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# **Site Development Plan for Swartvlei Equestrian Estate**

**Portion 1/182, George**

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**For**

**Swartvlei Equestrian Estate**

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## 1. INTRODUCTION

The landowner of portion 1/182 would like to commence with construction of a 106 000 m<sup>3</sup> offstream dam for storage of water for irrigation of newly established Macadamia nut and Avocado orchards on the lower portion of the property. The Macadamia and Avocado orchards were planted on historical agricultural fields (pasture and hops) and in areas recently cleared of pine and eucalyptus forestry. As part of the proposed dam's public participation required for the Basic Assessment, SANParks raised concerns regarding the clearance of extensive areas of historical forestry. The specific concerns raised are as follows:

- A planting plan was requested to better understand where there could be opportunities for conservation corridors linking important habitats, especially along watercourses.
- The mapped vegetation type where Macadamia and Avocado orchards are being planted on historical forestry is Knysna Sand Fynbos, a listed Threatened Ecosystem (See Appendix 1 for description).
- Buffer areas along watercourses, especially adjacent to Swartvlei Lake and the Wolwe River appear to be insufficient to protect Swartvlei Lake which is the 7<sup>th</sup> most important estuary in South Africa, a National Park and a listed Important Bird Area of global significance.
- Alien clearing on the property must be addressed to ensure compliance with legislation and to ensure improved groundwater recharge.
- Confirmation that a Basic Assessment is not triggered by the clearing of vegetation.

This report seeks to address the above concerns.

## 2. WATER RESOURCES ON 1/182

The property is in quaternary catchment K40D. Several perennial and non-perennial watercourses flow through the property that drain into the western arm of Swartvlei Lake through the Diep (a.k.a. Wolwe) River, Klein Wolwe River and other smaller tributaries (Figure 1). The mapped extent of Swartvlei Lake shown in Figure 1 corresponds with the 5 m. a.m.s.l. contour which defines the Estuarine Functional Zone (EFZ). According to the National Wetland Map (NWM) 5 Swartvlei Lake and the lower reaches of the Diep River are classified as wetlands. While no other wetlands have been mapped, it would not be unexpected for additional wetlands to be present at the site, particularly in the headwater regions of mapped drainage lines.

Several offstream dams and instream dams are present on the property. These were all present before the qualifying period in 1998 as defined by the National Water Act (Act No. 36 of 1998). The main instream dam of significance is on the Diep River which will provide the majority of water for the proposed offstream dam required for Macadamia and Avocado irrigation.

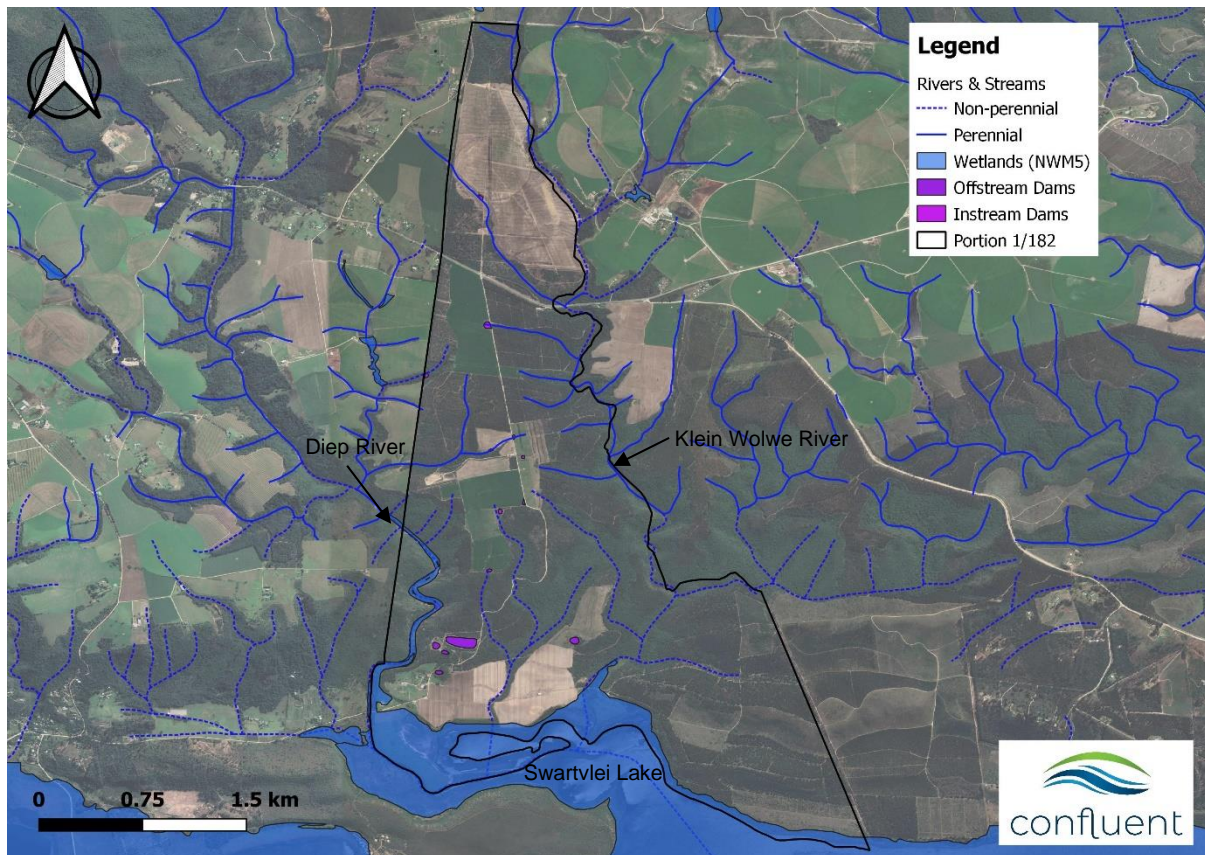


Figure 1. Mapped water resources at portion 1/182 indicating major features.

