no additional water will be sourced. Water use is regulated, and the applicants will abide by the water entitlements allocated to the farms. **See Appendix 4.1 for copies of water rights documents.** Also, the water that is released into the environment by the removal of the blue gum forests will be stored in the weirs and pumped into off channel dams. An **Ecological Water Requirement (EWR)** was defined for the stream and this EWR will be released into the downstream. See **Appendix 4.4.2** for detail in this regard.

Are there any known Red Data biota on or near the proposed development?

Yes	No
	X

Comments:

No, not seen during site visits to date. The Specialist Ecologist that has been appointed for the project has assessed this aspect in more detail as part of the Biodiversity- and Ecology Specialist Study. See **Appendix 4.4.3** for detail.

Are there any known rare bird breeding sites on or near the proposed development?

Yes	No
	X

Comments:

No breeding sites were discovered at or near the project site. The Specialist Study will however assess this aspect in more detail.

Yes	No
	X

Are there any known archaeological, cultural- or historical sites on or near the proposed development?

- A Heritage- and Culture Specialist was commissioned to assess the potential presence of historical sites and artefacts. **See Appendix 4.4.4.**
- No artefacts have been observed during the farming activities which have occurred on the property for decades.
- An accredited archaeologist must oversee and monitor the initial clearing of the development sites for the weirs.
- Should any artefacts or a find be discovered during construction/development, the proponent must engage the services of an accredited archaeologist to deal with the find.
- Should the application be approved, it is recommended that an Environmental Control Officer (ECO) oversee the implementation of the development phase and the handling of finds will be addressed as per the conditions listed in the Environmental Management Programme (EMPr).

What general precautionary measures will be taken if an archaeological, cultural- or historical site is discovered?

- Should any artefact, or historical site be discovered during the removal of vegetation and or installation of irrigation systems as well as in future, all works must cease with immediate effect.
- The find must be reported to the Project Manager for the development and the ECO for the project. These representatives will initiate an Action Plan in conjunction with SAHRA to address the management and handling of the find.

9. ENVIRONMENTAL ISSUES

This chapter describes the **issues, queries, concerns and opinions** identified:

- during the **public participation process, i.e., focus group meetings;**
- by **authorities and the applicant/management authority** during consultation- and pre-application meetings and telephonic discussions;
- by the **EAP** based on previous experience in the area.

9.1. Key Issues: See Issues and Responses Report in Appendix 2.

- The response to the on-site and newspaper advertisements was poor. The call for potential Interested and Affected Parties to attend the on-site meeting attracted interest from one Government Official and a member from the local Irrigation Board.
- The EAP also had to make a **special effort** to engage the local council in the form of Mr. Danny Sono to ensure that this important role-player was kept abreast of the progress of all aspects of the project in his area of jurisdiction.
- The following key **issues/impacts** are listed for consideration:

Environmental Aspects	<ul style="list-style-type: none"> • Specialist Study on Terrestrial/Aquatic ecology and Biodiversity. • Fishway. • Water Rights and Abstraction Quota/Measurement. • EWR: Ecological Water Requirement. • Maintenance of the Flow. • Water Use Licence Application (WULA). • Removing Blue Gums. • New Agriculture Potential.
Economic-Operational Aspects	<ul style="list-style-type: none"> • Job Creation and Stability. • Economic Sustainability.
Social Aspects	<ul style="list-style-type: none"> • Cultural Artefacts. • Land Claim. • Needs and Desirability of Project. • Job Creation and Stability.

9.2. Ranking of Environmental Issues Identified

To identify the significant issues, these were ranked as per the four different criteria outlined in the Environmental Impact Assessment Guideline Document for assessing impacts in Environmental Impact Reports.

The environmental elements (issues/impacts) are evaluated according to the following criteria:

1. **Intensity** – 4 Categories were distinguished:

Positive (+), Negative (-), No Impact (0), and Uncertain (U).

The positive- and negative categories were further divided to distinguish between low-, medium-, and significant impacts.

Scores were awarded as follows:

Low = 1, Medium = 2, and Significant = 3.

Issues/Impacts were ranked in order of importance as:

- | | |
|--|-------------------|
| 1. Critical Issues/Impacts with scores | ≥ -5, |
| 2. Important Issues/Impacts with scores | < - 5 to - 1, and |
| 3. Operational/Management Issues/Impacts with scores | ≥ 0. |

2. **Duration** - Is the impact – **Short-**, **Medium** term, or **Permanent**.

3. **Probability** of impact – **Improbable (I)**; **Probable (?)**; **Definite (D)**,

4. **Extent** – Is the effect **Local**; **Regional**; **National**; or **International**.

5. **NA** - Not Applicable.

9.3. Environmental Screening

KEY OF SYMBOLS TO BE USED IN TABLE			
Intensity of impact/issue:	Significant Impact	Medium Impact	Low Impact
Positive (+)	+ 3	+ 2	+ 1
Negative (-)	- 3	- 2	- 1
Impact uncertain (U)	U		
No envisaged impact (0)	0		
Duration of impact/issue	Short Term = S	Medium Term = M	Permanent = P
Probability of impact/issue	Improbable = I	Probable = ?	Definite = D
Extent of impact/issue	Local = L	Regional = R	National / Int. = N
NA: Not Applicable	TABLE FOR IDENTIFICATION OF POTENTIAL ENVIRONMENTAL IMPACTS		
ENVIRONMENTAL ELEMENT	DEVELOPMENT PHASE	OPERATIONAL PHASE	TOTAL SCORE
ENVIRONMENTAL ASPECTS: GENERAL			
Specialist Study on Terrestrial/Aquatic Ecology.	-1,P,D,L	+1,P,D,L	0
Fishway.	0,P,D,L	0,P,D,L	0
Water Rights and Abstraction Quota.	0,P,D,L	0,P,D,L	0
EWR: Ecological Water Requirement.	-1,P,D,L	+2,P,D,L	+1
Maintenance of the Flow.	0,P,D,L	+1,P,D,L	+1
WULA.	-1,P,D,L	+1,P,D,L	0
Removing Blue Gums.	-3,P,D,L	+3,P,D,L	0
New Agricultural Potential.	+1,M,D,L	+1,P,D,L	+2
ECONOMIC ASPECTS:			
Job Creation and Stability.	+1,M,D,L	+1,P,D,L	+2
Economic Sustainability.	0,M,D,L	+1,P,D,L	+1
SOCIAL ASPECTS			
Cultural Artefacts.	0,S,D,L	0,P,D,L	0
Job Creation and Stability.	+1,M,D,L	+1,P,D,L	+2
Land Claim.	0,S,D,L	0,P,D,L	0
Needs and Desirability of Project.	+1,M,D,L	+2,P,D,L	+3

9.4. Issues Identified

9.4.1 Critical/Important Issues

No **Critical/Important Issues** were identified during the screening process.

9.4.2. Operational/Management Issues

- Water Rights and Abstraction Quota.
- Cultural Artefacts.
- Land Claim.
- Specialist Study on Terrestrial/Aquatic Ecology.
- Fishway.
- WULA.
- Removing Blue Gums.

9.4.4. Positive Impacts

- Job Creation and Stability.
- Needs and Desirability of Project.
- Economic Sustainability.
- EWR: Ecological Water Requirement.
- Maintenance of the Flow.
- New Agricultural Potential.

9.5. Impacts/Issues: (This Section must be read in conjunction with the contents of the Environmental Management Programme: Appendix 5).

Operational or Management Impacts	Discussion/Mitigation/Recommended Management Approach
<p>1. Specialist Study on Terrestrial/Aquatic Ecology.</p>	<ul style="list-style-type: none"> • See Appendix 4.4.3 for detail on all aspects of the biodiversity associated with the Project Area. • Activity 1: The construction of two weirs in the non-perennial stream. • Impact 1.1: Clearing of the weir basin and manipulate the soil. • Nature of Impact: Removing indigenous vegetation from the weir basin will impact adversely on the riparian corridor and riverine habitats. Clearing will also disturb the soils of the basin and the bare soil will be prone to erosion. • Mitigation of Impact 1.1: The impact of the dammed areas in relation to the extent of the catchment is marginal and therefore the impact on the system is classified as low. • Clearing for the weir site should take place during the dry period or when the stream is not flowing. However, as high rainfall can occur in any month of the year, all measures should be taken to prevent exposed soils from being washed downstream. • Obtain permission from the ECO to proceed with the clearing of vegetation. Only clear specified areas. • Levelling and landscaping of the site should follow natural drainage patterns as far as possible. Retain natural trees, shrubbery and grass species wherever possible. The remaining peripheral riparian woodland in the weir basin should be left intact in order to still maintain the denser riparian corridor. • Adequate erosion and sedimentation control measures must be put in place once the clearing of the basin is completed. This will prevent siltation in the downstream habitat. • Following the completion of any works, the water user must ensure that all disturbed areas are: <ul style="list-style-type: none"> • cleared of construction debris and other blockages; • reshaped to free-draining and non-erosive contours, and • re-vegetated with indigenous and endemic vegetation suitable to the area. • Disturbed riparian areas must be rehabilitated immediately after construction of the weir and pipeline abstraction point, with indigenous species as required. Riparian habitat restoration will ensure that the integrity of a wildlife corridor is retained and links between habitat types are enhanced.

- **Impact 1.2:** Construction of the weirs and coffer dams.
 - **Nature of impact:** Construction of the weir has the potential to impact on the environment. The following activities can result in erosion and siltation:
 - All clearing of vegetation (for dams, pumps and pipelines, roads and all watercourse crossings).
 - Construction and operation of coffer dams and diversion pipes.
 - Construction of dam/weir walls and spillways.
 - Installation of pumps and pipelines.
 - Sedimentation in the stream due to disturbing soil layers during construction activities, will result in siltation of the downstream aquatic habitat.
 - **Mitigation of Impact 1.2:** It is generally specified that work in watercourses is carried out during periods of low average rainfall (April-October). This reduces the risks inherent in their construction.
 - Furthermore, the lower stream flows reduce the risks of scour and disturbance of sediment in the riverbed during construction.
 - The cofferdam construction must be properly managed and maintained.
 - Adequate erosion and sedimentation control measures (hessian/bidum curtains, hay bales etc.) must be put in place to prevent downstream impacts.
-
- **Impact 1.3:** Rehabilitation of coffer dams.
 - **Nature of Impact:** This impact involves the sedimentation and siltation during removal and rehabilitation of the coffer walls. It must be kept in mind that water that accumulated in the coffer dam could deteriorate. Sudden release of sediment or polluted water can be disastrous for some aquatic biota.
 - **Mitigation of Impact 1.3:** Ensure that pump outfalls and outfalls from any temporary treatment do not cause or generate erosion of land, banks or beds. This can be achieved by using baffles or other energy dissipating devices and scour protection.
 - Cofferdams must not be left in place for longer than 30 days. The coffer dam can serve to trap any sediments which may wash towards the downstream channel. Any such sediments must be physically removed from the channel before the coffer dam is removed.
 - In the event that submersible pumps are used for dewatering, they must be placed in sumps that isolate them from the base of the excavation in order to avoid the mobilisation of silt into suspension through turbulence.
 - Removal of the coffer dam should be planned and executed with the same degree of care as its installation, on a stage-by-stage basis.

