water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Private Bag X313, Pretoria, 0001, Sedibeng Building, 185 Francis Baard Street, Pretoria,
Tel: (012) 336-7500 Fax: (012) 323-4472 / (012) 326-2715

WATER USE LICENCE APPLICATION SUMMARY

NAME OF APPLICANT:

Balderja (Pty) Ltd

Compiled by:

Confluent Environmental

Signature:
Date :

1. Applicant details

Name of applicant: Balderja (Pty) Ltd
Postal address: PO Box 72328, Lynnwood Ridge, Pretoria, 0040
Cell phone number: 082 7813 155
Office number: N/A
E-mail address: deninabernard@me.com

2. Person submitting application

Jackie Dabrowski (Ph.D., Pr.Sci.Nat. Aquatic Science)
The South African Council for Natural Scientific Professions (SACNASP)
Registration Number 11516
Date of registration 27 January 2016

3. Background and purpose

The applicant purchased Portions 12, 15 and 17 of the farm Redford 232 Knysna RD, (collectively known as Balderja Farm), for the development of macadamias and cover crops under irrigation (Figure 1). The closest town is Plettenberg Bay.

The construction of a dam for the storage of water to which the properties are and may become entitled, was commenced on Portion 17/232 in 2021, but construction has been ceased (as per CMA directive Dec 2021) pending the outcome of the WULA. The proposed dam is located instream in a non-perennial drainage line on a tributary of the Whiskey Creek.

To cultivate the 28ha macadamia orchard under drip irrigation, the estimated mean annual irrigation requirement is approximately 81 000 m^3/a, with a maximum demand reaching up to 116 000 m^3/a (Hydrological Report, Confluent). Water for irrigation would be from three sources. The three farm portions each have a 1:31 share of a furrow allocation through the Rondebosch River Water User Association (RRWUA), which totals approximately 50 377 m^3/a using the WRSM Pitman model. However, actual flows measured by a user of the furrow, suggest that flows may be as much as 50% lower than predicted by the model (Hydrological Report, Confluent). Therefore, a volume of 25 000 m3 has been used in water supply calculations. Surface runoff from the proposed dam's catchment is approximately 12 200 m^3, and 69 000 m^3 would be sourced from a borehole on Portion 17/232. Water storage in the proposed dam of 70 000 m^3 was calculated (Hydrological Report, Confluent and Dam Engineer Report, Jan Brink) to be sufficient for the planned hectarage of macadamia nuts to be irrigated, providing assurance of supply even in drought conditions.

The Water Use License Application (WULA), WU21607, is for the following water uses in terms of the NWA (Act 36 of 1998):

Section 21(a) - Taking of surface water from dam's catchment (12 200 m^3/a)
Taking of groundwater from the borehole (69 000 m^3/a)
Section 21(b) - Storing of water in a dam (70 000 m^3)
Section 21(c) - Impeding the flow of water in a watercourse (dam construction)
Section 21(i) - Altering the bed, banks, course or characteristics of a watercourse (dam construction)

Figure 1: Location of dam on 17/232, showing the three farm portions owned by the applicant

3.1 Existing Authorisations

There is an Existing Lawful Water Use (ELU) under s32 of the National Water Act 36 of 1998 (NWA0, for the three portions of land purchased by the applicant. This is the Rondebosch River Water Use Association Certificate of Entitlement (16/06/2021) which provides for water use from the furrow system. The three properties receive a proportional allocation of water from the furrow system, which supplies 31 properties in total. The mean monthly furrow volumes for the catchment were calculated by the hydrology specialist (Dr. J. Dabrowski, Confluent Environmental). The proportion allocated to the landowner is at a ratio of 1:31 per portion. The allocation from the furrow was modelled to be approximately 50 377 m^3/a, but flows measured from a user of the furrow, suggest that the actual flows produced by the furrow may be as much as 50% lower than predicted by the model. Therefore, the total volume received from the furrow may be approximately 25 000 m^3/a. The difference between modelled and measured flows is further explained in the Hydrology Report.

Portion 12/232 has an existing offstream dam which is currently used to store water allocated through the RRWUA.

There are no other registered existing lawful water uses for Portion 17/232 through WARMS.

4. Location of water uses

The water use activities are in Redford, near the Crags, approximately 15 km North-East of Plettenberg Bay in the Western Cape. The existing unauthorised, and proposed water use occurs on Portion 17 of Redford Farm 232, within Quaternary Catchment K60E, in the Gouritz Water Management Area (Figure 2). The non-perennial watercourse on which the proposed instream dam occurs drains into the Whiskey Creek River, which is a tributary of the Keurbooms river. The property is bordered by the Whiskey Creek Nature Reserve to the south. The geographic location of the property where the water use will take place is -33.949283° and 23.447559°. Table 1 lists the

property ownership details. The location of the proposed dam and drilled borehole are indicated in Figure 1.

Table 1: Property ownership details of the three portions owned by the applicant

Property description	Title Deed number	Owner
Portion 17/232 (proposed water uses)	T3391/2021	Balderja (PTY) Ltd
Portion 12/232**	T13107/2021	Balderja (PTY) Ltd
Portion 15/232**	T32881/2020	Balderja (PTY) Ltd

**These properties are not part of the water use license application, but water taken and stored on Portion 17 will be used to irrigate macadamia orchards on these two properties in addition to Portion 17/232.