## 2.1 Klein Wolwe River Management Plan

When clearing of forestry on the land portion north of the 7 Passes Road commenced, it was recommended that a River Management Plan (RMP) be compiled to identify and mitigate potential impacts associated with the land-use change. A report to this effect was compiled and submitted for approval to the Breede-Gouritz Catchment Management Agency (BGCMA) and was subsequently Generally Authorised. Water quality monitoring has been undertaken on a bi-annual basis as part of the plan and is currently limited to the Klein Wolwe River north of the 7 Passes Road.

### 2.1.1 Riparian buffer zones

Guidelines for riparian buffer widths of streams and rivers were calculated as part of the Klein Wolwe RMP as follows:

**Klein Wolwe River: 20 m buffer zone**

**Tributaries: 15 m buffer zone**

Buffer zone widths are measured from the edge of the watercourse, not the middle.

As the terrain, soils, climate, land use and gradient are similar throughout the property, it would be acceptable to extend this recommendation to the remainder of watercourses on the property. The 20 m buffer zone would also apply to the Diep River, and the 15 m buffer zone would apply to dams.

As an estuarine lake, Swartvlei Lake undergoes a different type of assessment for buffer widths. The site-based riparian buffer tool for estuaries described by Macfarlane and Bredin (2017) was used to determine a buffer width for areas adjacent to Swartvlei Lake. The buffer zone determined for Swartvlei Lake provides two scenarios:

**Unmitigated land-use = 50 m**

**Mitigated land-use = 20 m**

The type of mitigation measures required to justify a reduced buffer of 20 m include minimal applications of fertiliser herbicides, and pesticides, minimal applications of gypsum for the removal of salts, use of drip irrigation, maintenance of dense grass and forb cover (preferably indigenous species e.g. *Cynodon dactylon*, or other species listed in Appendix 1) between orchard rows to reduce runoff, and planting rows along the contours so that water is not directed towards the lake.

It is important to note that these buffer widths are determined from the delineated edge of the lake. In the absence of a detailed delineation (involving soil and plant characteristics) the mapped edge of the Estuarine Functional Zone (EFZ) can be used as indicated in Figure 1. If these guidelines were strictly applied, it would mean that any cultivation below the EFZ (5 m contour) would be excluded.

### 3. HISTORICAL USE

Commercial forestry and agricultural fields which varied from pasture to hops over the years was the historical land use. Historical forestry blocks and agricultural fields were mapped using historical Google Earth imagery as well as historical aerial photographs (Figure 3). This mapping exercise was done as part of the Validation and Verification of Existing Lawful Use of water on the property.

It is important to note that historical pastures were present on the western arm of Swartvlei Lake below the 5 m contour. While this type of practice was common in the past, the present best practice would be to exclude agricultural fields and orchards from the EFZ. Particularly given the conservation value and importance of Swartvlei Lake. Fluctuating water levels in the lake also mean that the soil in this location will be periodically saturated at high water levels which will lead to the death of trees.

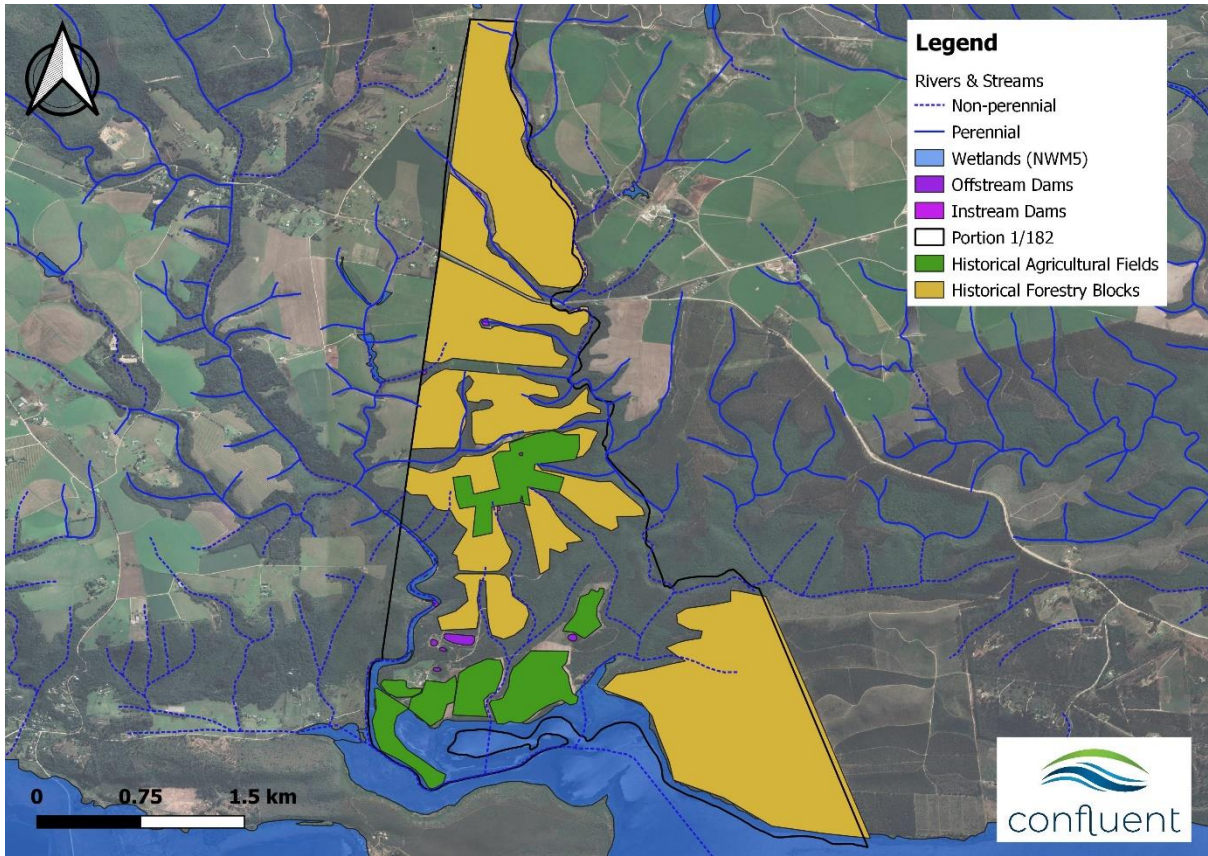


Figure 2. Historical layout of forestry blocks and agricultural fields prior to current developments on portion 1/182.