- **Impact 1.4:** Pollution due to construction activities and human presence at the site.
- **Nature of Impact:** Poor water quality or presence of contaminants impacting on aquatic biota at the site and in the downstream reach.
- Hazardous substances associated with construction activities include hydrocarbons (oil, diesel) from construction machinery and toxic materials used in dam/weir construction such as cement, shutter releasing fluid, paints, etc. In addition, washing soap, faeces, etc. from workers using the rivers and riparian zones for ablutions could pollute rivers.
- Pollutants could be harmful to aquatic biota, particularly during low flows when dilution is reduced and could pose a health risk to locals using the river water for domestic purposes. Lime-containing (high pH) construction materials such as concrete, cement, grouts, etc., are highly toxic and can be lethal to fish and other aquatic biota.
- If dry cement powder or wet uncured concrete is exposed to surface run-off or river water, these compounds can elevate the pH to lethal levels. Thus, extreme care should be taken when these hazardous compounds are used near water.
- **Mitigation of Impact 1.4:** Carefully control all on-site operations that involve the use of cement and concrete.
- Limit cement and concrete mixing to single sites where possible.
- Use plastic trays or liners when mixing cement and concrete: Do not mix cement and concrete directly on the ground.
- Dispose of all visible remains of excess cement and concrete after the completion of tasks. Dispose of in the approved manner (solid waste concrete may be treated as inert construction rubble, but wet cement and liquid slurry, as well as cement powder must be treated as hazardous waste). Engage the services of an accredited hazardous waste service provider.
- Contain water and slurry from cement and concrete mixing operations as well as from batching area wash bays. Direct such wastewater into a settlement pond or sludge dam for later disposal via the service provider.
- Do not allow the washing of trucks delivering concrete anywhere but within designated wash bays equipped with runoff containment. Direct such wastewater into a settlement pond or sludge dam for later disposal.
- Spills: Immediately clean any accidental oil or fuel spills or leakages.
- Do not hose oil or fuel spills into a storm water drain or sewer, or into the surrounding natural environment.
- Make use of absorption blankets and spill kits.
- Ensure that the contaminated soils are managed and handled by an accredited service provider.

- **Activity 2. Two small pump stations will be constructed to house the electrical/irrigation equipment required for the project.**
- **Impact 2.1:** Clearing of vegetation on footprint and construction activities.
- **Nature of Impact:** Construction impacts on the immediate environment, including removing indigenous vegetation.
- **Mitigation of Impact 2.1:** Infrastructure establishment should preferably not take place during high rainfall periods and erosion protection measures should be put in place in case heavy rainfall occurs e.g., placement of stop-boards, covering with bidum or other suitable material.
- Prior to work commencing, the contractor must supply the ECO with a layout plan demarcating the location and physical extent of the construction weir works.
- Identify and demarcate the extent of the site and maintain site demarcations as indicated on the approved plan using danger tape with steel droppers.
- Do not paint or mark any natural feature. Marking for surveying and other purposes must be undertaken using pegs, beacons or rope and droppers.
- All areas that were cleared or disturbed during construction activities must be rehabilitated to a natural vegetated state. Care must be taken to ensure that these rehabilitated areas blend in with the lie of the land.
- Clear and completely remove from site all construction plant, equipment, storage containers, temporary fencing, temporary services, fixtures and any other temporary works.
- Due to their high efficiency at low flows, submersible pumps will be used. These will be placed in the weirs at suitable positions.

- **Activity 3. Four bulk water supply pipelines will be installed in phases on the property.**
 - **Impact 3.1:** Pipeline activities: Trenching, excavation and rehabilitation.
 - **Nature of Impact:** Trenching impacts on the immediate environment, especially when it involves the clearing of indigenous vegetation.
 - These actions can result in erosion and siltation of the cleared area and disturbed soils. Inadequate erosion control along pipeline trenches could result in sediment or sediment-laden water entering the watercourses.
 - Laying of the pipelines
 - **Mitigation of Impact 3.1:** The pipelines will follow existing roads, minimising disturbance to the natural environment. For pipelines, a servitude width of 15m is permitted for machine excavation and 6m for manual excavation, unless otherwise specified by the ECO. This working servitude must accommodate all construction related activities, including materials storage, access routes etc.
 - Laying of the pipelines will require soil to be stockpiled. This must be adequately protected (e.g., by covers or regular spraying with water) to prevent sedimentation of watercourses. Soil stockpiles should not be stored for extended periods i.e., pipeline laying should occur in stages.
 - Laying of the pipeline near watercourse crossings should be scheduled for average low rainfall periods (winter months). However, erosion protection measures should be put in place in case heavy rainfall occurs e.g., placement of bidum/hay bales or other suitable material.
-
- **Activity 4. Three 40 000m³ HDPE lined off-channels balancing dams will be constructed on the property.**
 - **Impact 4.1:** Balancing dams: Clearing the footprint.
 - **Nature of Impact:** Removing all vegetation and associated habitats.
 - **Mitigation of Impact 4.1:** The dams will be constructed on cleared forestry blocks.
 - The areas earmarked for the dams have deep red soils, suitable for the construction of dams.
 - The dams will be designed to use the onsite material.
 - No imported material will be required.

- **Activity 5. Two weirs completed in the unnamed tributary.**
 - **Impact 5.1:** Inundating riparian habitats due to damming.
 - **Nature of Impact:** The integrity of a riparian corridor will be compromised by the inundation of the riverbank with the dammed water. The movement of mammals, herpetofauna and birds along a dense riparian corridor could be lost and replaced by an open aquatic habitat i.e., the dammed water.
 - **Mitigation of Impact 5.1:** During the clearing phase of the weir basin, the remaining peripheral riparian woodland around the basin should be left intact to maintain the denser riparian corridor.
 - Disturbed riparian areas must be rehabilitated immediately after construction of the weirs.
 - The weir sites are both surrounded with dense valley bush and the small weir footprints will not have a detrimental impact on the riparian corridor.
 - The areas surrounding these weirs will also have a protective buffer which will safeguard these sites from further development and impacts.
-
- **Impact 5.2:** Abstraction of water from the weirs
 - **Nature of Impact:** Dry spells during crucial months make irrigation essential for successful macadamia farming. Irrigation is therefore critical during the months of August, September and October, when flowering and fruit set occurs (highest irrigation demand and lowest rainfall). The months of July and August have the lowest rainfall (7mm and 12mm respectively). This rainfall is very low, indicating the need to irrigate during these times.
 - Storing or diverting water into weirs, alters the natural distribution and timing of stream flow. Changes in temporal and spatial characteristics of flow can have an impact on downstream habitat attributes such as an increase in duration of low flow season (or none-flow events), resulting in low availability of certain habitat types or availability of water at the start of the breeding, flowering or growing season of the riverine biota (aquatic and riparian).
 - **Mitigation of Impact 5.2:** The removal of approximately 187 ha of commercial forestry will increase the runoff on the Farm Nosilla by an estimated 187 000 m³ /annum.
 - The intention is the pump this water during the high flow months of November through to the end of May into off-channel dams. Due to the negative environmental impact of in-stream storage, off-channel storage of 120 000 m³ will be constructed on the farm to store the water.
 - Pumping of water freed up by the removal of exotic plantations, will only be allowed during the high flow months so as not to reduce the low flow in the system.
 - A low flow analysis shows that the removal of forestry and transferring the increase flow to the off-channel dams could result in a small decrease in the low flow, even though the EWR will still be met. The conversion from Streamflow Reduction (SFR) to irrigation will benefit downstream users by 25 900 m³ /annum.
 - As an additional safeguard to secure the low flow, it is recommended that the condition of the water use licence be

	<p>that a minimum flow of 11 l/s must always flow out of the lower weir (when there is flow in the system) and this must be metered.</p>
	<ul style="list-style-type: none"> • Impact 5.3: The dam wall as a migration barrier to aquatic animals. • Nature of Impact: Fish and other aquatic species could be prevented from migrating upstream. • Dams and weirs disrupt riverine migration routes. Preventing the free passage of aquatic animals and fish. • This disruption of migratory routes affects the lifecycle of anadromous species. Dam barriers prevent brood stock from reaching their spawning grounds during the breeding season, resulting in a failure of recruitment and eventual extinction of the stock above the dam. • Mitigation of Impact 5.3: During the ecological studies of the stream system, no fish were sampled in the small seasonal system. • Fishways are devised specifically to create passage for aquatic fauna to overcome migration barriers, such as man-made dams and weirs. The reason for the lack of fish in the system could be the fact that this system is seasonal and there are a number of small waterfalls and cascades in the narrow stream, rendering the system a challenging environment to overcome. • With no fish or other organisms that will need to migrate up the small stream, providing a fishway in the weir will not be unnecessary.

- **Activity 6. Farm Operations.**

- Different aspects which could impact on the riverine system can include roads, traffic, cleared surfaces, human activity, applying pesticides and herbicides, fertilisers, etc.
- These aspects can lead to threats such as:
 - Increases in sedimentation and turbidity.
 - Increased nutrient inputs.
 - Increased inputs of toxic organic and heavy metal contaminants.
- Pathogen inputs. Aspects of these threats have been sorted into three groups under the heading: Operational activities impacting on the riverine system:
 - Trampling in the riparian zone.
 - Erosion of the cleared lands and siltation of the non-perennial streams.
 - Irrigation return-flows containing fertilisers and pesticides seeping towards the drainage line.
- All of these threats have one shared mitigation measure and that is to establish **buffer zones** to protect the water course.
- Determining the required buffer width is largely an exercise of assessing the situation and linking it to an acceptable level of risk. Determining appropriate management measures for aquatic impact buffer zones is largely dependent on the threats associated with the proposed activity adjacent to the water resource.
- Buffer zones associated with water resources have been shown to perform a wide range of functions and on this basis, have been proposed as a standard measure to protect water resources and associated biodiversity.
- Using a site-based tool exercise the buffer zone requirements for the Nosilla drainage system were defined. According to this initial buffer requirement, it becomes apparent that, to protect the unnamed drainage line in its current condition from degradation, a **buffer of 20 m wide** on both sides of the drainage line is required.
- Additionally, most of the drainage system and its ecological buffer around the riparian corridor, are also protected by a buffer of natural woodland which will increase the integrity of the acquired buffer.
- Minimal impact should be permitted in riparian zones and buffer areas as these serve to contain water quality impacts. The riparian ecological buffers (or relevant buffers monitored by on-site supervision during fencing) should be adhered to.
- **Impact 6.1:** Operational activities.
- **Nature of Impact:** Roads
- **Mitigation of Impact 6.1:** Make use of existing roads and tracks where feasible, rather than creating new routes. Ensure that only authorised roads and access routes are used.