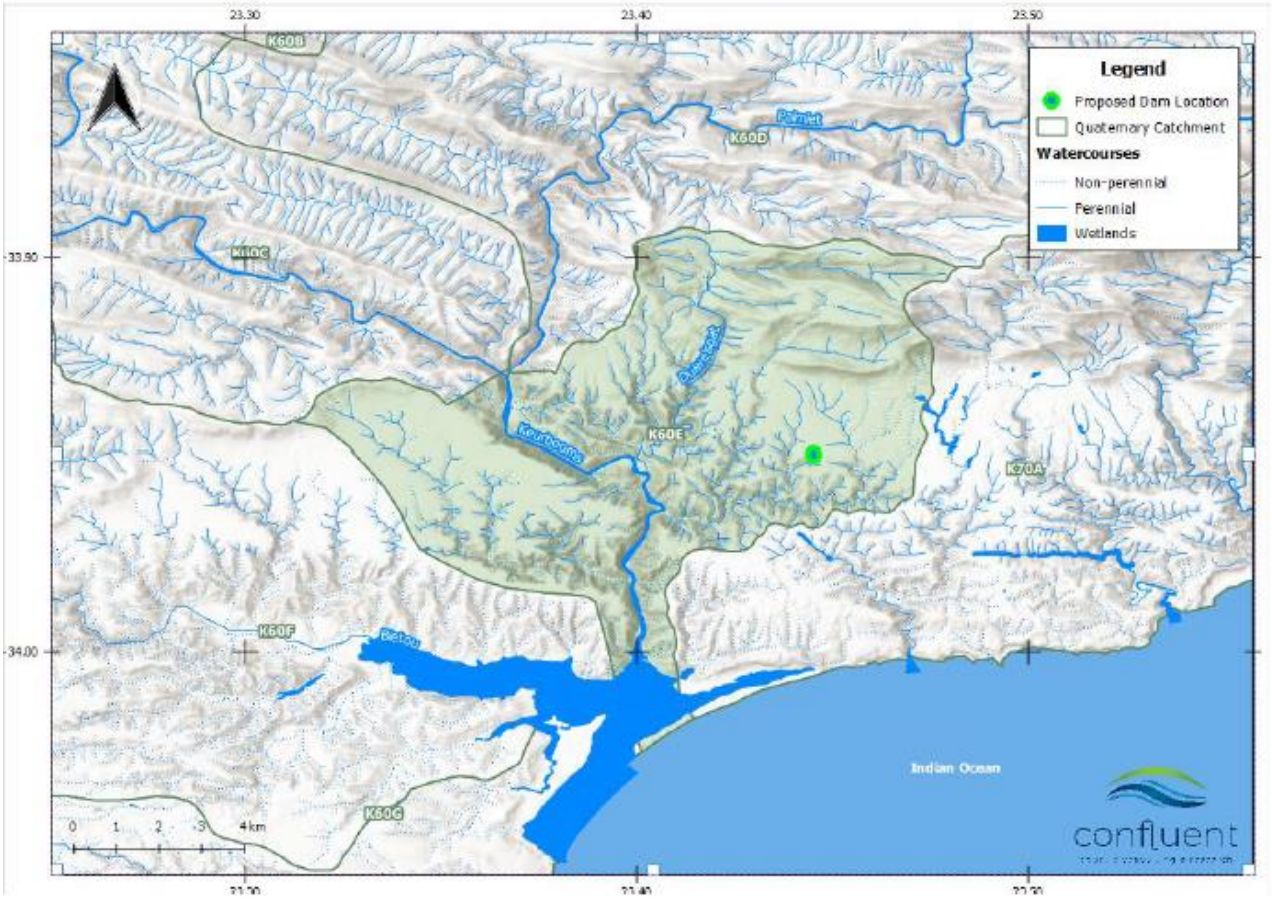

Figure 2: Location of dam within Quaternary Catchment K60E

5. Administrative documents and technical reports submitted by applicants

5.1 Administrative documents

The following administrative documents have been submitted in support of this application:

- Letter of Appointment
- Title Deed of properties
- Applicant's company registration certificate
- Applicant's contact details

- Tax invoice for BGCMA administration fee (R114.00)
- Certificates of entitlement for furrow allocations from the Rondebosch River Water User Association

5.2 Reports and other technical documents

Table 2 lists reports and other documents submitted as part of the application

Table 2: Documents submitted for the application

Technical documents	Compiled by	Date compiled
Agricultural Report	Confluent Environmental	Jun 2022
Aquatic Specialist Report	Dr. Jackie Dabrowski, Confluent Environmental	Oct 2021
Dam Rehabilitation Report (Decommissioning phase impact assessment in the Aquatic Specialist Report)	Dr. Jackie Dabrowski, Confluent Environmental	May 2022
Dam Design	Jan Brink, Consulting Engineering	Nov 2021
Dam Survey	Bekker & Houterman Land Surveyors	Sep 2021
Geohydrology Report	LE Stroebe/DH Stroebel, DHS Groundwater Consulting Services	Oct 2021
Hydrology Report	Dr. James Dabrowski, Confluent Environmental	Jun 2022
Technical Summary Report, including Section 27 motivation and public participation	Confluent Environmental	Jun 2022

6. Project Description

The applicant plans to develop macadamia nut orchards and cover crops on 28 hectares of land across portions 12, 15 and 17 of Redford Farm 232. These orchards will need to be irrigated from a reliable water source, for which a dam will be required. The water sources proposed for storage in the dam would be from three furrow allocations which are considered Existing Lawful Water Uses (ELWUs), surface water runoff from the dam's catchment and the borehole. While the water uses submitted in this application all take place on Portion 17/232, it must be noted that irrigation will take place across all three farm portions (12, 15 and 17/232).

6.1 Water uses

Section 21 (a): Taking of surface water and groundwater for irrigation.
Section 21 (b): Storage of water in an instream dam.
Section 21 (c): Instream sedimentation impeding flow (current) and construction of a dam wall (proposed).
Section 21 (i): Excavation of soil and removal of vegetation for the construction of the dam basin (current) and construction of an instream dam (proposed).

Water uses are provided in further detail in Table 3.

7. Methods statement (only for c and i activity)

The methods for the construction of the dam cover both the construction and operational phase of the proposed dam. However, should the decommissioning phase be necessary, methods for this are clearly explained in the Aquatic Specialist Report.

Construction methods involve mass earthworks using heavy machinery:
Alien vegetation (pines and wattles) were sawed and removed from the valley bottom. Excavators and tipper trucks are used to clear vegetation, soil and rock to construct the dam basin as indicated in Figure 1.

Mitigation measures are provided for as set out in the Aquatic Specialist report in Tables 9 and 10, with mitigation measures for each impact summarised below.

Construction phase:

Renewed earthworks: Soil erosion, downstream sedimentation, further vegetation loss, extension of disturbance footprint.

- The revised dam (including dam wall) must be within the existing area of disturbance ensuring no further vegetation is removed or disturbed.
- The footprint of the dam includes the spillway which should also be included in the existing area of disturbance.
- Demarcate the disturbed area with temporary fencing (not danger tape) and ensure all workers know this is the limit of disturbance.
- Construction vehicle parking and equipment stores must be located at least 100 m from the demarcated area to prevent fuel and material spills from entering the watercourse.
- Access by vehicles must be in and out on one road only to reduce the area of disturbance. Vehicles must not leave this road.
- Fence off the watercourse downstream and the wetland area upstream of the excavated area for the duration of construction. These must be demarcated 'No-go Areas'.
- Remove loose soil material from within the dam basin and stockpile it in distinct piles of rocky material, subsoil and topsoil. These must not be mixed as they can be re-used for rehabilitation.
- Until the dam wall has been constructed, a large silt fence must be actively maintained across the outflow of the excavated area to prevent sedimentation downstream. Refer to methods in the soil erosion control plan (Confluent Environmental).
- Once the dam basin and wall have been prepared, any disturbed areas above the high-water mark will be rehabilitated.
- In excavated areas replace and compact first the rocky layer then subsoils in all areas above the high-water mark, sloping the material to a 1:3 slope that ties in with the dam basin.
- Cover the above compacted layer with and grass (Methods in Appendix 2 of Aquatic Specialist Report).
- On both sides of the dam two silt fences can be installed along the full length of the 'edge' approximately 8 - 10 m apart (Methods in Appendix 3 of Aquatic Specialist report).

Operational Phase:

Maintenance of the dam involving dredging to remove silt: disturbance of rehabilitated slopes, disturbance to instream habitat and biota, increasing the dam capacity

- Heavy machinery for dredging the dam may only gain access to the basin from the dam wall or from the road indicated in Fig. 13 of the Aquatic Specialist report. Machines may not drive over previously disturbed and rehabilitated slopes.
- To minimise the impact of dredging on instream biota (plants and animals) dredging must be conducted in mid-winter to avoid the breeding season.

- Only 60% of vegetation that has established (reeds etc.) can be removed, working from the central basin outwards.
- Make an effort to rescue any obvious wildlife from disturbance such as frogs.
- Work should be conducted when the water level is as drawn down as low as possible to minimise increasing suspended sediments in the dam.
- The dam's original capacity must not be increased in volume, and records of the cubic metres of sediment removed must be maintained.
- No trees or large shrubs must be allowed to grow on the dam embankment (wall) as these can lead to piping erosion and dam wall failure.