Figure 3. Historical aerial photo of the approximate property boundary taken in 1991.

According to the DFFE landcover plans, the areas that have been historically mapped as plantations using historic aerials are confirmed. There is clear evidence that the plantations were actively managed up until the property was purchased by Swartvlei Equestrian Estate (Pty) Ltd.



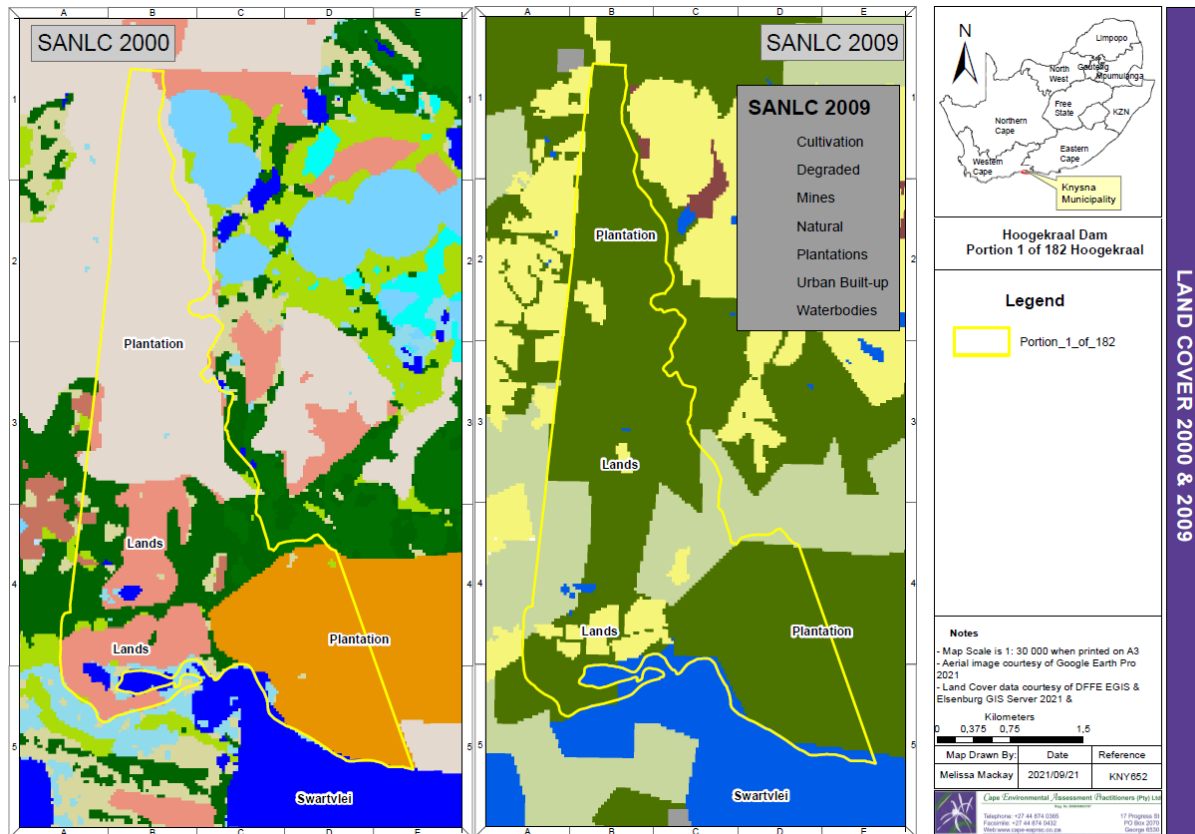


Figure 4. SANLC 2000 – 2009 (Cape EAPrac, 2021)