	<ul style="list-style-type: none"> • Any additional routes and turning areas required by the contractor must be approved by the ECO. Vehicles may not leave the designated roads and tracks and turnaround points will be limited to specific sites. Ensure that adequate vehicle turning areas are allowed for. • No off-road driving is permitted, unless authorised by the ECO. Do not permit vehicular or pedestrian access into natural areas beyond the demarcated boundary of the work area. • Avoid routes through drainage lines and riparian zones wherever possible. Where access through drainage lines and riparian zones is unavoidable, only one road is permitted, constructed perpendicular to the drainage line. • Routes should not traverse slopes with gradients more than 8%. Where this is unavoidable, stabilise the road surface. • In general, construction routes should not be wider than 3m in sensitive areas, with passing bays where two-way traffic is required. Clear up any gravel or cement spillage on roads. • Ensure that all access roads utilised during construction (which are not earmarked for closure and rehabilitation) are returned to a usable state and/or a state no worse than prior to construction. • Implement the buffer zone of 20 m.
	<ul style="list-style-type: none"> • <u>Impact 6.2:</u> Clearing of plantations for orchards. • <u>Nature of Impact:</u> Inadequate stormwater management and erosion control in the newly established fields could result in sediment or sediment-laden water entering the watercourses. • <u>Mitigation of Impact 6.2:</u> Maintaining strips of natural vegetation between orchards is encouraged, if and where feasible, to assist with run-off control. Natural indigenous vegetation should also support insects required for pollination or pest control. The unnamed drainage lines are surrounded with dense valley bush which forms an additional protective buffer which will safeguard these systems from sedimentation. <hr/> <ul style="list-style-type: none"> • <u>Impact 6.3:</u> Farming activities and irrigation of the orchards. • <u>Nature of Impact:</u> During the operational or farming phase, chemical (inorganic) fertilisers and pesticides are likely to be used. The key pollutants associated with fertilisers are phosphates and nitrogen. • Although pesticides are likely to be sprayed, rather than placed <i>in-situ</i>, during high rainfall periods, the pesticides can leach into the soil. Toxic pesticides or herbicides may negatively impact on riparian species. • <u>Mitigation of Impact 6.3:</u> Maintaining strips of natural vegetation between orchards is encouraged, if and where feasible, to assist with run-off control. • Natural indigenous vegetation should also support local insects required for pollination or pest control. • Only use environmentally friendly pesticides and herbicides. • The unnamed drainage lines are surrounded with dense valley bush which forms an additional protective buffer which will also safeguard these systems from sedimentation.

Biodiversity Impact Assessment Summary:

Impact No	Issue and aspect	Phases	Significance without mitigation	Significance with mitigation
1.1	Clearing of the weir basin.	Construction	Low (-ve)	Low (-ve)
1.2	Construction activities resulting in erosion and siltation.	Construction	Medium (-ve)	Low (-ve)
1.3	Rehabilitation of coffer dams.	Construction	Medium (-ve)	Low (-ve)
1.4	Pollution due to construction activities and human presence at the site.	Construction	Medium (-ve)	Low (-ve)
2.1	Clearing of vegetation on footprint and construction activities.	Construction	Low (-ve)	Low (-ve)
3.1	Pipeline activities: Trenching, excavation and rehabilitation.	Construction	Medium (-ve)	Low (-ve)
4.1	Balancing dams: Clearing the footprint.	Construction	Low (-ve)	Low (-ve)
5.1	Inundating riparian habitats due to damming.	Operational	Low (-ve)	Low (-ve)
5.2	Abstraction of water from the river system.	Operational	Medium (-ve)	Low (-ve)
5.3	The dam wall as a migration barrier to aquatic animals.	Operational	Low (-ve)	Low (-ve)
6.1	Impacting on the riparian zone.	Construction and Operational	Low (-ve)	Low (-ve)
6.2	Clearing of plantations for orchards.	Clearing	Low (-ve)	Low (-ve)
6.3	Farming activities and irrigation of the orchards.	Operational	Low (-ve)	Low (-ve)

Operational or Management Impacts	Discussion/Mitigation/Recommended Management Approach
2.Fishway.	<ul style="list-style-type: none"> • <u>Nature of Impact:</u> Dams and weirs disrupt riverine migration routes Fish and other aquatic species could be prevented from migrating upstream. • This disruption of migratory routes affects the lifecycle of some species. Dam barriers prevent brood stock from reaching their spawning grounds during the breeding season, resulting in massive failure of recruitment and eventual extinction of the stock above the dam. • It is therefore customary to include fishways in the design and construction of weirs and dams. • <u>Mitigation Nr. 1:</u> No mitigation is required as no fish were sampled in the small seasonal system. • The reason for the lack of fish in the system could be the fact that this system is seasonal and there are a number of small waterfalls and cascades in the narrow stream, rendering the system a challenging environment to overcome. • With no fish or other organisms that will need to migrate up the small stream, providing a fishway in the weir will not be unnecessary.
3. Water Rights and Abstraction Quota	<ul style="list-style-type: none"> • <u>See Appendices 4.3. and 4.4.1 for detail:</u> • <u>Water Allocations:</u> The farm has access to 185ha of existing lawful water use. This allocation has been confirmed by the IUCMA. • The applicant must remain within this allocated entitlement. • Approximately 187 ha of forestry will be removed which will ensure an additional 187 035m³/annum as part of a Steam Flow Reduction Activity (SFRA). • The SFRA is the subject of the Water Use Licence Application (WULA) process which is conducted parallel to the EIA application. • <u>Mitigation Nr. 1:</u> To ensure that the applicant remains compliant to the outcome of this investigation and the approved allocations, measuring devices will be installed upstream and downstream of the proposed weirs. The local Irrigation Board will have access to this data on request. • The following control measures must be implemented to ensure that the allocations and abstraction volumes remain within the approved entitlements: <ul style="list-style-type: none"> • Measure water flowing into the weirs, being pumped out of the weirs and allowed through the weirs (daily volumes). • Record rainfall. • Record evaporation.

4.Cultural Artefacts.

See **Appendix 4.4.4.** for detail on the Heritage aspects of the project area.

- A specialist study on the cultural/heritage importance of the project area was undertaken by Christine Rowe.
- The survey revealed no archaeological or historical structures/artefacts of significance in the sites designated for the two weirs.
- It is not believed that any archaeological or historical features will be impacted upon by the development of the weirs.
- Archaeological material or graves are not always visible during a field survey and therefore some significant material may only be revealed during construction activities of the proposed weir/pump house development.
- **Mitigation Nr. 1:** It is recommended that the owner be made aware that distinct archaeological material or human remains may only be revealed during the clearing of vegetation or site preparation or construction activities. Based on the survey and the findings in this report, Adansonia Heritage Consultants state **that there are no compelling reasons which may prevent the proposed weir development to continue**, but it is recommended that earthmoving activities be monitored by a qualified archaeologist and that an assessment be undertaken should any archaeological material be found.
- The specialist study was submitted to SAHRA and we await their comments.
- **Mitigation Nr. 2: No artefacts** have been observed during the farming activities which have occurred on the property for decades.
- The developer has farmed this area for several years and has not **unearthed/located** any grave sites; historical sites or artefacts which are of historical importance.
- However, should any artefacts or a find be incidentally discovered during trenching/construction activities, the proponent **must engage the services of an accredited archaeologist** to deal with the find.
- It is recommended that an **Environmental Control Officer (ECO)** oversee the implementation of the development phase and the handling procedure of any finds is described in the Environmental Management Programme (EMPr).
- Should any artefact, or historical site be **incidentally** discovered during excavations for foundations as well as in future, all works must cease with immediate effect.
- The find must be reported to the Project Manager for the development and the ECO for the project. These representatives will initiate an Action Plan in conjunction with SAHRA and the developer to address the management and handling of the find.

<p>5.Land Claim.</p>	<ul style="list-style-type: none"> • <u>See Appendix 4.2.</u> for detail on the Land Claim process in the project area. • As per the contents of the letter from the Lands Claim Commissioner, no land claim has been registered against the Farm Nosilla 27 JU. • The applicant is free to expand his farming activity. No objections to the proposed improvement of the infrastructure have been lodged with the EAP. • No mitigation measures are applicable.
<p>6.Water Use Licence Application (WULA).</p>	<ul style="list-style-type: none"> • See <u>Appendix 4.4.1: Engineering Planning Report:</u> As part of mitigation the following aspects must be implemented: • <u>Mitigation Nr. 1: Accredited Company:</u> The weirs must be designed by an accredited engineering company and the design must satisfy various safety- and standard regulations and requirements. This process is well managed and controlled by the various officials in the Department of Water and Sanitation, represented by IUCMA in this case. • <u>Mitigation Nr. 2: Apply the Legislation: Water Use Licence Application:</u> To ensure a transparent process, several on-site meetings have been held by these stakeholders and a WULA process was initiated concurrently with the EIA process. The outcome of the EIA will inform the IUCMA as to the impacts of the weirs on the ecology of the area and social long-term benefits of the development. IUCMA will then consider the WULA and issue a decision accordingly. This process is currently ongoing and on track. • <u>Mitigation Nr. 3: Plan- and Design the Weirs: The Engineering Planning Report has confirmed the following:</u> • <u>Natural Resources and Climate:</u> The soils are suitable for irrigation and the production of the crops listed by the applicant. The weirs will be developed on solid, stable bedrock. • Rainfall is in the region of 1113mm per annum. Dry spells during crucial months (July-October) make irrigation essential for macadamia farming. • <u>Motivation:</u> During drought periods the farms experience water shortages that have negative impacts on crop production and results in a loss of job opportunities. By establishing additional storage capacity on the property (3 off channel dams on areas cleared of forestry), farm management will be able to mitigate these impacts. • Water will be pumped from the new weirs to the off-channel storage dams and this water will then be available for irrigation. • <u>Mitigation Nr. 4: Remain within the Allocated Quota:</u> Water use will be measured. No additional water will be sourced. All water will be used and stored as per the allocated entitlements registered to the farm. • <u>Mitigation 5: Downstream Users:</u> The Ecological Water Requirement (EWR) has been determined for the unnamed stream.