8. Stormwater Management Plan

N/A

9. Rehabilitation Plan

The WULA incorporates the application for storage of water in the proposed dam. The impact assessment compiled in the Aquatic Specialist report includes mitigation measures during the construction and operational phase aimed at limiting further environmental degradation, and rehabilitating remaining disturbed areas should the dam be approved. This includes methods to rehabilitate disturbed areas of soil and vegetation above the high-water mark (shoreline) and including a 10m buffer beyond that (see Section 7 of this report for detailed methods). The Aquatic Specialist report states that retention of the dam in its current location is the most certain way of limiting downstream sedimentation in the long term, as loose sediment and rock will be retained in the dam's basin. Basic rehabilitation methods are provided in the decommissioning phase impacts of the Aquatic Specialist report.

Should the dam not be approved through the WUL process, the decommissioning phase mitigation measures for anticipated impacts will need to be implemented. The mitigation measures in this section of the report at the same steps that would be prescribed for rehabilitation of the site. This has been submitted as part of the WUL application. Given the extensive earthworks that were undertaken, rehabilitation of this site is likely to be challenging with possible failures requiring repeated follow up.

Detailed reference has been made in the Aquatic specialist report (Confluent) to the re-establishment of indigenous and riparian vegetation in a 10 m buffer around the dam, and how to prevent soil erosion during all phases of the project. A list for recommended indigenous plant species for use in rehabilitation of vegetation of the site is given in Table 11 in the aquatic specialist report (Confluent).

According to the aquatic specialist report, the decommissioning rehabilitation steps to follow are for three main activities, namely, the replacement and stabilisation of soil, restoration of the stream bed and revegetation of the disturbed area.

- **The replacement and stabilisation of soil (rock, subsoil and topsoil) with earthworks to prevent erosion, soil loss and sedimentation of the watercourse downstream.**

    - Demarcate the disturbed area with temporary fencing (not danger tape) and ensure all workers know this is the limit of disturbance.
    - Construction vehicle parking and equipment stores must be located at least 100 m from the demarcated area to prevent fuel and material spills from entering the watercourse.
    - Access by vehicles must be in and out on one road only to reduce the area of disturbance.
    - Fence off the watercourse downstream and the wetland area upstream of the excavated area for the duration of construction. These must be demarcated 'no-go-areas' for people and vehicles.

- Replace and compact soils in the order in which they were removed, i.e. rock layer followed by subsoils (usually yellowish colour). Topsoil must be placed over the subsoil, but the latter must not be compacted.
- Topsoil must be at a depth greater than or equal to 50 cm.
- It is extremely important to not mix soil profiles (e.g. topsoil with subsoil).
- There may not be sufficient topsoil from the site, in which case this will need to be purchased and brought in to achieve the required depth.
- Attempt to reshape and slope the valley to the natural site contours, avoiding the creation of ditches and cuts which channel waterflow and cause erosion.
- Work must not be conducted during periods of rainfall to avoid further disturbance.
- A large silt fence must be established and maintained free of silt for the duration of the rehabilitation work.
- The depth of topsoil and final landform must be independently assessed by an Environmental Control Officer / Aquatic Ecologist using an auger prior to revegetation to ensure a uniform distribution of topsoil has been achieved.

- **Restoration of the stream bed to lessen erosion, habitat loss and sedimentation downstream.**

  - Install 4 – 5 gabion check dams equally spaced at intervals along the stream bed. The purpose is to slow and filter flows and encourage settling of sediment upstream of each check dam.
  - Gabions must be correctly installed on a geotextile such as bidim to prevent erosion from occurring beneath and around them. They should be 'anchored in' to the bottom of the valley sides.
  - The final gabion must be located at lower extent of the disturbed area.
  - Cover approximately 40% of the stream bed with cobbles and small rocks (approximately 30 cm width) placed randomly along the length of the stream bed.

- **Revegetation of the disturbed area, the lessening of erosion of recently replaced soil. Without vegetation, replaced soil will erode causing habitat loss and sedimentation downstream.**

  - Seed the slopes and stream bed with a grass mixture (Italian Ryegrass, *Cynodon dactylon* (kweek), *Digitaria eriantha* (Smuts finger grass) and cover with a light mulch.
  - On the slopes, nail in overlapping sil saver matting to protect the soil (methods in Appendix 2 of the report)
  - On both sides of the dam four silt fences must be installed parallel to each other along the full length of the disturbed slopes approximately 8 – 10 m apart (Appendix 3 of the report states the methods).
  - Revegetated slopes must be actively monitored to ensure a dense cover of >80% of grass. Gaps should be actively reseeded.
  - A 10 m buffer zone surrounding the area of disturbance must be established and demarcated with basic fencing.
  - A combination of active and passive revegetation must take place in the 10 m buffer zone: Active = planting recommended indigenous species and Passive = not disturbing indigenous plants that naturally germinate (Table 11 of the report lists suitable plant species)
  - Alien vegetation must be actively removed before it becomes established when it can either be hand-pulled or removed with a tree popper. NO heavy machinery can be used within the buffer or previously disturbed area for the purpose of alien removal.
  - Revegetation of th buffer and previously excavated area must be monitored 6-monthly for 3 years by an Environmental Control Officer / Aquatic Ecologist.
  - Monitoring should also take place by the landowner following heavy rainfall to identify and proactively address erosion before it can progress too severely.

- Eroded areas of the steep banks must be refilled with topsoil, reseeded with grass mix, covered with a light mulch and protected with soil saver mats. The use of silt fencing can be extended to problem areas to provide further protection.

10. Water Uses applied for

The application includes the following water uses (Table 3).

Table 3: Water use applied for Redford Farm 17/232

Water use	Purpose	Capacity/Volume	Property Description	Co-ordinates
Section 21(a) – taking water from a watercourse				
Abstraction of groundwater through Borehole (BH1)	Irrigation	69 000 m^3/a	Portion 17/232	-33.9510;23.4448
Taking of surface water runoff (dam's catchment)	Irrigation	12 200 m^3/a	Portion 17/232	-33.9497;23.44604
Section 21(b) – storing water				
Storage of water in instream Bernardskloof Dam	Irrigation	70 000 m^3	Portion 17/232	-33.9497;23.44604
Section 21 (c) – impeding or diverting the flow of water in a watercourse				
Impeding the flow of water due to a dam	Irrigation	-	Portion 17/232	-33.9505; 23.4458
Section 21(i) – Altering the bed, banks, course or characteristics of a watercourse				
Excavation of soil and removal of vegetation for construction of dam basin and dam wall	Irrigation	-	Portion 17/232	-33.9498; 23.44604

11. Impacts and mitigation measures

Impacts and mitigation measures for surface water related to the proposed dam are discussed in the Aquatic Specialist report (Confluent Environmental). Operational phase impacts are provided should the proposed dam be approved. Mitigation measures in all phases include recommendations for monitoring.

11.1 Impact of continuing with dam construction

Should the dam on portion 17/232 be approved through the WULA and the S24G process, construction thereof will continue. The proposed dam would need to be accommodated in the existing footprint of disturbance. This impact is divided into two categories, namely the construction phase and the operational phase (Aquatic Specialist Report, Confluent).