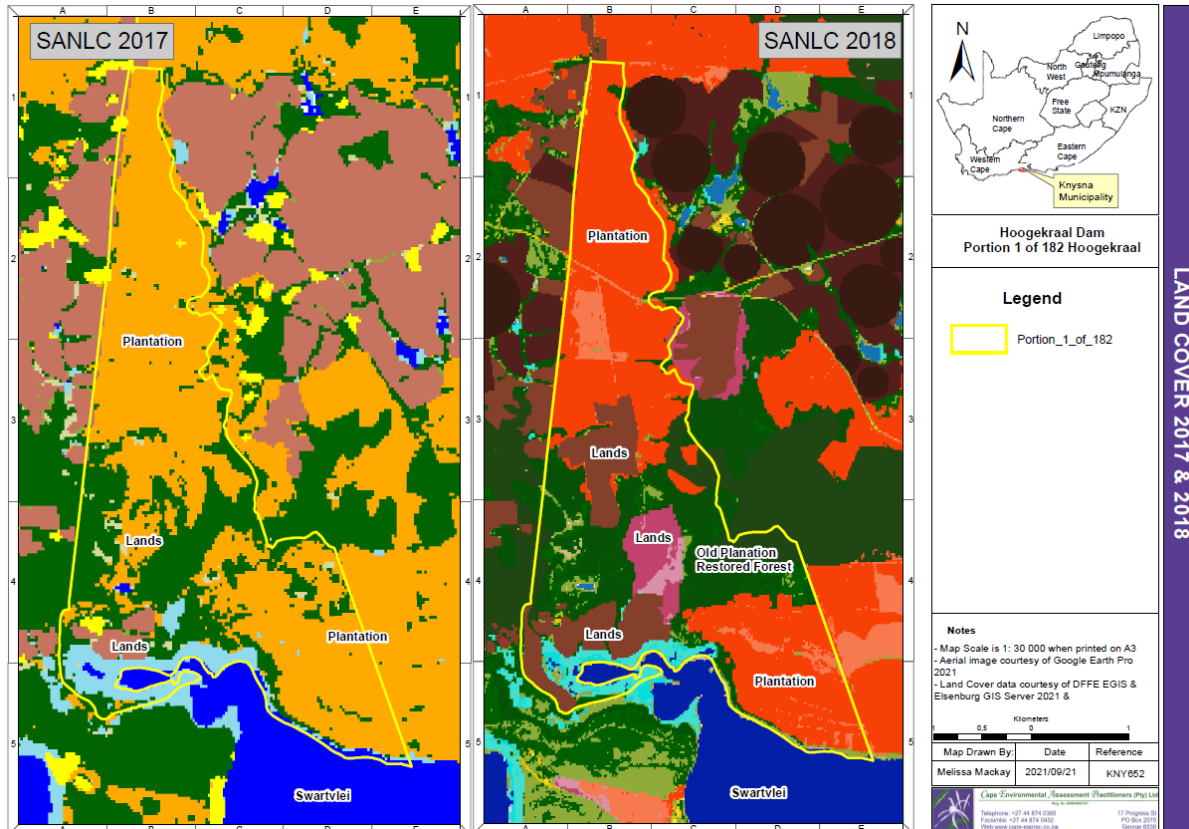


Figure 5. SANLC 2017 – 2018 (Cape EAPrac, 2021)

#### 4. SITE DEVELOPMENT PLAN (SDP)

The proposed site development plan is presented in Figure 6. Much of the plan has already been implemented. However, there are still areas of Pine and *Eucalyptus* where clearing is planned in the future. An additional explanation for each of the legend categories for the SDP in Figure 6 is provided in Table 1.

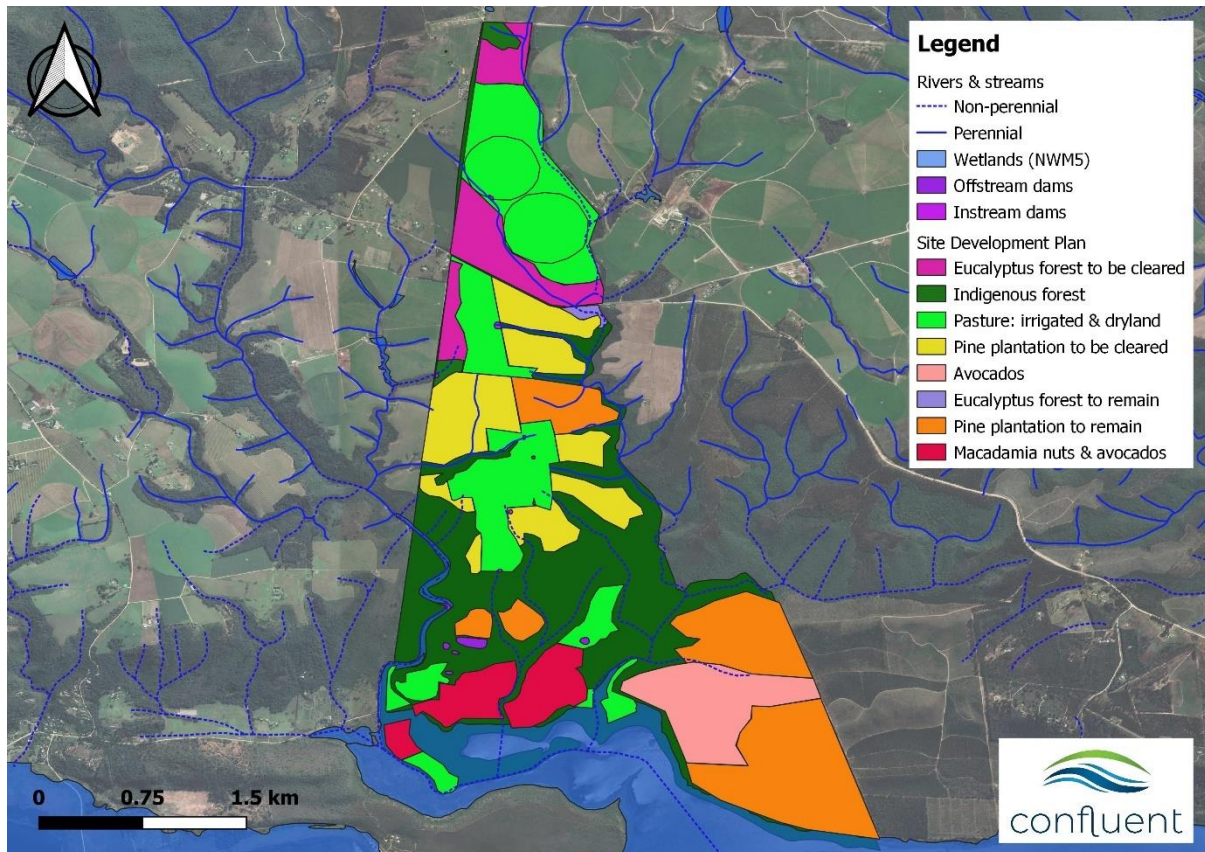


Figure 6. Proposed Site Development Plan which has partially been implemented.

Table 1. Explanatory notes for each category in the Site Development Plan.

SDP Category	Explanation
<i>Eucalyptus</i> forestry to be cleared	Clearing will be mostly undertaken as soon as possible (12 – 18 months) and the land will be planted with pasture (rye, fescue, lucerne and clover)
Indigenous forest	Mostly indigenous forest with areas of fynbos and some light alien invasion. These areas were never cleared for agriculture or forestry and will not be developed.
Pasture: irrigated and dryland	These areas have already been cleared of historical pine and <i>Eucalyptus</i> plantations and converted to pasture. The two irrigation pivots north of the 7 passes road are the only two areas where pastures will be irrigated. The remaining areas will be dryland.
Pine plantation to be cleared	Clearing will be undertaken between 2022 and 2025, and the land will be planted with pasture (rye, fescue, lucerne and clover)
Avocados	These orchards are being established with drip irrigation on historical forestry areas that have been cleared.