	<ul style="list-style-type: none"> • This EWR must be maintained at all times. • As part of this analysis 25 900m³/annum of water must be released from the weirs to the downstream users. • 11lires/second must flow out of the lower weir at all times.
7.Removing Blue Gums.	<ul style="list-style-type: none"> • <u>Removing Exotic Trees:</u> Exotic trees which were planted for timber as part of the forestry industry require vast quantities of water for their survival and production of wood. • Many of these forests were planted on marginal soils in areas of the Lowveld which are subjected to intermittent droughts and water shortages. • Combined these two aspects places a water stress on the ecosystem. • Contrary to Public belief South Africa <i>per se</i> is known as an arid country which must develop sustainably whilst recognising the climatic limitations of the region. • <u>Mitigation Nr. 1:</u> Replacing blue gums with irrigated crops will result in a water saving and a more efficient use of the water available to the environment. • <u>Mitigation Nr. 2:</u> Similarly ensuring that additional water saving is achieved and maintained the applicant will install a low flow irrigation system • <u>Low Flow Irrigation:</u> The efficient use of water and the implementation of a site-specific irrigation system will go a long way towards the sustainable use of irrigation water on the new orchards. • It is therefore essential that a cost-effective system is used which optimises the use of water and prevents run-off and erosion. For this reason, the <u>Low Flow Irrigation System (LFIS)</u> is proposed for consideration. • It is widely known that water is a scarce commodity and for this reason the following measures of mitigation will be implemented: • <u>Mitigation Nr. 3: Irrigation Scheduling:</u> Irrigation scheduling involves deciding when and how much water to apply to an orchard. Good scheduling will apply water at the right time and in the right quantity in order to optimise production and minimise adverse environmental impacts. Bad scheduling will mean that either not enough water is applied, or it is not applied at the right time, resulting in under-watering, or too much is applied, or it is applied too soon resulting in over-watering. Under- or overwatering can lead to reduced yields, lower quality and inefficient use of nutrients. • <u>Water Efficiency:</u> The efficiency of water use in agricultural production is generally low. Only 40% to 60% of the water is effectively used by the crop, the rest of the water is lost in the system or on the farm either through evaporation, run-off or by percolation into the groundwater. Irrigation scheduling, if properly managed can offer a good solution to improve water efficiency in the farm. • Various methods and tools have been developed to determine when crops require water and how much irrigation water needs to be applied. These include the various soil- and plant monitoring methods as well as the more

common **soil water balance and scheduling simulation models.**

- **Advantages of Irrigation Scheduling:** It can:
 - Enable farmers to schedule watering to minimise crop water stress and maximise yields.
 - Reduce farmer's costs of water and labour through less irrigation, thereby making maximum use of soil moisture storage.
 - Lower fertiliser costs by reducing surface run-off and deep percolation (leaching) to a minimum.
 - Increase net returns by increasing crop yields and crop quality.
 - Minimise water-logging problems by reducing the drainage requirements.
- **What is Low Flow Irrigation?** Sub-surface or low volume irrigation is the process of delivering precise amounts of water and nutrients directly to the plant's root zone, drop by drop, offering users exact irrigation control and efficient use of limited water resources.
- **Why Should One Use Low Volume Irrigation?** This method saves water use. It is far more water-efficient than sprinklers. In general, these applications use 30% - 70% less water than an overhead irrigation system and plants grow to maturity about 50% faster.
 - Water loss due to evaporation, mist, surface run-off or wind interference is virtually eliminated. Because of the conserving nature of low volume products, users report that they are typically granted an exemption from their water management district when other forms of irrigation are being restricted or banned.
- **Advantages of Low Flow Irrigation:** Notable advantages are:
 - A slow, even flow of water application to the plants and soil. Plants will thrive under these conditions.
 - A slow, steady application of water and nutrients directly to the plant's roots is the best way to ensure plant health and vitality (Improved plant growth).
 - The system is easy to install, it is flexible and adaptable.
 - It solves spray- and rotor irrigation problems.
 - No damaging spray finds its way onto unwanted areas, e.g., roads and buildings. This prevents erosion and unnecessary run-off.
 - The adjacent soil and foliage are kept dry, reducing fungal diseases.
 - Soil aeration is improved because soil particles are not washed down, thus decreasing soil compaction and improving root growth.
 - The system saves on maintenance and labour.
 - The system does not make use of moving sprinkler parts which require intensive maintenance to repair.
 - Unobtrusive and aesthetic. Hidden under mulch or beneath the soil.
 - The system does not interfere with landscaping or scenery.

- Decreased labour to install and maintain plus lower overall material cost.
- Security/Less theft. No exposed sprinkler heads, pipes or surface driplines to tamper with.
- **Summary of Benefits of Low Flow Irrigation System:**
- **Broader water distribution:** Since water enters the ground at a slow pace, it spreads around the sides of the plant rather than seeping downward.
- **Better nutrient utilisation:** Since water stays closer to the area where the roots are most active, more nutrients are available to the plant and there are fewer ground pollutants.
- **Larger and enhanced yields:** Since the in-ground air-water ratio at any given moment is higher, crop yields are larger and of a better quality.
- **Lower nutrient usage:** Since all fertiliser is distributed at the active root-zone level, the plant receives a high percentage of the amount distributed, leading to lower quantities of applied fertiliser.
- **Water saving:** Irrigation is placed underneath the agricultural fabric; the low flow drip ensures no over irrigation. Drip emitters have an ultra-low flow of 0.7 lt/hr each, spaced 1m apart.
- **Fertiliser Used:** Water soluble fertilisers will be mixed on the farm and dosed into the irrigation lines. The fertiliser is only injected in targeted areas therefore there will be no negative impact on indigenous trees or shrubs. Also, this reduces the amount of fertiliser required and saves on costs.
- Typical fertilisers used are as follows: Ammonium sulphate, Potassium chloride, Calcium nitrate, Zink nitrate, Boron, Monoammonium phosphate. These fertilisers are not detrimental to indigenous plants.

Positive Impacts	Discussion/Mitigation/Recommended Management Approach
<p>1.Needs and Desirability of the Project.</p>	<ul style="list-style-type: none"> • <u>Strategic International- and Regional Importance and Potential:</u> • With a global population that is increasing exponentially, so does the need for healthy, sustainable food sources. • The climate of Nosilla, as part of the Lowveld Region in South Africa, suits itself perfectly to the cultivation of the aforementioned crops. Macadamias are sold worldwide and are considered a healthy source of protein and vitamins. Blueberries are one of the Super Foods, and not only very healthy to eat, but it is a creator of employment. • SCF currently employs over 250 staff during the blueberry picking season, which will increase to 500 staff with the additional plantings that are envisaged for Nosilla. Ginger, also a Super Food, high in antioxidants has played a crucial role in keeping global populations healthy during the Covid epidemic for the last two years. • Ginger requires a moderate sub-tropical climate and is therefore also ideally suited to Nosilla. Ginger is planted and harvested manually and therefore also a significant creator of employment in the White River area. All the above-mentioned commodities require water to grow successfully and therefore the need to build weirs to ensure a sustainable water supply especially during dry periods remains critical. • <u>The proposed construction of the weirs:</u> • With the proposed construction of the weirs and utilising the water within the criteria as set out by the project, it will enable Nosilla to store water in the off-channel storage dams for irrigating the crops during winter and as needed during the remainder of the year. • Constructing the weirs and the off-channel storage dams will allow the applicant to continue to maintain and expand their orchards and remain fully operational during times of low water availability or drought. Growing, processing, sales and exporting of macadamia and other products will thus continue as per the economic vision described above. This approach will also ensure more job security for the staff on the farms especially during drought events. • Without the development of the dams and weirs, Nosilla would not be able to be an economically viable project in the long term. • <u>Do we need new irrigation weirs?</u> • Yes. The farm needs to extract water from the weirs to pump to off-channel storage facilities. The water extracted from the weirs would comply to the annual legal water use allowance registered against the farm. • Having water in storage dams available would enable the farmer to distribute water to orchards during the dry seasons and allow for sustainable irrigation. The weirs are seasonal and water would only be pumped during the wet season.

- The removal of many hectares of blue gum forests will enhance the availability of water in the environment. See Specialist Study in **Appendix 4.4.2.** for detail.
- In this way the farm remains economically viable throughout the year.
- **What are the benefits of having new weirs?**
- During summer, normal rainfall events ensures that less water is used for irrigation. Water is then utilised to be pumped from weirs to off channel dams for storage and use during the winter months.
- The water stored in the off-channel dams would then enable Nosilla to irrigate during winter months, and successfully cultivate the crops envisaged. This would ensure an economically viable project, creating jobs and ensuring a sustainable agricultural business in the White River area.
- Finally, this will also enable the property owners and managers to irrigate during the drier winter months and prevent loss of production and orchards due to severe water shortages such as was the case during the **2015/2017** drought.
- **Will the weirs affect the neighbours negatively?**
- No, no neighbours would be negatively affected. The removal of the timber and the land use change to agricultural crops will consume less water, and therefore make more water available to the surrounding area. The **Ecological Water Requirement** recommendations (EWR) as described in **Appendix 4.4.2.** will also ensure that additional water is released back into the riparian environment.
- **Will the dam/weirs be beneficial to the community at large?**
- Yes, it will create more employment, more food security for South Africa and ensure less job losses due to the sustainable water supply during droughts.
- **What are the economic benefits of the new weirs?**
- Storing the water will ensure that the irrigation of orchards during periods of low water availability, or severe droughts, will continue and this will prevent orchards being abandoned or scaled back which could result in a loss of income or job opportunities both on the property as well as in the local fruit processing facilities.
- **What will the development of the weirs and off-channel storage dams cost?**
- The construction of the weirs is estimated in the region of R 300 000.00 per weir, with the building of the 120000m³ off-channel dams to be in the region of R 500 000.00.
- **Neighbouring land uses compatibility:**
- The Project is surrounded by Agriculture and a diversity of similar, compatible farming operations which include macadamia-, blueberry- and ginger production. To date no objections to the project proposal (development of in-stream weirs for irrigation purposes) have been submitted by any of the neighbours.

- **Financial Viability and Agricultural Potential of the Property:**
- The property has the potential to produce the aforementioned crops successfully and viably. These crops have been farmed for years in the area and neighbouring farms. The financial success and sustainable use would however greatly depend on the ability to store water for the purpose of irrigation.
- **Land Claims:** No Land Claims has been lodged against the Property. See **Appendix 4.2.**
- **Industry Growth:**
- **Blueberry Demand:** The demand for blueberries has never been so high as it has recently been classified as one of the “Super Foods”. Total 2016 annual world production of blueberries from both high- and low bush varieties was just over 860,000 metric tons (from 60,000 ha). Over the past 100 years, the blueberry market has been dominated almost exclusively by North American production. More recently plantings outside of North America have gained momentum. Currently the Northern Hemisphere accounts for 80% of production with 20% of relatively new production in the Southern Hemisphere.
- With “super food” status, blueberry demand worldwide is increasing rapidly especially in the UK, Europe, China and India where access to fresh blueberries has been relatively restricted in past years. There exists a gap to supply these regions in their out of season period when Northern Hemisphere production has tailed off. These Northern hemisphere markets are “empty” for six months and they rely entirely on South America and more recently South Africa for their supply. South American production is traditionally exported to the vast USA market whilst UK and Europe is left empty with little supply.
- Over the past three years, South African production has grown rapidly to take advantage of this supply window. In 2017 RSA export production reached a record level of 6,000 tons from 350ha. This volume represents a drop in the ocean making up only 0.5% of world production. Significantly the shortfall demand from the UK and EU during the RSA season is in the order of 100,000-1500,000 metric tons which equates to 5000 ha of production. Significantly too, there is a rapidly increasing demand in the middle east, India, and the far east especially China. Taking all these markets into account, Southern Africa could comfortably plant and market over 8000 ha of blueberries. Southern Africa is perfectly positioned to fill this northern hemisphere gap especially to the UK and EU where existing long term fruit trade routes and trading relationships are well established.
- **Macadamias:** According to the latest tree sales data received from nurseries for 2019, the macadamia industry is still growing rapidly. In 2019 the Southern African **Macadamia Industry** planted 5 962 new hectares of macadamias.
- KwaZulu-Natal remained for a second year the Province that established the most hectares, followed by Mpumalanga and then Limpopo. In terms of new hectares macadamias established, KwaZulu-Natal planted 2 348 new hectares in 2019.
- When the growth by the number of trees sold is taken into consideration, there are approximately 44 775 hectares

established in South Africa. Macadamia production in South Africa has increased exponentially and the rate of production is expected to increase even more in the near future due to an exponential increase in new plantings annually.