11.1.1 Construction Phase

Impact*:* Renewed earthworks to finish constructing the dam

Mitigation Measures

- The revised dam (including dam wall) must be within the existing area of disturbance ensuring no further vegetation is removed or disturbed.
- The footprint of the dam includes the spillway which should also be included in the existing area of disturbance.
- Demarcate the disturbed area with temporary fencing (not danger tape) and ensure all workers know this is the limit of disturbance.
- Construction vehicle parking and equipment stores must be located at least 100 m from the demarcated area to prevent fuel and material spills from entering the watercourse.
- Access by vehicles must be in and out on one road only to reduce the area of disturbance. Vehicles must not leave this road.
- Fence off the watercourse downstream and the wetland area upstream of the excavated area for the duration of construction. These must be demarcated 'No-go Areas'.
- Remove loose soil material from within the dam basin and stockpile it in distinct piles of rocky material, subsoil and topsoil. These must not be mixed as they can be re-used for rehabilitation.
- Until the dam wall has been constructed, a large silt fence must be actively maintained across the outflow of the excavated area to prevent sedimentation downstream. Refer to methods in the soil erosion control plan (Confluent Environmental).

Impact*:* Soil erosion above high-water mark

Mitigation Measures

- Once the dam basin and wall have been prepared, any disturbed areas above the high-water mark needs to be rehabilitated.
- In excavated areas replace and compact first the rocky layer then subsoils in all areas above the high-water mark, sloping the material to a 1:3 slope that ties in with the dam basin.
- Cover the above compacted layer with loose topsoil from the site to a depth of at least 50 cm.
- Seed the slopes with a grass mixture (Teff, Cynodon dactylon (kweek), Digitaria eriantha (Smuts finger grass), cover with a light mulch, and then nail in overlapping soil saver matting to protect the soil (Methods in Appendix 2).
- On both sides of the dam two silt fences must be installed along the full length of the 'edge' approximately 8 - 10 m apart (Methods in Appendix 3).

11.1.2 Operational Phase

Impact*:* Erosion of previously excavated slopes.

Mitigation Measures

- Revegetated slopes above the high-water mark must be actively monitored to ensure a dense cover of > 80% of grass. Gaps should be actively reseeded.
- A 10 m buffer zone surrounding the area of disturbance must be established and demarcated with basic fencing.
- A combination of active and passive revegetation must take place in the 10 m buffer zone: Active = planting recommended indigenous species, and Passive = not disturbing plants that naturally germinate.
- Alien vegetation must be actively removed before it becomes established when it can either be hand-pulled or removed with a tree popper. NO heavy machinery can be used within the buffer or previously disturbed area for the purpose of alien removal.
- Revegetation of the buffer area must be monitored 6-monthly for 3 years by an Environmental Control Officer / Aquatic Ecologist.
- Monitoring should also take place by the landowner following heavy rainfall to identify and proactively address erosion before it can progress too severely.
- Eroded areas of the steep banks must be refilled with topsoil, reseeded with grass mix, covered with a light mulch and protected with soil saver mats. The use of silt fencing can be extended to problem areas to provide further protection.

Impact: Maintenance involving dredging to remove silt

Mitigation Measures

- Heavy machinery for dredging the dam may only gain access to the basin from the dam wall or from the road indicated in Figure 9. Machines may not drive over previously disturbed and rehabilitated slopes.
- To minimise the impact of dredging on instream biota (plants and animals) dredging must be conducted in mid-winter to avoid the breeding season.
- Only 60% of vegetation that has established (reeds etc.) can be removed, working from the central basin outwards.
- Try to rescue any obvious wildlife from disturbance such as frogs.
- Work should be conducted when the water level is as drawn down as low as possible to minimise increasing suspended sediments in the dam.
- The dam's original capacity must not be increased in volume, and records of the cubic metres of sediment removed must be maintained.
- No trees or large shrubs must be allowed to grow on the dam embankment (wall) as these can lead to piping erosion and dam wall failure.

As this is an in-stream dam, the likelihood of erosion of the surrounding areas is fairly high. Therefore, the dam may require dredging for the removal of silt which are likely to accumulate in the years following construction. Dredging dams close to natural areas such as the Whiskey Creek Nature Reserve, can cause significant impacts. A range of wildlife and plants habitat is dependent on such areas. By implementing mitigation measures it can be mitigated to a negligible level (Aquatic specialist report, Confluent).

11.2 Groundwater abstraction impacts and mitigation measures

Impacts and mitigation measures from the groundwater specialist report (DHS Groundwater) are summarised as follows:

Impact: Depletion of groundwater resource due to over-abstraction

Mitigation measures:

- Yield testing of borehole as per SANS10299-4 2003 standards. Do not exceed calculated sustainable yield of borehole.
- Groundwater level monitoring – reduce abstraction in event of anomalous lowering of groundwater levels.
- Take 'ecological water reserve' into account during water balance.

Impact: Groundwater quality deterioration as a result of over-abstraction

Mitigation measures:

- Do not exceed calculated safe yield of borehole.
- Groundwater level and quality monitoring – reduce abstraction in event of anomalous lowering of groundwater level and/or deteriorating water quality.

12. Water demand and water supply

Establishment of macadamia orchards represents a significant financial investment. Establishment costs of the orchards are approximately R 200 000/ha. At 10-12 years age, the orchards are expected to yield 3 tonnes/ha at a return of R 300 000/ha. As such security of water supply, particularly during below average rainfall conditions is critical for protection of the investment. This section summarises the findings of the hydrological analysis conducted as part of the WULA the objectives of which were to:

1. Assess the yield of surface water flows available in the immediate catchment of the dam;
2. Assess the yield of surface water flows that enter the furrow system and estimate the volume of water that can realistically be delivered from the furrow system;
3. Estimate the irrigation requirements of the proposed macadamia plantation and determine whether the surface water yield is sufficient to meet these requirements; and
4. Develop a water balance for the dam and estimate the size of the dam required to meet the irrigation requirements.

A detailed monthly time series water balance was therefore compiled to estimate the required dam volume and borehole abstraction volumes to ensure assurance of supply covering the full range of expected climatic conditions over a 50-year period. The WRSM2000/Pitman model was used to estimate surface flows into the dam and the SAPWAT model was used to produce monthly irrigation requirements using weather data (supplied with the model) covering the period from 1950 to 2000 (i.e. a 50-year period). The findings of the hydrological report can be summarised as follows:

- The mean annual estimated irrigation requirement for 28 ha of macadamia trees under drip irrigation is approximately 81 500 m^3/a average, with up to a maximum of 116 000 m^3/a (Table 4).
- The furrow system is estimated to deliver 25 000m^3 based on measured flows.
- Surface runoff from the immediate catchment area of the dam is expected to yield 12 200 m^3 per annum (Table 4).
- Combined furrow allocations and surface runoff from the catchment area (37 000 m^3) will therefore be insufficient to meet the irrigation requirements for 28 ha of macadamia trees and the deficit in irrigation requirements will need to be supplied by a borehole (Table 4).
- An annual abstraction of 69 000 m^3 from the borehole will be sufficient to meet the irrigation deficit over the duration of the simulation. The recommended borehole abstraction of 69 000 m^3 per annum is higher than the mean annual irrigation deficit. The 69 000 m^3 volume therefore takes worst-case scenarios into account when low rainfall periods result in an irrigation deficit that is significantly higher than average (Figure 3 – see Hydrological Report for further details).
- According to the geohydrological report the sustainable yield of the borehole drilled for this purpose is 69 000 m^3/annum or 5 800 m^3/month (Stroebel, 2021). The borehole is therefore

capable of providing supplemental water required to meet the total irrigation requirements of the crop.