Eucalyptus forest to remain	This is a small area that is steep and inaccessible where <i>Eucalyptus</i> cannot be removed.
Pine plantation to remain	Pine plantations will be actively managed and maintained for forestry in these blocks.
Macadamia nuts & avocados	These orchards have been established with drip irrigation on historical agricultural fields which have been converted.

A closer perspective of the northern, central, and southern sections of the property are presented in Figure 9, Figure 8, and Figure 7 for clarity. Most areas not delineated in a colour are indigenous forest or fynbos with some areas where alien vegetation has invaded.

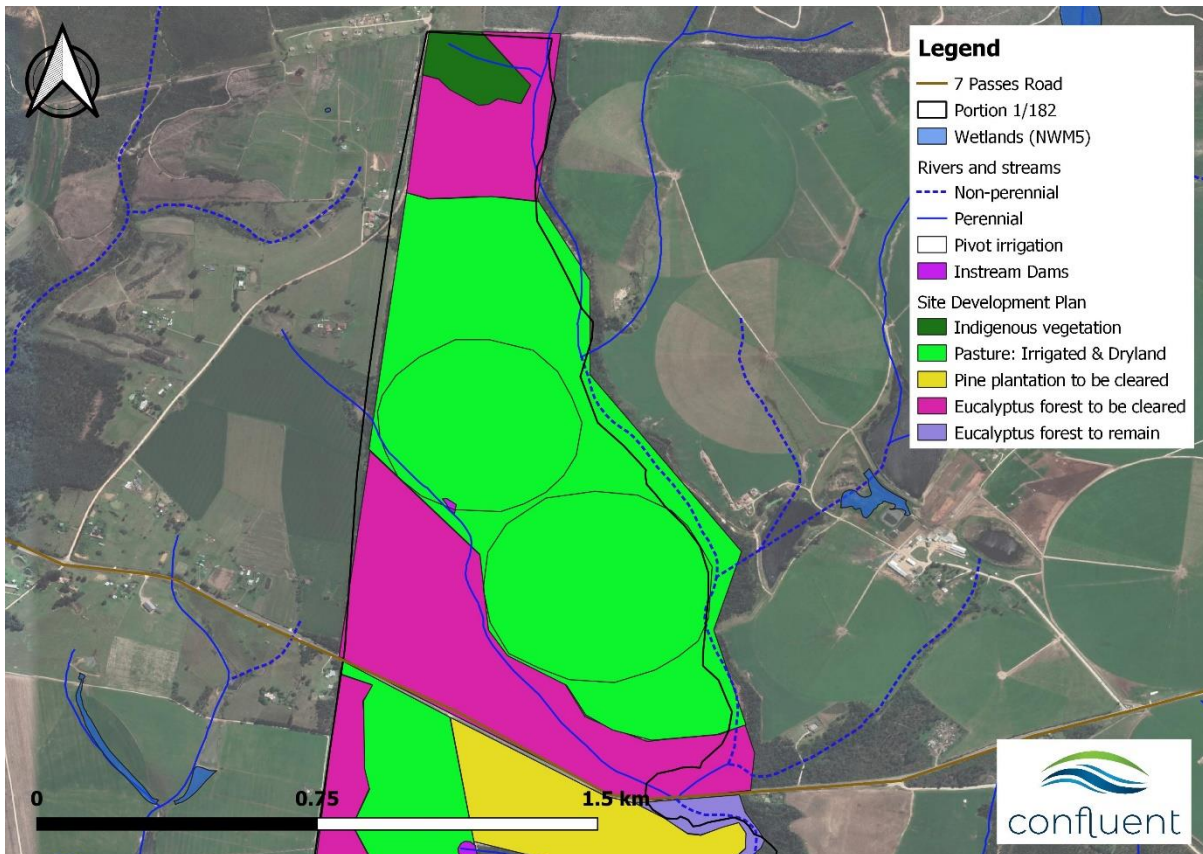


Figure 7. Site Development Plan for 1/182 north of the 7 Passes Road.