- More than 98% of South Africa's macadamia produce is exported. According to corrected figures received from the South African Revenue Service, the total value of macadamia exports in 2019 was R4.8 billion.
- Exported macadamia kernel totalled to 30 991 tons when converted to an in-shell basis at 32% crack out, which was approximately 52% of the total exported macadamia crop in 2019.
- **Nut in shell (NIS):** Nut in shell (NIS) macadamia exports totalled to 28 059 tons, which was approximately 48% of the total export quota that was destined mainly for East Asia and Southeast Asia.
- **Kernel:** Total exports for kernel was 9 917 tons. Approximately 41% were exported to North America, 47% to Europe Union (including UK), 2% to Southeast Asia (China) and 7% to the Middle East.
- The weighted average price for kernel was R261.11 per kg and for NIS R74.13 per kg.
- The financial model for these properties based on crop production is thus dependent on a reliable supply of irrigation water. To this end the proposal makes economic sense as crop production is a long-term project and will ensure that production is not stifled during drought events. This security of water supply also provides the landowner an opportunity to remain financially competitive in an ever changing and diverse business market.
- **Social Commitment and Job Creation:**
- With the successful implementation of this project, many sectors would be positively affected. With the additional development approximately 500 seasonal jobs would be created for both skilled- and unskilled labour segments. This would create a significant relief for unemployment in the local area.
- Skills transfer and uplifting of unskilled labour would be at a highest priority. There would also be permanent jobs created throughout the management structures of the proposed project. These jobs would entail tractor drivers, supervisors, packhouse personnel, quality assurance officers and packhouse managers. These industries would employ people across the employment equity spectrum and would therefore create employment for men and woman on an equal level.
- The operation also complies to SIZA, which is an International Social Audit body to ensure that staff are treated equally, that the company complies to labour laws, and that no unfair labour relations are being harboured by the company.
- Furthermore, several business sectors and community members will benefit if this project is successful. The property owners and their families will benefit financially in the long term. In the short to medium term however the development node will require substantial capital to construct the dams and weirs and install services (pump houses, irrigation pipework and electrical connections).
- The Lowveld region and outlying rural areas have been classified as one of the poorest in South Africa.

Conservative estimates list unemployment figures in the region of 30%, HIV infections just under 40% and many job seeking immigrants from neighbouring countries migrate to this area and add to the challenges faced by rural communities.

- The Covid 19 Pandemic has also resulted in additional job losses across the various industries and associated businesses.
- A construction company will be tasked with building the dams and weirs and associated infrastructure – this will provide work opportunities (an estimated 15 persons) for both skilled and unskilled labour (machinery operators, bricklayers and general labour). Unskilled labour will earn in the region of R3500/month.
- The opportunities listed above do not include the addition to subsidiary services such as vehicle maintenance; retail needs; medical facilities and building materials. This development will as a result, benefit businesses in White River and Mbombela.
- **Location:** Is this the correct location for the project? Four alternatives were assessed during this survey and all options were evaluated during the course of this investigation. Please refer to the Project Maps in the appendices for more detail.
- The preferred options do not affect neighbouring properties (flooding into neighbouring properties) and makes economic sense in terms of storage capacity versus development costs.
- The project site is fixed and the proponents do not own similar land elsewhere. In terms of compatibility of land uses this development will fit in with current agricultural developments in the area and surrounding farms. The location is thus regarded as ideal. The project site is surrounded in all wind directions with similar land uses.
- **Environmental (Ecological) Implications/Limitations:** An assessment of the prevailing fauna and flora has not revealed any threats to species/habitat or highlighted any critical limitations to the development which can be of ecological significance, or which cannot be mitigated to ensure sustainability of the environment.
- **Detailed studies** were however commissioned to ensure that impacts on the environment are clearly understood and the results are included in the specialist reports on biodiversity in the **Basic Assessment Report**.
- **Positive Impacts:** Job creation and the prevention of job losses is regarded as a significant impact which will spill over into the well-being of several families in the local community.
- Additionally, the financial viability of the project will translate into further economic growth for the investors and the local White River/Mbombela area, albeit in the medium to long term. The growth in agricultural production together with the improvement in the sustainability of the properties will result in higher incomes and ensure food/crop security.
- **Access Roads:** The access to the property is from the R40 Provincial Road between White River and Hazyview. The access road to the farm is functional and does not require any changes or upgrade. Construction vehicles will have unhindered access to the project site.

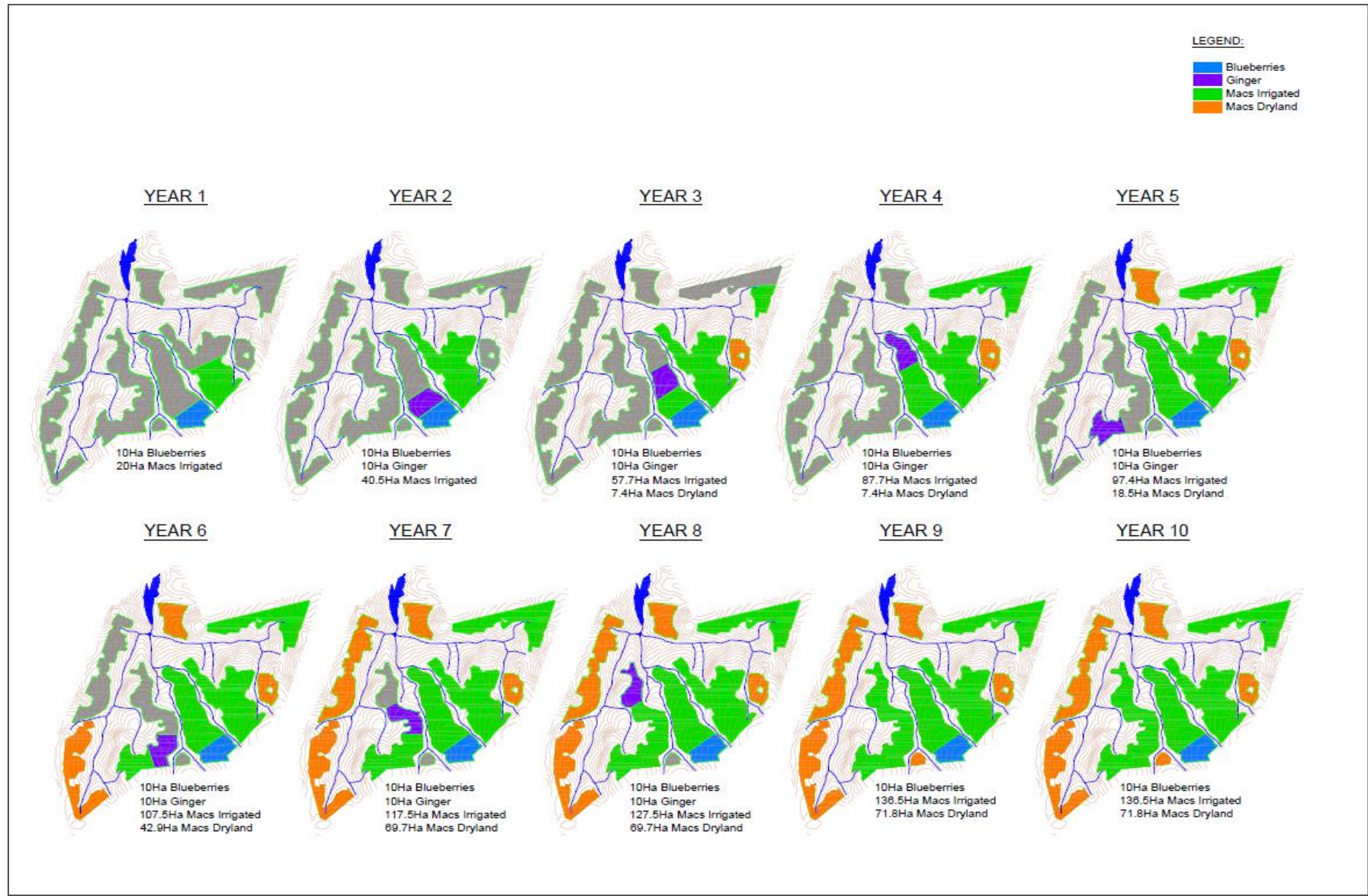
- **Timing:** Is this the right time to implement such a development? The recent drought (2015-2018) has highlighted the fact that crop producers must anticipate drought events to remain sustainably competitive. Access to reliable water for irrigation within the framework of allocated entitlements is possible on the properties and the applicant is planning ahead in anticipation of unavoidable drought-cycles occurring in the future.
- In terms of the need for more blueberries and macadamia the figures listed above speak for themselves. The economic impact of the Covid pandemic has highlighted the fact that agriculture can be a reliable vehicle to enhance industrial and socio-economic growth during this very challenging period.
- **Integrated Environmental Management:** The objective of integrated environmental management is to balance all interests towards sustainability. For many the word “sustainability” remains a ‘unicorn’ of environmental management – i.e., a myth that is often poorly defined and/or understood.
- As participants in environmental management, we can at best evaluate the project for its inherent advantages and disadvantages. With the help and input of the Public, Specialists and Project Consultants we endeavour to draw a clearer picture with which we all can associate and hopefully agree to, as well as support.
- **We raise the following questions, which include but are not limited to:** Is the proposed activity/development harmful to the environment? Did we ensure that all perceived impacts were mitigated adequately in favour of maintaining the environmental integrity? Will the local/regional/national community benefit from this development or is the development an improvement on an old or outdated concept? Did we ensure that the general public participated in this project from the day of advertisement till submission of documentation? Did we ensure that the economics of the activity were in place prior to project implementation? Is the project feasible? What are the alternatives? Have we considered the various Government role players with regards to sharing information and/or authorisation requirements of this project?
- The list goes on however the team associated with this proposal is confident that we have addressed all the issues to date and can answer in the positive to the questions listed above. In some cases, we have suggested measures of mitigation to soften the impact towards a degree of sustainability.
- **Need and Desirability of the Proposed Project:** In conclusion, it is the opinion of the EAP that the cumulative effect of the factors listed above will result in a positive contribution in the fields of economic benefit and social upliftment in the region with little, or at most manageable, impacts in the environmental arena.