- Based on a detailed monthly water balance, covering a 50-year period, a dam size of 70 000 m^3 is expected to provide 100% assurance of supply over the long term and will not result in an irrigation deficit (Figure 3).

Table 4: Long-term estimated irrigation requirements for 28 hectares of macadamias

	Irrigation Requirements								Mean Monthly Water Supply (m^3)			
Month	**Max**	**95 %**	**75 %**	**Median**	**25 %**	**5 %**	**Min**	**Average**	**Furrow Allocation**	**Runoff from Catchment**	**Borehole**	**Total**
October	16240	16240	8120	8120	0	0	0	6259	3 275	1 587	5 750	13 888
November	24360	16240	16240	8120	8120	0	0	9304	2 934	1 421	5 750	13 039
December	32480	24360	16240	16240	8120	8120	0	13364	2 058	996	5 750	10 862
January	32480	24360	16240	16240	8120	8120	0	15394	1 410	683	5 750	9 253
February	24360	21518	16240	8120	6090	0	0	9473	1 122	543	5 750	8 573
March	16240	16240	8120	8120	0	0	0	6598	1 388	672	5 750	9 197
April	16240	13398	8120	4060	0	0	0	4568	1 507	730	5 750	9 494
May	18514	12976	10150	7795	4385	763	325	7267	1 876	909	5 750	10 411
June	8120	0	0	0	0	0	0	338	1 853	897	5 750	10 352
July	8120	8120	0	0	0	0	0	1523	1 954	946	5 750	10 604
August	16240	8120	8120	0	0	0	0	3045	2 662	1 289	5 750	12 364
September	16240	16240	8120	0	0	0	0	3383	3 150	1 526	5 750	13 576
Annual	**115953**	**107054**	**91025**	**79088**	**72764**	**58902**	**62600**	**80516**	**25 189**	**12 200**	**69 000**	**106 389**

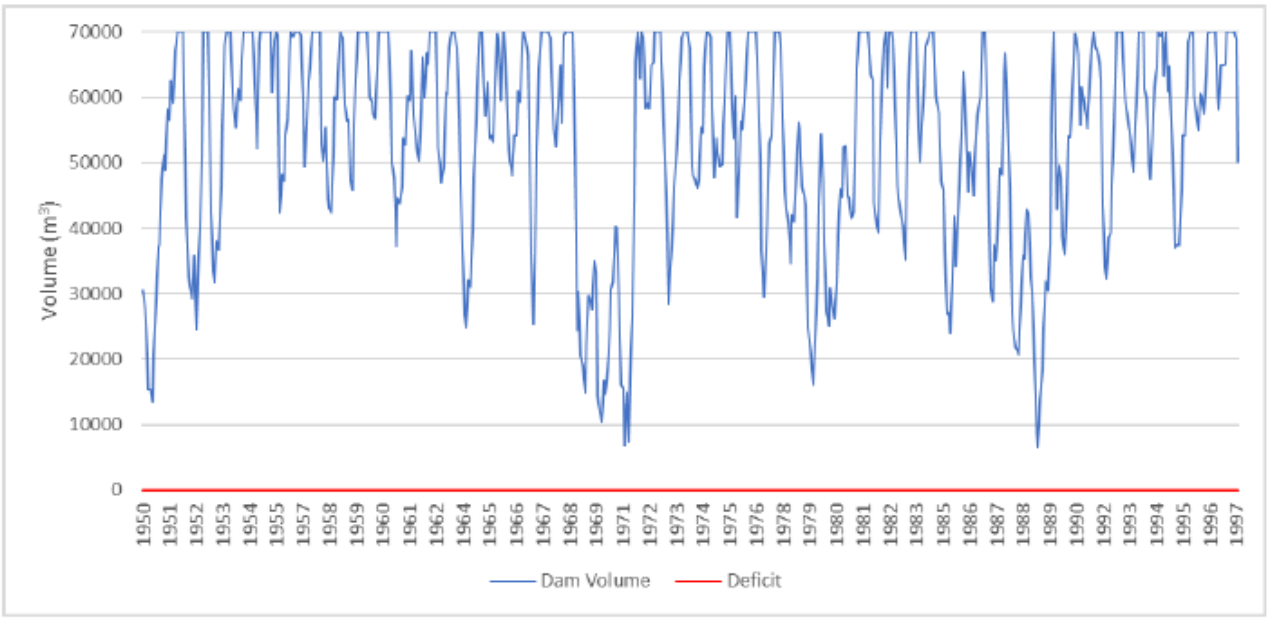

Figure 3: 50-year simulation with a 70 000 m3 dam and 5 750 m3/month borehole abstraction

According to the Geohydrological report, (DHS, Groundwater Consulting Services) the groundwater abstraction will have an overall 'negligible – negative' impact on the geohydrological environment investigated, if appropriate mitigation measures are implemented. The maximum sustainable supply from the borehole is 69 000 m^3/a and will place the application in a Category B (medium scale abstractions: 60% - 100% recharge to the GRU). Therefore, the borehole can supply 100 % of the demand if the deficit volume of water of 60 000 m^3/a to be applied for in the WUL is abstracted. The analyses of the water indicated a slightly elevated iron concentration, but the water still complies with the SANS21 drinking water limits.

13. Public participation

The public participation process was conducted in terms of Section 41 (4) of the National Water Act, Act no 36 of 1998. The process was run for 60 days as required from 10 December 2021 until 10 February 2022. The process was run simultaneously to the S24G Public Participation with EcoRoute, inviting comments from the public for both applications. An advertisement was placed in the Knysna-Plett Herald on 9 December 2021 and site notices were placed at the entrance to Balderja Farm and at local shops (Crags Superette). All relevant specialist studies were made available to Interested and Affected Parties through the EcoRoute website.

The site notices and newspaper advert have been uploaded as separate documents in the technical reports section on eWULAAs to save space in the current document.

4: Outcome of the public participation

The comments from I&APs and responses from relevant specialists were compiled as a separate document and uploaded as a supplementary technical report in eWULAAs as it was in excess of 20 pages.

10. Other authorisations applicable to the activity

Section 24G application in progress.

11. Section 27 (1)

The requirements contained in Section 27(1) of the National Water Act, 1998 (Act 36 of 1998) have been considered with reference to the proposed storage of water on Portion 17/232 Redford Farm, Plettenberg Bay. These requirements are discussed further below.

a) Existing lawful water uses

The Rondebosch River Water User Association (RRWUA) have provided Certificates of Entitlement which permit the use of a 1:31 share of water for each of three properties owned by the applicant. These are Portions 12, 15, and 17/232 Redford. All three properties receive a proportional allocation of water from the Rondebosch Furrow system, which supplies 31 properties in total. On this basis, the applicant has a 3:31 share of the scheme in total. The hydrological specialist report (Confluent Environmental, 2022) calculated the mean monthly furrow volumes for the catchment and divided them proportionally between the 31 properties to determine an estimated allocation per property.

Modelled calculations from the report indicate that each property receives approximately 16 792 m^3/a, which means the landowner is permitted to take a total of 50 377 m^3/a from the furrow system. However, measured flows by a furrow user were obtained, which suggested that the actual flows could be as much as 50% lower than predicted by the model. Therefore, the total volume received from the furrow was calculated as 25 000 m^3/a, (Hydrological Report, Confluent). The applicant wishes to store the allocation from all three properties in the dam proposed on Portion 17/232.