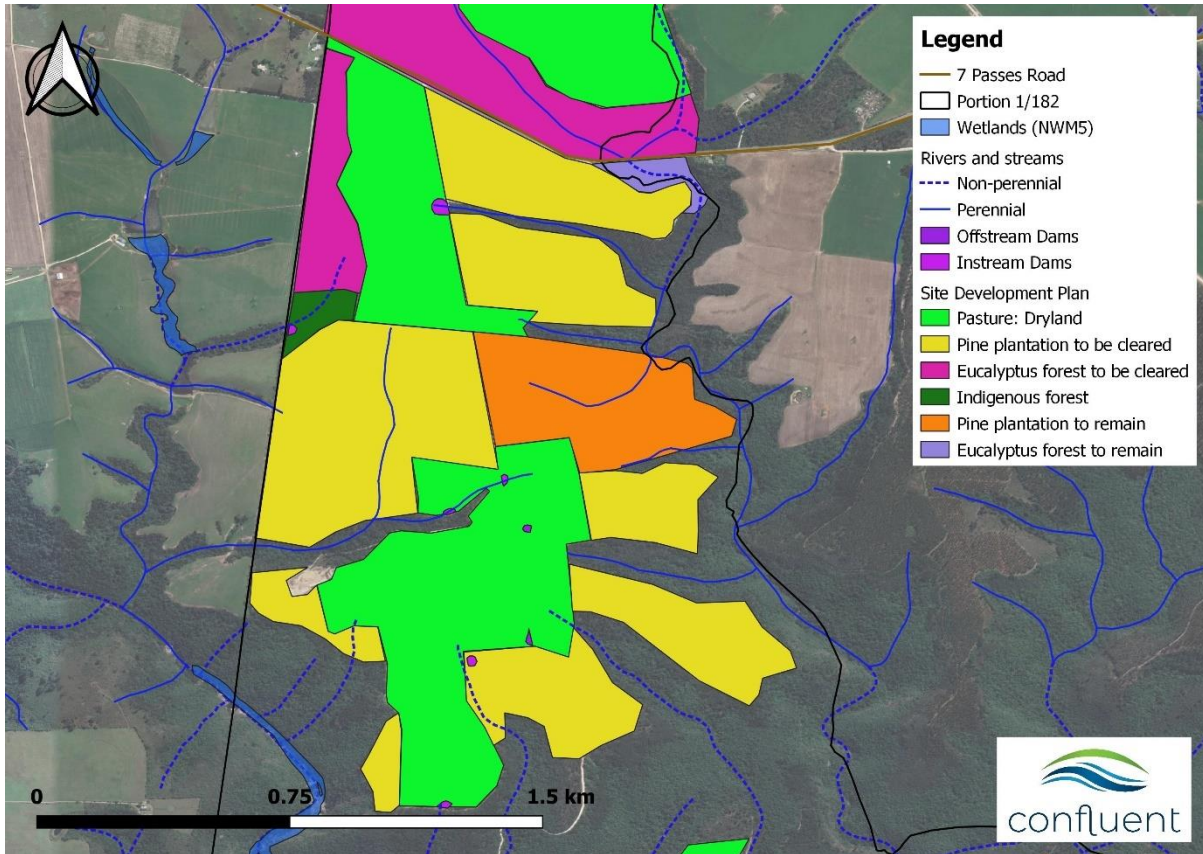


Figure 8. Site Development Plan for the central area of 1/182.

The southern area includes a new fenceline which was erected around the Macadamia nut and Avocado orchards. The fenceline intersects a forested watercourse causing a potential disruption to the movement of wildlife along the stream which connects indigenous forest to Swartvlei Lake.

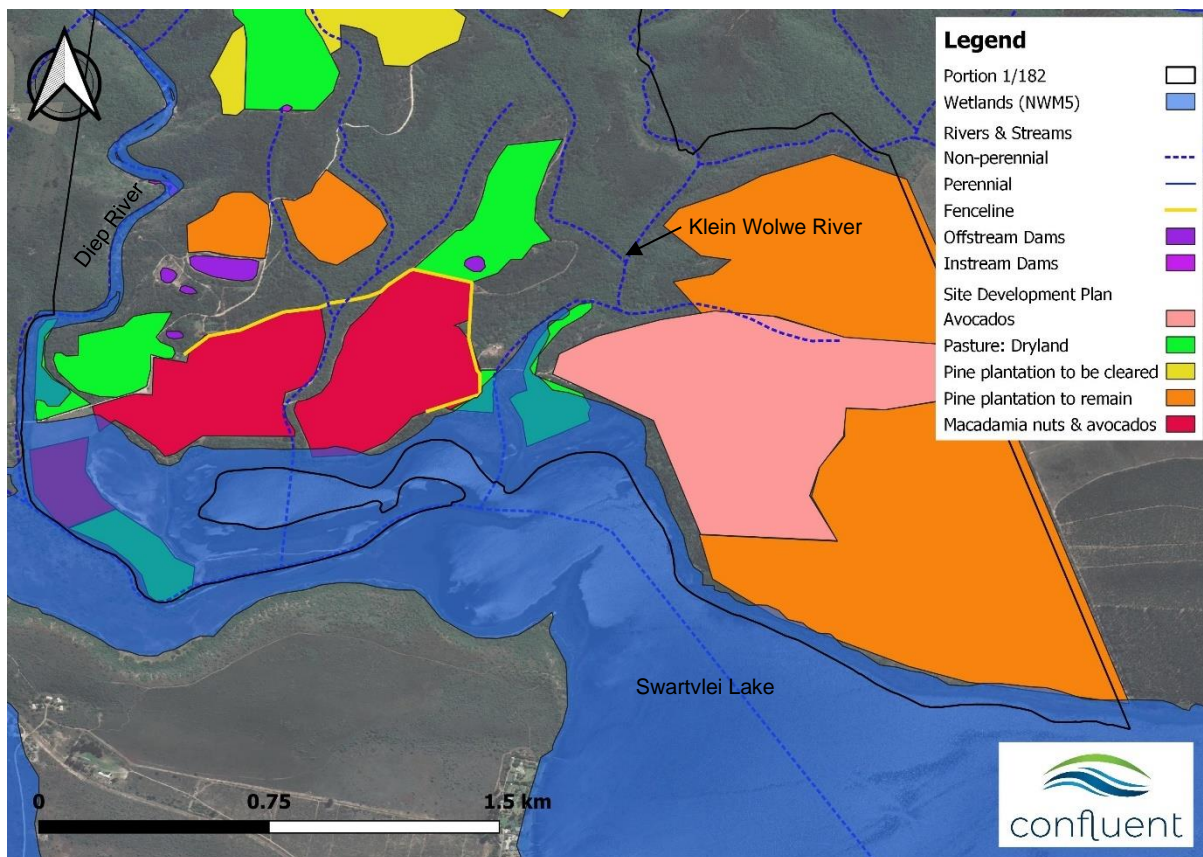


Figure 9. Site Development Plan for the southern portion of 1/182.

## 5. ALIEN CLEARING

Methods for clearing forestry areas used to date are to remove the tree with chainsaws, remove the stump with an excavator, chip the remaining wood and mix the mulch back into the soil to improve the soil Carbon content. Depending on the fire risk of the location and season with regard to planting for pasture, woody material is occasionally burnt under permit. However, this is kept to a minimum where possible. Some important considerations with regard to legislation that must be adhered to, but are unknown in terms of clearing that has taken place are:

- Alien clearing cannot be undertaken using machinery (i.e. clearing where the topsoil or watercourse is directly affected) in riparian areas (in or next to rivers and streams) or in wetland areas without an Environmental Authorisation in terms of NEMA.
- No burning on site may take place without a permit in terms of the National Veld and Forest Fire Act (Act 101 of 1998).

The property is registered with the Southern Cape Fire Protection Agency (SCFPA) and all burns are done under the management of the SCFPA.