Positive Issues	Discussion/Mitigation/Recommended Management Approach																																							
<p>2. EWR: Ecological Water Requirement.</p>	<ul style="list-style-type: none"> • See Appendix 4.4.2. for detail in this regard. • Mitigation Nr. 1: Implement the EWR: It is entrenched in the National Water Act that the rivers in South Africa will allow the ecology of the landscape to continue functioning in a sustainable manner, i.e., allow sufficient water to flow through the system to ensure that all ecological processes continue unhindered and that the ecosystem remains functional. • Most rivers and streams have thus been allocated an ecological reserve and an ecological water requirement to achieve the objective above. Where the EWR has not been determined a water use model or yield analysis must be undertaken to determine how much water can be abstracted for storage and irrigation purposes. • Furthermore, by extrapolating information of the EWR for the Sabie River using the Hughes Desktop Model one can define a EWR for the project site and the unnamed stream. • The EWR requirement was thus determined at 31% of run-off or rather 1.3 million m³/annum The EWR is not a constant flow and has to be adapted to the seasons of the area. • For the Nosilla system to abide by this required water allocation the EWR is simplified to monthly values equivalent to the 80 percentile of the EWR requirement as follows: <p style="text-align: center;">Ecological Water Requirement per month in m³</p> <table border="1" data-bbox="696 826 1924 1412"> <thead> <tr> <th>Month</th> <th>Weir 2</th> <th>Weir 1</th> </tr> </thead> <tbody> <tr><td>Jan</td><td>6000</td><td>19 011</td></tr> <tr><td>Feb</td><td>6967</td><td>21 134</td></tr> <tr><td>Mar</td><td>7071</td><td>21 936</td></tr> <tr><td>Apr</td><td>6843</td><td>21 228</td></tr> <tr><td>May</td><td>6642</td><td>20 474</td></tr> <tr><td>Jun</td><td>6013</td><td>18 398</td></tr> <tr><td>Jul</td><td>5571</td><td>17 549</td></tr> <tr><td>Aug</td><td>5143</td><td>16 086</td></tr> <tr><td>Sep</td><td>4769</td><td>14 152</td></tr> <tr><td>Oct</td><td>4500</td><td>13 893</td></tr> <tr><td>Nov</td><td>4769</td><td>14 152</td></tr> <tr><td>Dec</td><td>5143</td><td>16 086</td></tr> </tbody> </table>	Month	Weir 2	Weir 1	Jan	6000	19 011	Feb	6967	21 134	Mar	7071	21 936	Apr	6843	21 228	May	6642	20 474	Jun	6013	18 398	Jul	5571	17 549	Aug	5143	16 086	Sep	4769	14 152	Oct	4500	13 893	Nov	4769	14 152	Dec	5143	16 086
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	<ul style="list-style-type: none"> • Mitigation Nr. 2: Downstream Flow: The estimated yield of the scheme is 170 000 m³/annum at 80% assurance with an average long-term supply of 153 000 m³/annum. • The proposed water allocation and long-term supply after taking into account droughts and water restrictions will result in a net increase of flow exiting the farm downstream of approximately 25 900 m³/annum. • As an additional safeguard to secure low flow a minimum of 11litres per second must be released out of the lower weir. All these releases must be metered by the applicant.
3.Maintenance of the Flow.	<ul style="list-style-type: none"> • Mitigation: The following mechanisms must be implemented: • Maintaining the EWR: Construction of the weirs will occur in the months from April to October. It is not expected that river diversion will be a major issue in this time. Depending on the flow of the stream the construction team will make use of a coffer dam to contain water with a 400mm diameter outlet pipe to manage the flow in the stream. • Provision will also be made to release the EWR from an outlet pipe as per the quantities described in the EWR table above. • As an additional safeguard to secure low flow a minimum of 11litres per second must be released out of the lower weir. All these releases must be metered by the applicant. • No additional water will be sourced. The applicant must remain within the allocated entitlements. • Water Meters: Measuring devices will be installed upstream and downstream of the proposed weirs. The local Irrigation Board will have access to this data on request.
4.Job Creation and Stability.	<ul style="list-style-type: none"> • Mitigation Nr. 1: Social Commitment and Job Creation: • With the successful implementation of this project, many sectors would be positively affected. With the additional development approximately 500 seasonal jobs would be created for both skilled- and unskilled labour segments. This would create a significant relief for unemployment in the local area. • Skills transfer and uplifting of unskilled labour would be at a highest priority. There would also be permanent jobs created throughout the management structures of the proposed project. These jobs would entail tractor drivers, supervisors, packhouse personnel, quality assurance officers and packhouse managers. These industries would employ people across the employment equity spectrum and would therefore create employment for men and woman on an equal level. • The operation also complies to SIZA, which is an International Social Audit body to ensure that staff are treated equally, that the company complies to labour laws, and that no unfair labour relations are being harboured by the company. • Furthermore, several business sectors and community members will benefit if this project is successful. The property owners and their families will benefit financially in the long term. In the short to medium term however the development node will require substantial capital to construct the dams and weirs and install services (pump

	<p>houses, irrigation pipework and electrical connections).</p> <ul style="list-style-type: none"> • The Lowveld region and outlying rural areas have been classified as one of the poorest in South Africa. Conservative estimates list unemployment figures in the region of 30%, HIV infections just under 40% and many job seeking immigrants from neighbouring countries migrate to this area and add to the challenges faced by rural communities. • The Covid 19 Pandemic has also resulted in additional job losses across the various industries and associated businesses. • A construction company will be tasked with building the dams and weirs and associated infrastructure – this will provide work opportunities (an estimated 15 persons) for both skilled and unskilled labour (machinery operators, bricklayers and general labour). Unskilled labour will earn in the region of R3500/month. • The opportunities listed above do not include the addition to subsidiary services such as vehicle maintenance; retail needs; medical facilities and building materials. This development will as a result, benefit businesses in White River and Mbombela.
<p>5.Economic Sustainability.</p>	<ul style="list-style-type: none"> • <u>Economics of the Development:</u> Refer to the Needs and Desirability Chapter in Paragraph 4 of the BAR for detail on the economics of the crop types: • <u>Economic benefits of the new weirs?</u> Storing the water will ensure that the irrigation of orchards during periods of low water availability, or severe droughts, will continue and this will prevent orchards being abandoned or scaled back which could result in a loss of income or job opportunities both on the properties as well as in the local fruit processing facility. • <u>Inherent Costs:</u> The estimated development cost is in the region of R5 million which is a substantial investment to ensure the long-term agricultural objective and benefit of the properties. • The proponent has secured the funds to implement this proposal which will ensure a sustainable long-term product for the applicant and the staff on the farm. • No mitigation measures are applicable.
<p>6.New Agricultural Potential.</p>	<ul style="list-style-type: none"> • <u>Replacing Blue Gums with Orchards and Crops:</u> • <u>Mitigation Nr. 1:</u> The property has the potential to produce the aforementioned crops successfully and viably. These crops have been farmed for years in the area and neighbouring farms. The financial success and sustainable use would however greatly depend on the ability to store water for the purpose of irrigation. • The removal of blue gums has opened up the potential of these soils to accommodate profitable crop farming. • The layout of the project over the next ten years as depicted below was compiled by an agricultural specialist and supports the vision of the needs and desirability chapter.

Development Plan for Crops:



9.6. Description of Options, Alternatives and Monitoring Requirements

9.6.1. Site Alternatives:

- **Two Weir Sites: Location Alternatives:** The land earmarked for development is fixed and is part and parcel of an existing farming enterprises. The proposed development is required to ensure a sustainable supply of irrigation water for the existing farming operations during drought conditions.
- Two suitable weir sites were identified during the engineering assessment phase. Both sites are viable in terms of construction and functionality. **See Appendix 1** for maps of the various options. No other options are available on the property for the storage of water for abstraction purposes.
- By virtue of their position these sites are ecologically more acceptable in terms of impact on the biodiversity of the area; less farming land is lost due to flooding and construction implications are cost effective.
- By optimising the potential of these two sites, the applicant is confident that the land can continue to contribute sustainably to the agricultural business opportunities of Farm.
- **Access** to the site is in place and no new roads will be required.

9.6.2.: The No Go Option:

- **The No Go Option** will affect economic growth and negate economic opportunity in the area. The applicant has assessed the potential of the farm to produce high value crops for the local and export market.
- To optimise the potential he requires a sustainable supply of irrigation water especially during the dry months of the year.
- This application is for an expansion to the farming operations especially during drought conditions. A no-go approach would remove these options out of the economic- and social equation in the area.
- No known environmental reasons were identified which could make this a “No Go” option.
- **Indirect Impact:** Irrigation needs during times of drought will not be met with water shortages or having an impact on the quality of the agricultural product resulting in crop losses and downscaling of operations which will include job losses.

9.6.3. Demand Alternatives:

- **Power Supply: Two Options:**
- **Eskom Supply:** Eskom remains the only viable and practical option for an agricultural activity of this nature. The electricity will be required to pump water and run pumps to the various orchards. Eskom supply is in place and has been upgraded at one of the distribution poles.
- **Solar Power:** Solar power (panels and energisers) have been installed to electrify certain boundary- and installation/facility fences. These units provide security and controlled access to the various sites on the farm.
- **Water Supply and Irrigation: Two Options:**
- Water supply (potable and for irrigation) will be made available from the farm dams, the weirs and bore holes as per the water allocation and entitlements existing in the name of the applicant.

Low Flow Irrigation: Advantages (Recommended Option)	Overhead/Sprinkler Systems: Advantages
<ul style="list-style-type: none"> • Efficient use of available irrigation water. 	<ul style="list-style-type: none"> • Easy to install.
<ul style="list-style-type: none"> • Water is deposited on the plant roots, optimising plant growth. 	<ul style="list-style-type: none"> • Labour intensive creating more job opportunities during operational and maintenance phases.
<ul style="list-style-type: none"> • Cost effective as it limits wastage. 	<ul style="list-style-type: none"> • Applies vast quantities of water in a short period.
<ul style="list-style-type: none"> • Reduces evaporation and overspray. 	
<ul style="list-style-type: none"> • The system is easy to install, it is flexible and adaptable. 	
<ul style="list-style-type: none"> • No damaging spray finds its way onto unwanted areas, e.g., roads and buildings. This prevents erosion and unnecessary run-off. 	
<ul style="list-style-type: none"> • The adjacent soil and foliage are kept dry, reducing fungal diseases. 	
<ul style="list-style-type: none"> • Water and nutrients are delivered directly to the root zone which promotes healthy plant growth and reduces plant stress. 	
<ul style="list-style-type: none"> • Soil aeration is improved because soil particles are not washed down, thus decreasing soil compaction and improving root growth. 	
<ul style="list-style-type: none"> • The system saves on maintenance and labour. 	
<ul style="list-style-type: none"> • The system does not make use of moving sprinkler parts which require intensive maintenance to repair. 	
<ul style="list-style-type: none"> • Unobtrusive and aesthetic. Hidden under mulch or beneath the soil. 	
<ul style="list-style-type: none"> • The system does not interfere with landscaping or scenery. 	
<ul style="list-style-type: none"> • Decreased labour to install and maintain plus lower overall material cost. 	
<ul style="list-style-type: none"> • Security. No exposed sprinkler heads, pipes or surface driplines to tamper with. 	
Dripline Irrigation: Disadvantages	Overhead/Sprinkler Systems: Disadvantages
<ul style="list-style-type: none"> • Blockages can be troublesome. 	<ul style="list-style-type: none"> • Water loss and wastage is high.
<ul style="list-style-type: none"> • Less labour required during various phases. 	<ul style="list-style-type: none"> • Water application per plant not always effective.
	<ul style="list-style-type: none"> • More water is irrigated increasing costs and more electricity is used.
	<ul style="list-style-type: none"> • Unwanted areas, e.g., roads are often covered in water and spray.
	<ul style="list-style-type: none"> • More incidents of erosion and run-off are associated with this irrigation method.
	<ul style="list-style-type: none"> • Less effective during windy periods.
	<ul style="list-style-type: none"> • Susceptible to theft of the various components.
	<ul style="list-style-type: none"> • High maintenance costs.