There are no other registered existing lawful water uses for Portion 17.

Portion 12/232 has an existing offstream dam which is used to store water allocated through the RRWUA.

b) Need to redress the results of past racial and gender discrimination

The planning phase, construction phase and operating phase of the project already have and will continue to contribute to redressing the results of past racial and gender discrimination. Various

temporary job opportunities have already been created for the preparation of the agricultural area. During the construction phase of the dam, 19 job opportunities will be created. Employment will be sourced from local areas such as Kurland, benefitting previously disadvantaged men and women. All employment will be sourced locally as far as the necessary skills are available. Where specific skills are required, these will be sourced from as nearby as possible. At the moment the only labour sourced is within the local area and within the Eastern and Western Cape as far as professional services has been required.

A significant investment has already been made as can be seen in Table 6. Jobs that benefit the local community have already been created over the past 2 years and include:

- Initial clearing of alien vegetation(done)
- Amelioration of 35ha (done)
- Borehole (done)
- Solar panels and installation of pipes to connect borehole to the house(done)
- Fencing (ongoing with approx. 6-8 workers involved)
- Ridging (ongoing with approx. 5 workers involved)

A local excavator operator was sent to White River for training on how to construct perfect ridges for Macadamia Nut orchards.

Three historically disadvantaged individuals are currently permanently employed for weeding and maintenance.

When workers are transported to the farm for casual or seasonal work a transport operator will benefit from this.

The planned drying / dehusking facility will mostly be operated by historically disadvantaged women. Construction of this facility as well as infrastructure to house the irrigation facility, machinery and equipment will be required, and will be undertaken by several historically disadvantaged individuals.

Installation of the irrigation system including extensive pipe laying requires specialist skills and ongoing skills development. The applicant's irrigation consultant has recommended a skilled individual to transfer their knowledge to a local team of historically disadvantaged individuals to lay the pipes and complete the installation independently.

Tree planting will require temporary employment of approximately 14 historically disadvantaged individuals including several women who have already been trained by a local service provider for this task. Several of these women will return to the farm as seasonal workers.

As more farms are established, more processing capacity is also created to cope with the ever-increasing volumes. Eventually when enough farms are established in the Western Cape a processing facility will be established locally which will also employ a large number of people. These facilities are labour intensive and the majority of people who are employed there are women.

The development in processing facilities located in the Western Cape could then also lead to the expectation of more products to be exported from the province. The Western Cape Province can take a trade advantage in the Chinese market attributable to the distance and transaction cost the Western Cape have with these markets.

During the operational phase of the Macadamia Nut orchards, permanent as well as seasonal work opportunities will be created. A total of 28 ha of orchards will be established. Job opportunities created will include skilled as well as unskilled work. This project will allow further economic growth and development for these people, benefitting their families and other residents.

The farm has a 50%-female ownership, who also gains 50% of the profit from harvests. The applicant does not have a B-BBEE status.

c) Efficient and beneficial use of water in the public interest

The water uses relate to construction of a dam primarily for the storage of water from three furrow allocations, along with surface runoff from a small catchment and the supplementary storage of water abstracted from a borehole. The water will be used to irrigate macadamia nut orchards. Activities for which a Water Use License need to be applied for according to Section 21 of the National Water Act are included in Table 5.

Table 5: Water use activities for Portion 17 of Farm Redford 232.

Water Use	Description	Property
Section 21(a)	This relates to the abstraction of water from the catchment into the dam.	Portion 17/232
Section 21(a)	The abstraction of water from a borehole	
Section 21(b)	The storage of water in the dam	
Section 21(c)	This refers to impeding additional waterflow from the downstream watercourse due to the dam.	
Section 21(i)	This refers to the altering of the bed and banks of the watercourse and clearing of vegetation due to the dam construction.	

The development is focussed on creating a healthy agricultural environment supported by key infrastructure developments such as building a dam, a technically advanced irrigation plant and, in the future, a processing facility.

Construction of the instream dam from which to irrigate the orchards is critical to the applicant's agricultural development plan. Should a water storage facility not be approved, this will result in abandonment of the project altogether, and the opportunity will be lost to provide smaller communities with improved economy. As such security of water supply is critical for protection of the investment. Job opportunities not only benefit individuals. These benefits extend to their families too. Both permanent and seasonal work opportunities would be eliminated without a reliable water supply. The minimum economically viable unit of macadamia nuts is 20 – 25 ha. Reducing job opportunities is not in the public interest, given the high unemployment rate (28%) in the Bitou Municipality. In the concluding statements of the Bitou Integrated Development Plan, the report states that:

"*A number of factors contribute to the growing rate of unemployment and there is not much the municipality can do except* ***create favourable conditions for job creation and economic growth****."* It goes on to state that:

"The fight against unemployment should be a concerted effort by Private Sector, National, Provincial and local government. The coastal location of Bitou makes its economy seasonal and increase the unemployment rate off-season.

The efforts to diversify the economy should include the following:

- *Increase government services and facilities; construction of Correctional Facility, Public Hospital, additional schools and weigh-bridge*

- *Unlock the possibilities of the ocean economy;*

- ***Maximise the agricultural and forestry sectors**; and*

- *Regularly maintain the government infrastructure like roads etc."*

The goal of the farm is to irrigate 28 ha of macadamia nut orchards, with low-flow drip irrigation, which is the most efficient irrigation method for these orchards. In addition to the highly efficient method of drip irrigation, precision irrigation technology with soil moisture probes and weather stations monitored through computer software will be used to ensure accurate and optimal irrigation schedules. Mulches and cover crops will be applied to reduce evaporative losses from the soil and soil erosion.

Additional water uses applied for include Section 21c) and i). Should construction of the dam be permitted through the WULA, comprehensive rehabilitation / mitigation measures have been prescribed in the aquatic specialist study (Confluent Environmental, 2022). The rehabilitation of banks above the high-water mark, and revegetation of a 10 m buffer zone measured from the high-water mark will improve habitat around the proposed dam. The buffer zone aims to intercept diffuse overland flow from surrounding fields to reduce agricultural runoff entering the watercourse.

d) Socio-economic impact

At a broad scale, the socio-economic importance of agriculture is captured well in the following quote by Allan Savory:
"Agriculture is not crop production as popular belief holds – it is the production of food and fibre from the world's land and waters. Without agriculture, it is impossible to have a city, stock market, banks, university, church or army. Agriculture is the foundation of civilisation and any stable economy."

In South Africa, agriculture has a great capacity to provide employment and economic upliftment in rural and semi-rural communities as well as downstream business opportunities within the agri-processing and manufacturing sectors.

The macadamia nut value chain starts off with growers using various inputs and primary activities to support on-farm production. According to SAMAC (2020), the average operating cost per hectare to produce macadamia's is around R25 000 (weeding, fertilising and irrigation) and another R100 000 to establish new orchards. All of these activities directly translate into the industry creating economic opportunities for primary inputs applied in the cultivation of macadamias including seedling, fertilizers, crop protection chemicals, research of cultivars, and agricultural equipment, contractors and other businesses services (Western Cape Government, 2021).

The Bitou Local Municipality has the third smallest population within the Garden Route District, after Hessequa and Kannaland. As of 2019, the Bitou Local Municipality had a population of 61 645 people with an annual growth of 0.8%. There is an unemployment rate of 27.9% within the Bitou Local Municipality (BIDP, 2020-2021).