## 6. CONCLUSIONS AND RECOMMENDATIONS

### 6.1 Conservation and connectivity

The two main areas where conservation and connectivity opportunities exist are the mostly indigenous vegetation between the southern and central areas, and the area along the Klein Wolwe River. The latter forms the entire eastern boundary of 1/182, and the same landowner owns the property to the east of the northern area (Lancewood Farm). The Klein Wolwe River also flows between SANParks protected area to the north (Beervlei), and Swartvlei Lake providing a good prospect as a wildlife corridor.

However, it must be noted that most of the areas identified as indigenous vegetation in the SDP are in high gradient (steep) areas which may not be easily navigated by some wildlife. Figure 10 shows the 5 m contours in white to demonstrate that most of the dark green (indigenous vegetation) areas are no longer visible because they are so steep. Most areas with a lower gradient are earmarked for development of some type. This situation could be improved by restoring some of the blocks currently under pine plantation to indigenous vegetation and clearing some of the pine indicated as 'pine plantation to remain' north of the Avocado field. This could be through selected removal of pine trees as opposed to total clearance of trees and disturbance of soil. It is very likely that indigenous trees, shrubs, and smaller plants are growing between the pine trees and will regenerate once the competitive impact of the pine trees is removed. Numerous indigenous plants will also regenerate from the seedbank.

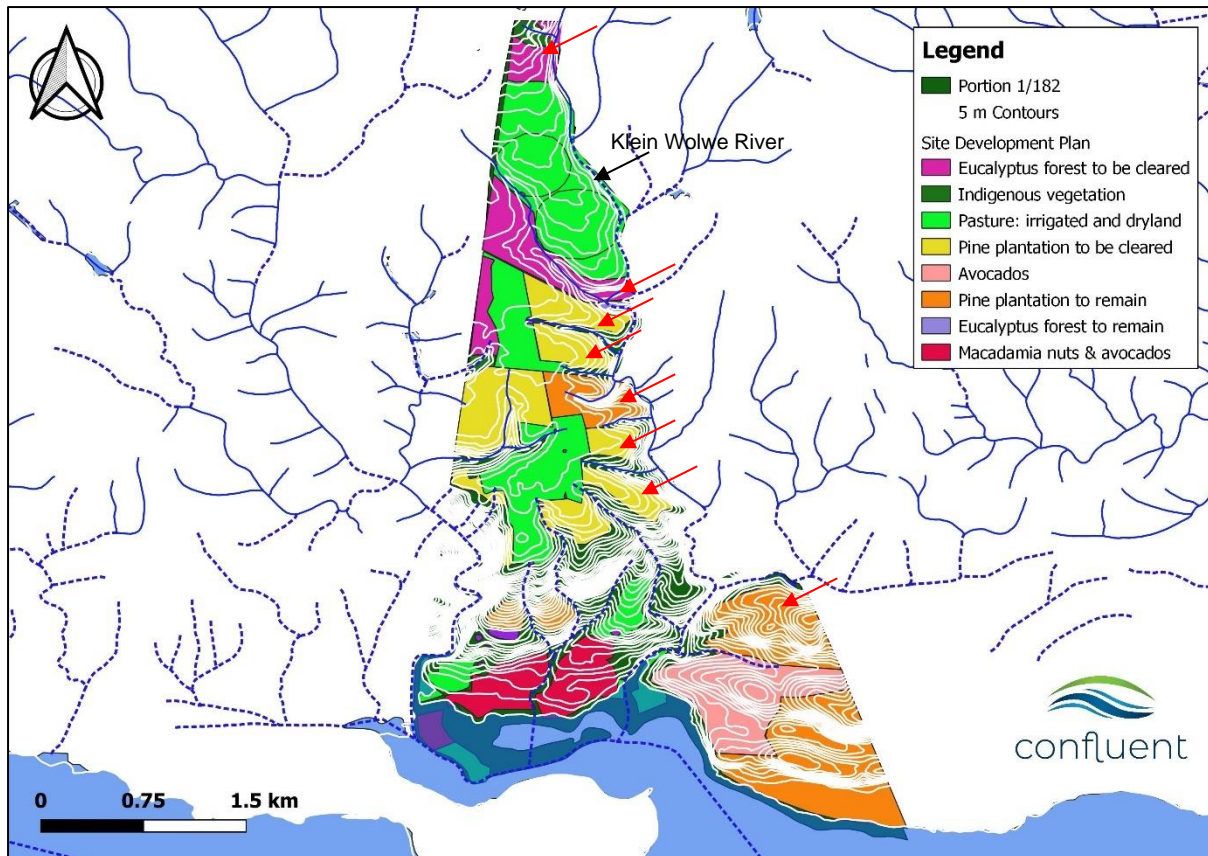
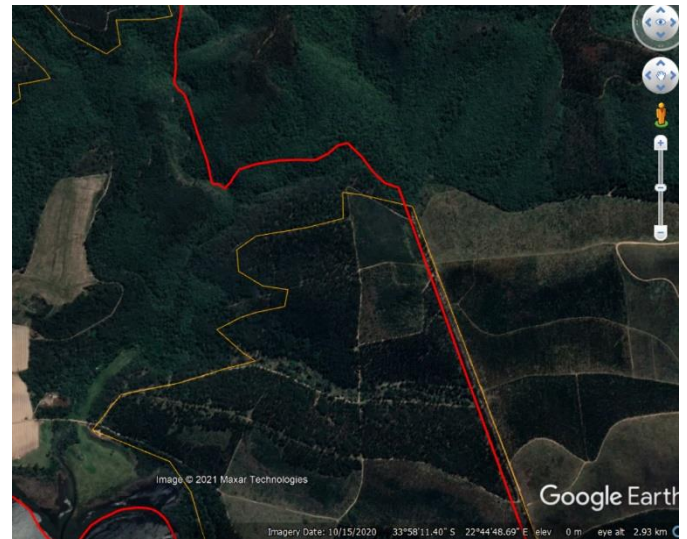
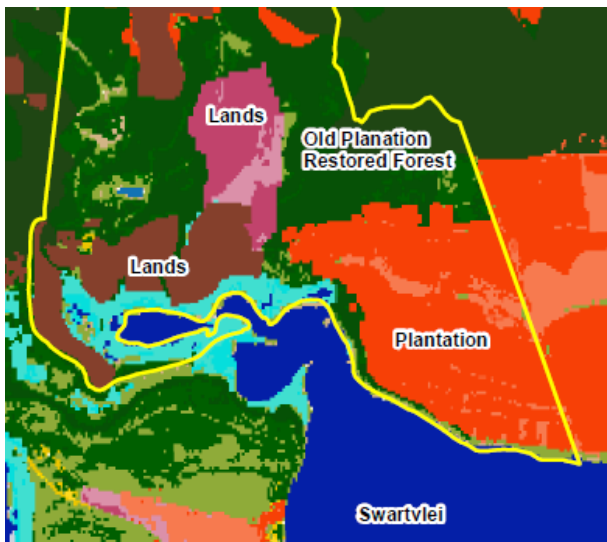