9.6.4. Scheduling Phases/Alternatives:

- **Time of Year (Season):**
- To ensure a safe working environment and to reduce the potential impact to the surrounding natural environment, it remains imperative that the in-stream weirs and off channel dams are constructed during the period April to October. This period is relatively dry and will allow for unhindered construction operations.
- **Time of Week:**
- It is recommended to keep the construction period as short as possible. Work will be limited to normal working hours daily (07h00-16h30) from Monday through to Friday.

9.6.5. Input/Systems Alternatives:

- **Variety of Plants and Crop Options:**
- **Blue Gums:** The impact of blue gums on the overall environment is well documented particularly the need for too much water. This has an impact upon the underground aquatic system and places additional stress on the water resources of the area.
- Together with the lack of economic benefits from continuing with this plant type on a small property negates the continued use of this option for the future.
- **Agricultural Crops:** Macadamia nuts are not limited to one or two varieties. Varieties are numerous and each type has its own set of advantages and disadvantages. These characteristics vary from being disease resistant; water friendly (require less irrigation); producing more product per plant (less is more) and being adaptable to soil type diversity.
- The applicant has access to an Advisory Service in the industry and these officials will play a vital role in matching the project site with a plant variety that will best fit the local project site conditions.
- **Blue Berries and Ginger:** To ensure the applicant follows an integrated approach to farming and thereby maximising his economic options to remain sustainable in the long term, the planting of Blue Berries (long term) and ginger (cash crop) adds two more sustainable alternatives to the agricultural model.
- The soils at Nosilla are suitable for all three crop options and together with a reliable supply of irrigation water these plant alternatives are more viable than blue gums.

9.6.6: Layout, Design, Density Alternatives:

- **Layout (Optimising Agriculture versus Forestry):** The layout of the orchards (refer to the development map for the crops) and farming zones has avoided the drainage lines and streams that dissect the property.
- The crops will be planted on the soils most suitable for their specific needs.
- As highlighted by Dr. Deacon in his report, the change of land use from forestry to high value crops has had a positive impact on the ecology of the area. This has allowed the riparian zones to recover and where possible remain untouched; it has allowed for the implementation of a buffer area and finally has allowed more water back into the stressed aquatic system.

9.6.7. Monitoring Requirements: Alternative Methods:

- **Measuring Mitigation:** Environmental performance monitoring should be designed to ensure that mitigation measures are implemented. The monitoring programme should clearly indicate the linkages between impacts, indicators to be measured, measurement methods and definition of thresholds that will signal the need for corrective actions. A monitoring programme for the biodiversity associated with the project, would ideally be to record the reaction of the biota to changes in the environment due to the impacts of the project.
- **ECO:** The applicant must appoint an independent ECO that will have the responsibility of monitoring and reporting on compliance with the conditions of the Environmental Authorisation (EA), as well as monitoring and reporting on the implementation of the approved EMPr.
- **Monitoring Programme:** A monitoring programme for the biodiversity associated with the project, would ideally be to record the reaction of the biota to changes in the environment due to the impacts of the project.
- **Aspects 1: EWR:** Very little monitoring will be necessary during the operational phase of the project. Most of the mitigatory aspects, will be assessed by the ECO during construction. The only impact require monitoring during the operational phases of the project, is to ensure that the **flow releases from the weirs** will meet the requirements stipulated for the Environmental Water Requirement releases.
- **Aspect 2: Abstraction of water from the river system:** Pumping of water freed up by the removal of exotic plantations, will only be allowed during the high flow months so as not to reduce the low flow in the system.
- As an additional safeguard to secure the low flow, it is recommended that the condition of the water use licence be that a minimum flow of 11 l/s must always flow out of the lower weir (when there is flow in the system) and this must be metered.
- **Aspect 2: Measuring the flow:** Whatever system will be in place to release and measure flow releases must be monitored regularly in order to ensure the 11 l/s is released and be confirmed using the metering system.
- The weirs must be inspected frequently to maintain the system and ensure that the outlets are not blocked or not functioning properly. The results of the metering of flows should be made available to the relevant authority or Irrigation Board on request.
- **Aspect 3: The buffer zone and riparian corridor:** The implementation of the buffer area should be monitored throughout the duration of construction activities to ensure that the effectiveness of the final buffer zone areas are maintained and that management measures are implemented appropriately. Regular inspections during the operational phase should also be undertaken to ensure that functions are not undermined by inappropriate activities.
- **Aspect 4: Exotic and alien invasive plants:** To anticipate and evaluate imminent or potential risks to the project area regarding exotic- and alien invasive plants, as well as pathways of invasion, a monitoring programme should be developed in order to create effective mechanisms to manage or mitigate these. Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge. It is important to evaluate the effectiveness of control methods and to monitor the cleared areas on a regular basis to identify emergent seedlings and to remove those immediately.

Summary of Preferred Alternatives: Key Points:

- **Weir Sites**: The project site is fixed. Two weir sites were considered viable and should be developed as described in this assessment.
- **Power**: Service provision for power will be supplied by Eskom and water will be sourced from the existing storage dams, canals and boreholes on site.
- **Timing**: Preparation will commence during the mid-season avoiding windy conditions and very wet periods where possible.
- **Irrigation Type**: A low flow irrigation system will be used for purposes of irrigation during the establishment phase.
- This will be combined with a computerised water/moisture maintenance facility to maximise water application at the correct times and only when necessary.
- **Advice and Guidance**: Extension officers and consultants will assist with the choice of crop varieties. This will be determined as per the soil potential of each orchard section.
- **Forestry Areas**: The layout of the orchards will coincide with areas which were historically used for forestry. The off-channel storage dams will also be located in these areas.

10. PUBLIC PARTICIPATION

- **Legislation**: As per applicable environmental legislation the applicant must submit an application to the local Departments of Environmental- and Water Affairs to obtain authorisation and permission to develop the proposed dam.
- **Advertisements (Printed Media)**: A newspaper advertisement (The Lowvelder: Local and regional newspaper) was placed in the printed press on **15 July 2021** inviting public participation and involvement.
- **Advertisements on Site and Town**: Site Notices were placed at the entrance/access to the site on the White River-Hazyview R40 Provincial Road and near the site on the farm.
- **Neighbours**: Advertisements and invitations were also submitted to direct neighbours of the property.
- **Government Departments**: The Department of Agriculture, South African Heritage Resources Agency; the Department of Rural Development, Land and Environmental Affairs; the Department of Water and Sanitation (IUCMA); the Department of Agriculture, Forestry and Fisheries; Mpumalanga Tourism and Parks Agency and the Municipality of Mbombela (White River) were all informed of the project and invited to participate.
- **Public Information Meeting**: An information/public meeting was held on site **on 6 September 2021 at 10h00**. Persons that may be affected and or interested in the proposed project were invited to register their interest with the contact person listed below and requested to attend the Public Meeting.
- **Focus Group Meetings**: Where applicable, on-going consultation will be formalised through focus group meetings with each neighbour and or official department as per request and or as the need arises.
- **Impacts**: Issues and Impacts were determined by RES, the specialists involved in the research and complimented by those raised during discussions with neighbours and officials from the various departments. Many of these were also gleaned from similar projects in the Lowveld and from previous experience obtained on projects recently completed in the area.
- **Minutes**: See **Appendix 2** for a comprehensive set of minutes and the Issues and Responses Report.
- **Reports/Copies of Information**: Copies of all **Reports** generated will be submitted for comments as per the registered list of Interested and Affected Parties. **Hard Copies** will be made available at **Public Venues (White River Library)** and electronic copies will be submitted as requested via post.
- **Specialist Studies Completed**: Ms Christine Rowe (Heritage Specialist) has completed an archaeological evaluation of the Project Site and Dr. Andrew Deacon (Biodiversity Specialist) has undertaken various aquatic- and terrestrial surveys. Contents and outcomes of these studies will be shared with I&APs at the Public Meeting and as the reports are produced.
- **Contact Person (WULA)**: Mr. Johan Enslin is responsible for the water use licence application and can be contacted at **johan@iwula.org**. and Cell: 072 332 2442.

Any **social benefits** that will result from this proposed development?

Yes	No
X	

Comments:

- **Job Security:** The development process will result in significant job security and business opportunities during various stages of the process.
- Development labour and expertise will be required to construct the weirs and pump houses and install additional service lines associated with irrigation requirements.
- This phase will require input from both informal- and formal sectors of the agricultural industry.
- The advent of the proposed project will necessitate the employment of skilled- and unskilled labour and expertise.
- Job opportunities will include but not be limited to maintenance positions on the irrigation systems and general farming operations.
- Unskilled labour will earn in the region of R 3500.00 per person per month.
- The opportunities above do not include subsidiary services such as an increase in maintenance of vehicles, retail needs and medical facilities. This development will thus benefit the businesses in White River town.

11. DECOMMISSIONING PHASE

The applicant accepts responsibility for the Cradle to Grave principle. It is unlikely that the proposed development will be decommissioned in the foreseeable future however elements of the site may require a change in land use or must undergo a process of decommissioning in some form or another. For this event, several **objectives** are submitted for the record and consideration.

11.1. Decommissioning Objectives

The applicant/developer remains responsible for the life cycle of the project and all the decommissioning activities in the project area. The infrastructure will undergo a full and comprehensive decommissioning programme. This programme must be described in a **decommissioning plan**.

It is recommended that an **Independent Environmental Assessment Practitioner (EAP)** is appointed at the time **to compile a detailed decommissioning plan** to address all the aspects of the decommissioning process prevalent at the time.

11.2. Decommissioning Approach (Under guidance of an EAP)

Essentially the following approach must be implemented:

11.2.1. Removable concrete structures

- All foreign material such as gravel and concrete (Pump Houses?) must be broken up and removed to a designated gravel pit, which will be identified by the local Municipality for purposes of rehabilitation.
- All roads, buildings and service infra-structure must be demolished and removed off site.
- All service lines, where applicable (electrical- and water supply) must be removed and trenches rehabilitated.
- The lie of the land must be returned to fit in with the adjoining land surface.

11.2.2. Reinstatement

- All foreign material must be removed and disposed of at a borrow pit earmarked for rehabilitation.
- The disturbed area must be levelled off and contoured to fit in with the rest of the landscape.
- The disturbed area must be ripped, and fertilised to enhance re-vegetation.
- The exposed soil must be brush packed with brush and grass material from the area, to serve as a seed bank for re-vegetation.
- The reinstated area must be irrigated once a week to promote the re-vegetation process.
- These aspects will require on site monitoring, as the occurrence of natural rainfall will determine the frequency of irrigation required.

12. MONITORING AND AUDITING

- It is recommended, that in the event that this proposal/application is approved, that the developer/applicant appoint an independent **Environmental Control Officer (ECO)** to oversee the implementation of the **Environmental Management Programme (EMPr)** and **monitor compliance** of the **Environmental Impact Assessment (EIA)** and the **Environmental Authorisation (EA)**.
- Furthermore, if the proposal is approved, the ECO must ensure that all the **conditions** as set out in the **Environmental Authorisation** issued by the DARDLEA, are met and implemented as stipulated.
- The ECO must submit a monthly Audit Report during the development phase to the applicant and DARDLEA for record- and implementation purposes.
- The **role of the ECO** and independent audit teams are well defined within the framework of the **Integrated Environmental Management (IEM)**.