According to The Macadamia (South Africa's leading publication for the Macadamia nut industry), seasonal workers on farms in South Africa increased from 10 174 in 2019 to 11 111 this year. Seasonal factory workers increased from 2 356 to 2 460. They predict that a 65 000-ton crop will be harvested for 2021, creating a bigger uptake of seasonal workers for longer periods of time in factories as well as on farms. South Africa is the second largest producer of Macadamia Nuts after Australia.

Macadamia nuts are classified among the 17 super foods of 2017. The popularity of superfoods has been growing in recent years, with accelerated growth fuelled by the COVID-19 pandemic and the strong focus on general health, wellbeing, and immunity. The investment in new and upgrading of

existing infrastructure throughout the value chain is undisputedly critical to increase the potential for sustainable production at a primary level.

According to SAM Worldwide the demand for macadamia nuts exceeds supply, so the market is expected to grow (DAFF, 2019). As a Macadamia nut grower, the contribution to the economy through the capital investment required to establish the orchards, creation of both permanent and seasonal employment opportunities and through contribution to GDP will be achieved. As a luxury foodstuff, Macadamia Nuts are not going to feed the poor of the world directly, but their production creates jobs which puts food on the table for individuals and their families.

Failure to approve the dam for water storage will result in abandonment of the project altogether, and the opportunity will be lost to provide smaller communities with improved economy. As such security of water supply is critical for protection of the investment.

e) Any catchment management strategy applicable to the relevant water resource

Portion 17 Farm Redford 232 falls within the Breede-Gouritz Catchment Management Agency (BGCMA). Catchment Management Strategies focuses on the equity and efficiency with which water resources can be used to support social and economic development.

The Bitou Municipality Integrated Development Plan (BIDP, 2020-2021) has policy guidelines to manage the Municipal area in a manner that supports sustainable resource use. Portions 12, 15 and 17 / 232 are zoned agricultural land, and the BIDP refers to the Redford Area as an 'agricultural focus area'. Barring dryland pasture, which has limited productive value, any cultivation on the land would require irrigation and security of water supply.

The vision of the Keurbooms-Bitou estuarine system, is in line with the vision of the BGCMA. Their aim is to maintain biodiversity and to preserve the natural and cultural heritage for all South Africans, by harmoniously managing the catchment to coast area of the Keurbooms and Bitou systems.

The vision of the BGCMA Catchment Management Strategy is captured by:

"Healthy water resources, for all, forever",

This can be reflected by the mission statements to maintain healthy water resources for all forever by means of policy and regulation.

The water use license application process has been implemented to ensure that water use activities are authorised in a manner that achieves these broad mission statements, particularly the mission of ensuring healthy water resources and allocating water for all forever.

Sustainable development is emphasised, and given that the land is zoned agricultural, it is reasonable to expect that sustainable use of water be permitted to develop the agricultural potential of the land.

f) Likely effect of the water use to be authorized on the water resource and on other water users.

The effect of the proposed dam on water resources and other water users is best explained in the Hydrology Report (Confluent Environmental) which states:

"The immediate catchment area of the dam covers approximately 25 % of the total catchment area of the drainage line on which the dam will be located (Figure 4). Assuming all instream flows are captured by the dam, flows to the catchment immediately downstream of the dam would therefore be reduced by approximately 25 %. The actual flow reduction is likely to be less than 25 % as the dam balance does indicate that the dam will overflow periodically during larger flood events. The

impact on the reserve of the stream reach immediately below the dam is considered to be negligible as it is a non-perennial river that receives intermittent flow following rainfall events. The stream reach is not anticipated to host diverse aquatic biota that are dependent on regular instream flows. The primary function of the stream reach is to therefore deliver flows to more seasonal and perennial watercourses downstream.

The impact on the reserve of the larger catchment area immediately below the dam is expected to be low as 75 % of the catchment area remains un-impounded and can therefore still generate runoff to the larger stream network.

No abstractive water users (e.g. irrigated farms) are located downstream of the dam."

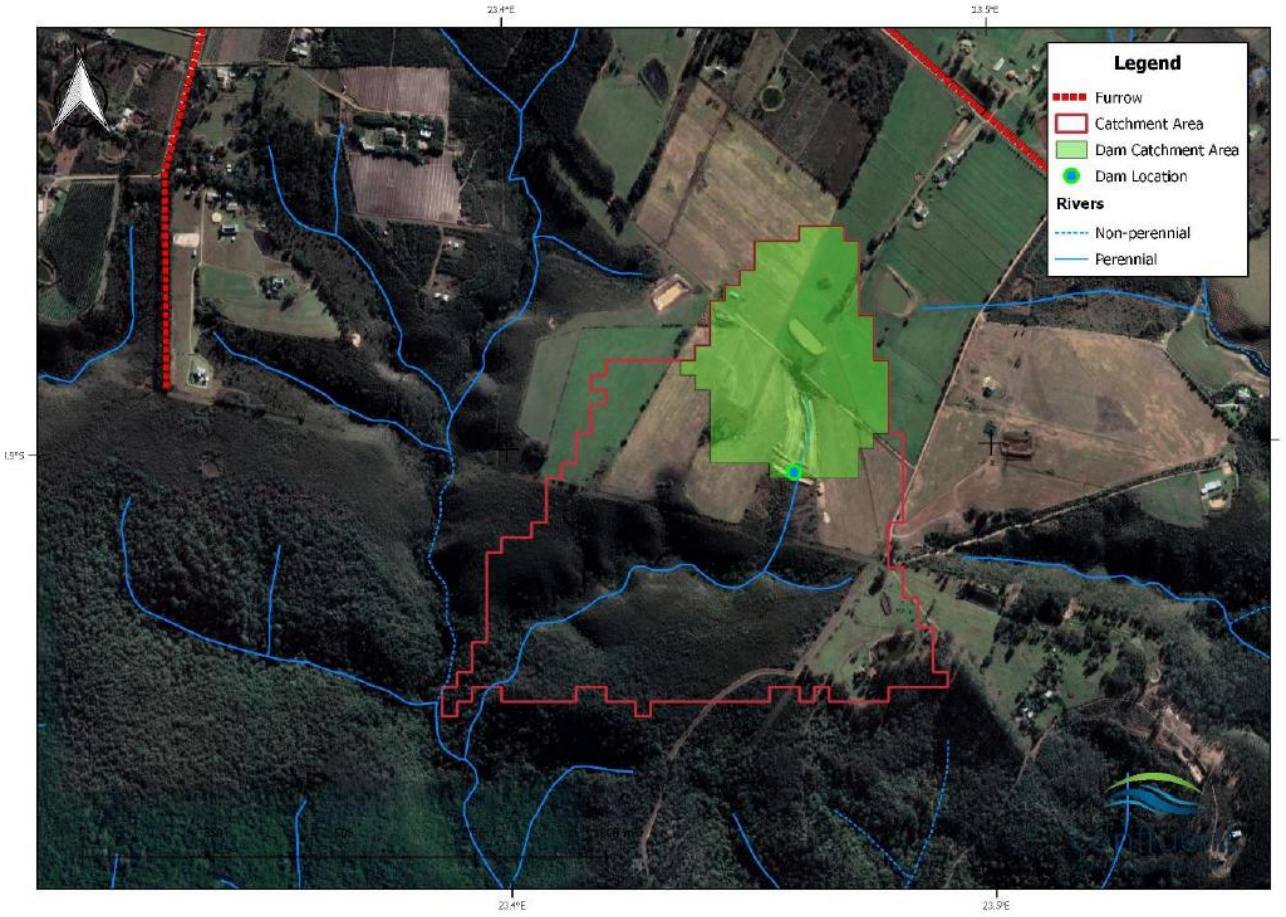

Figure 4. Map indicating the immediate catchment area of the dam within its larger catchment area (hydrology report).