13. RECOMMENDATIONS AND CONCLUSIONS:

- **1.Experience and Knowledge:** The applicant and his family have more than **15 years of experience of crop farming** in the Lowveld area and have expressed their intention to ensure a sustainable supply of water to their crops during times of water shortage and environmental stress by developing two instream storage weirs. The water will be pumped from the weirs into off channel storage dams during the wet season. The applicant has access to the funds, equipment, trained staff and knowledge to undertake this development project.
- **2.Preferred Location Options:** Only two sites are in any way viable. This application could not identify any other sites which could accommodate the construction of a weir and or function as a storage facility. The applicant wishes to develop both sites.
- By virtue of their position in the landscape these sites are ecologically acceptable in terms of impact on the biodiversity of the area; less farming land is lost due to flooding and construction implications are cost effective. By optimising the potential of these sites, the applicant is confident that the land can continue to contribute sustainably to the agricultural business opportunities of the Farm.
- **3. The Specialist Study on Biodiversity and Ecology** followed the step-by-step guidelines described in the Mpumalanga Biodiversity Sector Handbook (MBSP) as compiled by Dr. Mervyn Lötter *et al.*:
- These conditions are based on the identification of mitigation measures and solutions that minimise impacts on biodiversity and conflicts in land-uses by making use of CBA maps in the Environmental Impact Assessment. The steps used in this section correspond with the steps which are obtained from the Mpumalanga Biodiversity Sector Plan (2014). Step 2.3 listed in the Land-use planning and Decision-making table 50 in the **Appendix 4.4.3** lists compromises and solutions that minimise impacts on biodiversity and conflicts in land-use, which are supported by the following five steps:
- **Step 2.3.1 Retain natural habitat and connectivity in CBAs and ESAs:** The avoidance of environmentally sensitive areas identified during the Sensitivity Mapping exercise is regarded as the single most effective possible mitigation measure for mitigating impacts on the ecology of the project area.
- **Forestry Areas:** It is clear that the areas planted for timber was mainly located on the crests of the hilly landscape and the steeper slopes and valley bottom were left mostly intact.
- The developer will only develop the cleared areas, while the remaining slopes and valleys will be conserved in its current, near natural state. According to the Mpumalanga Biodiversity Sector Plan, the untransformed valleys are a mixture of Optimal Critical Biodiversity Areas and Other Natural Areas. These areas will thus be maintained in a natural state while the cleared crest areas (previously forestry) will be farmed.
- The valleys on the farm will function as natural corridors, connecting the upstream landscape with the downstream corridors towards the Da Gama Dam. The valleys with their broad, dense untransformed woodland, serve as a good example of the concept “retaining natural habitat and connectivity in an Optimal CBA”.
- As no fish were found in the stream, the weirs will not pose any migration barrier.
- **Step 2.3.2: Apply the mitigation hierarchy:** The mitigation hierarchy for dealing with negative impacts on biodiversity, consists of four activities:
- **Avoid and prevent:** Consider options in land-use location, siting, scale, layout, technology and phasing to avoid impacts on biodiversity, ecosystem services and people. This is the best option but not always possible.

- The weir sites are both surrounded with dense valley bush and the small weir footprints will not have a detrimental impact on the riparian corridor. The areas surrounding these weirs will also include a 20m protective buffer zone which will safeguard these sites from further development and impacts.
- **Minimise:** Consider alternatives in land-use location, siting, scale, layout, technology and phasing to minimise impacts on biodiversity, ecosystem services and people.
- Two small weirs will be constructed in the drainage line. From here the water will be pumped to three 40 000m³ HDPE lined off-channels balancing dams, which will be constructed in the areas where commercial forestry was cleared. The reason for constructing these dams off-stream and not in the drainage, is because of the negative environmental impact that such a large impoundment will have on a natural drainage system.
- **Rehabilitate:** If impacts have been unavoidable, take measures to return impacted areas to a condition similar to the pre-impact or natural state — although this is important and necessary, rehabilitation can never replicate the diversity and complexity of an un-impacted natural site.
- The cleared forestry areas will be stabilised and planted after clearing has taken place. The dense natural buffer and the established ecological buffer around the drainage lines will be more than adequate to deter any adverse conditions from the cleared areas during the initial planting phases.
- **Offset:** As a last resort, compensate for remaining unavoidable negative impacts on biodiversity. When every other effort has been made to minimise or rehabilitate impacts to a degree of 'no net loss' of biodiversity against biodiversity targets, offsets can compensate for unavoidable negative impacts.
- The removal of approximately 187 ha of commercial forestry will increase the runoff on the Farm Nosilla by an estimated 187 000 m³ /annum. Due to the negative environmental impact of in-stream storage, off-channel storage of approximately 125 000 m³ is being developed on the farm to store the water. Pumping of water freed up by the removal of exotic plantations, will only be allowed during the high flow months so as not to reduce the low flow in the system.
- A low flow analysis shows that the removal of forestry and transferring the increase flow to the off-channel dams could result in a small decrease in the low flow, even though the EWR will still be met. The conversion from Stream Flow Reduction (SFR) to irrigation will benefit downstream users by 25 900 m³ /annum. As an additional safeguard to secure the low flow, it is recommended that the condition of the water use licence be that a minimum flow of 11 l/s must always flow out of the lower weir (when there is flow in the system) and this must be metered.
- The local Irrigation Board will have access to the data collected at the water use meters.
- **Step 2.3.3 Secure priority biodiversity in CBAs and ESAs through biodiversity stewardship:** Set aside land of high biodiversity importance for conservation through biodiversity stewardship options. Where biodiversity losses are unavoidable, set aside another piece of land of equivalent or greater biodiversity importance for conservation:
- By not impacting significantly on the untransformed valleys, approximately 267 ha of Optimal Critical Biodiversity Area (55% of project area) will be protected as a natural system on the farm.

- **Step 2.3.4 Remedy degradation and fragmentation through rehabilitation:** Design project layouts and select locations that minimise loss and fragmentation of remaining natural habitat and maintain spatial components of ecological processes, especially in ecological corridors, buffers around rivers and wetlands, CBAs and ESAs. Activities that are proposed for CBAs must be consistent with the desired management objectives for these features and should not result in fragmentation.
- The valleys on the farm will act as natural corridors, connecting the areas from the south to the corridors situated downstream of the farm towards the Da Gama Dam.
- This is a good example of retaining natural habitat and connectivity in a CBA Optimal. Approximately 267 ha of Optimal Critical Biodiversity Area (55% of project area) will be protected as a natural area on the farm.
- **Step 2.3.5 Promote long-term persistence of taxa of special concern:**
- Environmental Water Requirement releases from the weirs will keep the downstream habitats ecologically sound.
- Eight bird species of special concern will utilise the intact habitat of the project area, including species such as African Crowned Eagle, Martial Eagle, Knysna Turaco and the Cape Vulture might overfly the area.
- Eight mammal species of special concern will utilise the intact habitat of the project area, including medium-sized species such as Serval, Cape clawless otter, Honey badger and Brown hyaena.

4. Additional key issues include:

- The applicant has access to **adequate water** as per entitlements and lawful water use.
- The soils on the cleared forestry areas are **suited for orchard purposes.**
- The soils and geology at the **weir sites are stable** for the construction of the two weirs.
- To protect the unnamed drainage line in its current condition from degradation, a **buffer of 20 m wide** on both sides of the drainage line is required.

5. Heritage Aspects:

- It is recommended that an Environmental Control Officer (ECO) oversee the implementation of the development phase and the handling procedure of any finds is described in the Environmental Management Programme (EMPr).
- An accredited archaeologist must oversee and monitor the initial clearing of the weir development site/s.
- Should any artefact, or historical site be incidentally discovered during excavations for foundations as well as in future, all works must cease with immediate effect. The find must be reported to the Project Manager for the development and the ECO for the project.
- These representatives will initiate an Action Plan in conjunction with SAHRA and the developer to address the management and handling of the find.

6. Weir Management:

- The following control measures must be implemented to ensure that the allocations and abstraction volumes remain within the approved entitlements:
- Measure water pumped into the dams from the weirs. (daily volumes).
- Record the water released downstream from the weirs.
- Record rainfall.
- Record evaporation.

7. Yield Analysis:

- The EWR requirement was determined at 31% of run-off or rather 1.3 million m³/annum. The EWR is not a constant flow and has to be adapted to the seasons of the area.
- For the Nosilla system to abide by this requirement water allocation the EWR is simplified to monthly values equivalent to the 80 percentile of the EWR requirement as follows:

Ecological Water Requirement per month in m³

Month	Weir 2	Weir 1
Jan	6000	19 011
Feb	6967	21 134
Mar	7071	21 936
Apr	6843	21 228
May	6642	20 474
Jun	6013	18 398
Jul	5571	17 549
Aug	5143	16 086
Sep	4769	14 152
Oct	4500	13 893
Nov	4769	14 152
Dec	5143	16 086

- **Maintaining the EWR:** The estimated yield of the scheme is 170 000 m³/annum at 80% assurance with an average long-term supply of 153 000 m³/annum.
 - The proposed water allocation and long-term supply after taking into account droughts and water restrictions will result in a net increase of flow exiting the farm downstream of approximately 25 900 m³/annum.
 - As an additional safeguard to secure low flow a minimum of 11 litres per second must be released out of the lower weir. All these releases must be metered by the applicant.
 - Construction of the weirs will occur in the months from April to October. It is not expected that river diversion will be a major issue in this time. Depending on the flow of the stream the construction team will make use of a cofferdam to contain water with a 400mm diameter outlet pipe to manage the flow in the stream.
 - Provision will also be made to release the EWR from an outlet pipe as per the quantities described in the EWR table above.
 - **Water Meters:** Measuring devices will be installed upstream and downstream of the proposed weirs. The local Irrigation Board will have access to this data on request.
- 8. Fatal Flaw:** The evaluation process did not reveal any **fatal flaws** during the investigation process.

Conclusion and Environmental Statement: The project satisfies the requirements of sustainable integrated environmental management. Provided the developer implements the recommendations and conditions of this report, and the mitigation measures proposed, especially in terms of biodiversity management, it is recommended that the development of the two weirs are approved.

14. REFERENCES

Department of Environmental Affairs and Tourism, 1998. *Guideline Document, EIA Regulations, implementation of sections 21, 22 & 26 of the Environment Conservation Act*. Government Printer, Pretoria.

Gertenbach W P D, 1980. *Rainfall Patterns in the Kruger National Park*. Koedoe 23, National Parks Board, Pp 35 – 43.

Mucina L. and Rutherford M.C., 2006. *The Vegetation of South Africa, Lesotho and Swaziland*.

Using a site-based tool exercise the buffer zone requirements for the Nosilla drainage system were defined. According to this initial buffer requirement, it becomes apparent that, to protect the unnamed drainage line in its current condition from degradation, a **buffer of 20 m wide** on both sides of the drainage line is required.