Should the dam fail to be authorised through the WULA process, the decommissioning of the project and rehabilitation of the site will be complex and high risk, with the likelihood of repeated failures requiring ongoing interventions to maintain for years to come. This will result in repeated impacts to the water resource, dominated by ongoing sedimentation. Should the dam be authorised, these impacts will be mitigated by completing the dam construction where any mobile sediment will be retained in the dam basin. The recommendation of the aquatic specialist study is that the dam should be retained within the existing footprint of disturbance with no further disturbance beyond this area.

The geohydrological study done for the borehole (DHS, 2021) indicates that the abstraction of 70 000 m^3 groundwater from the site will have an overall 'negligible – negative' impact on the geohydrological environment if appropriate mitigation measures are implemented. The irrigation demand of 69 000 m^3/a, falls within the sustainable yield from the borehole and places the application in Category B (medium scale abstractions: 60% - 100% recharge to the Groundwater Resource Unit - GRU). The tested boreholes will be able to supply 100% of the demand up to a maximum of 69 000

m^3/a. The impact to other groundwater users was considered in the hydrocensus conducted as part of the geohydrological study.

g) Class and the resource quality objectives of the water resource

The classification of water resources and development of RQOs for the Breede-Gouritz CMA was finalised in 2018. Portion 17 of Redford Farm 232 falls within quaternary catchment K60E, which falls within the G15 Coastal Integrated Unit of Analysis (IUA). The Water Resource Class for this IUA is II, indicating moderate protection and moderate utilisation. Main rivers falling within the IUA are the Keurbooms River, with a Target Ecological Category of B. The proposed dam on portion 17/232 is located on a non-perennial tributary of the Whiskey Creek which is a tributary of the Keurbooms River.

h) Investments already made and to be made by the water user in respect of the water use in question

A significant investment of almost R20 million has already been made in the acquisition of the three farm portions as well as the planning and authorisation phase of the proposed farming operation (Table 6). An amount almost equal to this will still need to be invested to ensure the farm is operational should the WULA be authorised.

Table 6. Estimated costs incurred and estimated future costs related to development of the macadamia nut farm and associated water use.

		Incurred	To be incurred
Property investment		R 14 000 000,00	
Borehole		R 850 000,00	
Initial clearing of alien vegetation		R 300 000,00	
Continuous weeding/maintenance		R 120 000,00	
Irrigation implementation			R 500 000,00
Soil mapping		R 50 402,00	
Topographical surveys		R 69 550,00	
Orchard design		R 66 000,00	
Amelioration of 35ha		R 770 000,00	
Ridging/layout			R 500 000,00
Covercrops			R 120 000,00
Planting			R 100 000,00
Roads			R 500 000,00
Fencing		R 450 000,00	R 600 000,00
Trees purchased		R 600 000,00	R 600 000,00
Project consultants		R 30 000,00	
Pumphouse and infrastructure construction		R 298 000,00	R 6 500 000,00
Dam Design		R 30 000,00	
Dam construction			R 4 500 000,00
Specialist studies	Technical Hydrogeological Study and Reporting - WULA	R 29 700,00	
	Dam site survey	R 11 500,00	
	Test Pumping borehole	R 34 643,00	
	Blue Pebble	R 214 426,00	
Machinary and equipment		R 1 300 000,00	R 2 000 000,00
Processing and drying facility			R 2 000 000,00
		R 19 224 221,00	R 17 920 000,00

i) Strategic importance of the water use to be authorised

According to the 2020-2021 Integrated Development Plan for Bitou Municipality, their strategic objectives will strengthen the National Development Plan objectives. In line with the National Water Resources Strategy the Municipality is creating a sustainable environment for social development and economic growth.

A draft Strategic Environmental Assessment will be prepared, to identify the impacts development has on the natural environment and a management framework to reduce environmental risks caused by future developments.

The National Water Resource Strategy's framework on water use can be summarised as the protection, use, development, conservation, management and control of the water resources for the whole country. This provides the framework within which regional and catchment level water management areas are defined.

In this respect, the water use can be regarded as of strategic importance with respect to meeting the development goals for the Bitou Municipality. However, it is acknowledged that social development and economic growth opportunities supported by the agricultural enterprise must be balanced with sustainability for the environment. Hence the requirement, and completion of specialist studies that have been provided in support of the application.

j) The quality of water in the water resource which may be required for the Reserve and for meeting international obligations

A 10 m vegetated buffer surrounding the dam and watercourse was recommended in the aquatic specialist study. Given the location of the dam adjacent to the Whiskey Creek Nature Reserve it is important that water quality impacts are kept to a minimum. The vegetated buffer aims to achieve this, and if the water use is authorised should be fully implemented.

Given the likely depth of the dam (approximately 17 m), a bottom release from the dam could technically release water of a poor quality, which could have low to no dissolved oxygen, into the watercourse below if any Reserve releases are required. This is no reflection on the surrounding land-use but the result of natural and predictable physico-chemical changes in water in the hypolimnion (deep water layer) when it undergoes stratification. It is always preferable to release surface water. This can be easily achieved through installation of a floating intake with a flexible pipe to the bottom release valve recommended for installation by the dam engineer (J. Brink).

As a non-perennial drainage line, the sensitivity of the system downstream to periods of low to no flow is low according to the aquatic specialist report. The NGI 1:50 000 drainage lines spatial layer indicates the watercourse is perennial (**Error! Reference source not found.**), however this is incorrect and has been confirmed by the aquatic specialist as a non-perennial drainage line. Given the location of the proposed dam at the very upper portion of a small catchment, measured as 0.14 km^2, there is also a low volume of surface runoff annually that enters the watercourse (Figure 4).

k) Probable duration of any undertaking for which a water use is to be authorised

The duration of the water use is permanent.

14. Declaration by the applicant with signature confirming that the information submitted is correct.

Mrs Denina Bernard	**Date**

15. REFERENCES

Aquatic Specialist Report (Confluent Environmental, 2022)

Bitou Integrated Development Plan (BIDP, 2020-2021).

Department of Agriculture, Forestry and Fisheries, (DAFF, 2019), https://www.dalrrd.gov.za/doaDev/sideMenu/Marketing/Annual%20Publications/Macadamia%20Market%20Value%20Chain%20Profile%202019.pdf

Geohydrological Report (DHS Groundwater Solutions Consulting Services, 2021)

Hydrological Report (Confluent Environmental, 2022)

Macadamias South Africa (SAMAC, 2022), Macadamias South Africa - SAMAC

Market Intelligence report: Macadamia Nuts Industry, (Western Cape Government, 2021), https://www.elsenburg.com/wp-content/uploads/2022/03/2021-Macadamias-MIR.pdf

The Macadamia, The Macadamia - Leading publication for the Macadamia Nut industry

[END OF WATER USE LICENCE APPLICATION SUMMARY]