Figure 10. Map of the Site Development Plan for 1/182 in relation to 5 m contours (white lines). Red arrows indicate potential areas for restoration that could enhance a conservation corridor along the eastern property boundary.

The plantation areas that have been cleared for macadamias and avos are located within historic plantations sites as confirmed by historic aerals and the DFFE EGIS data. The only portion within those plantations that shows a recovery / restoration to more indigenous forest is located in the north eastern portion of the lower part of the property, as shown below. This is consistent with the 2021 Google image that shows more natural vegetation as opposed to plantations.

The historic aerals also show that the plantations have been actively managed and utilised during the preceding 10 years<sup>1</sup>, and as such the clearance of the plantation to develop orchards does not trigger clearance of indigenous vegetation activities as per the NEMA 2014 EIA Regulations. It is recommended that no clearance takes place in the areas where natural forest has begun restoring in the areas identified below.

<sup>1</sup> NEMA definition: "**indigenous vegetation**" refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years



## 6.2 General Recommendations

A preliminary list of recommendations based on this high-level desktop assessment are made below.

- The fenceline in the southern section must either be removed in the section crossing the watercourse, or if the fields require protection from wildlife such as bushpigs, then they should be individually fenced and gated, leaving the watercourse open so it can continue to connect the lake to the indigenous forest area.
- Historical fields in the delineated EFZ should preferably not be cultivated with orchards. The trees may not survive high water levels, and the active management of orchards in terms of traffic, disturbance, and pesticide applications is not consistent with management of a sensitive natural area. Furthermore, Macadamia nut trees that are in poorly drained soil are continually at risk of developing phytophthora fungus on the roots which causes root rot and death of the trees.
- Develop an Integrated Pest Management Plan (IPM) with the assistance of a consultant (if there isn't one already). The aim is to ensure that the correct pesticides are applied at the lowest possible rates and non-target impacts in terrestrial and aquatic habitats are kept to a minimum. Macadamias South Africa (SAMAC) have developed an app called Macshield which has useful information about common pests of Macadamia nut trees.
- Species composition of the orchard floor is one aspect of IPM which can also improve the runoff quality of water from the orchard during rainfall events. A diverse, dense assemblage of indigenous grasses and forbs provides habitat for insect pests which will occupy this area instead of feeding on the trees. The other benefit of a dense orchard floor cover is the reduction of flow velocities during surface runoff, which will reduce soil loss and erosion. While kikuyu grass is very dense and fast growing, it has little biodiversity value and is invasive. It would be preferable to introduce additional species such as *Cynodon dactylon* (Bermuda grass), *Tephrosia capensis* (a nitrogen fixing legume), *Tristachya leucothrix* (Hairy trident grass) and *Eragrostis capensis* (hartjiesgras).



- Similar to the above recommendation, the casuarina (beefwood) trees planted for windbreaks in orchards offer little in terms of diversity value and habitat for pests and their natural enemies. Mature casuarina trees (>5 years) can also compete with Macadamia trees in the adjacent rows for water, causing trees on either side to die back. Furthermore, in some areas of the Western Cape beefwoods are becoming invasive in watercourses, providing further motivation to avoid planting them near sensitive aquatic habitats. It is therefore recommended that wind breaks be created from nitrogen-fixing indigenous trees such as Keurbooms (*Virgilia spp.*), or a suitable alternative.
- All mapped watercourses should have buffer zones implemented at the widths recommended in this report. The recommended management of buffers is simplified as follows:
  - o During establishment of orchards or clearing of forestry, watercourse buffers should be marked out with shade cloth fencing (or similar, but not danger tape as it's too easy to cross or remove) and all workers informed that these are 'no-go' areas for heavy machinery.
  - o Areas where excessive woody material has been dumped or pushed into the watercourse must be cleared. Wood must be cut in the watercourse and dragged out in smaller pieces, without the use of heavy machinery.
  - o In steep sections of the Diep River, alien trees (Black wattle and blackwood) are growing in the riverbed. These should be cut with a chainsaw into small sections, stumps painted with herbicide, and logs scattered along the water course as far as possible to avoid creating log jams.
  - o Alien vegetation clearing in buffer areas can be done manually using the cut and paint (herbicide) method, hand-pulling, tree-popping or ring-barking.
  - o Riparian buffers must be inspected on a bi-annual basis to determine whether indigenous vegetation is establishing effectively, if follow-up control is required for aliens, and if any erosion or sedimentation has occurred.
  - o If indigenous vegetation fails to regenerate, then more active planting may be required. Some suitable species are provided in Appendix 2.
  - o Where livestock are present, buffer zones must be fenced with single-strand electric fencing which excludes cattle but not wildlife (e.g. bushbuck).
- Where new Macadamia nut or avocado orchards are to be laid out, it is recommended that tree ridges are orientated along the contours, and do not direct flow downslope towards watercourses. This requires more planning and potentially expense upfront, but as the trees will be established for many decades it is worth orientating them this way to reduce the amount of runoff containing agricultural chemicals from being directed into watercourses in the long-term.
- The plantations that have started restoring should be avoided for any new orchards, particularly the area in the north-east of the lower portion of the property.
- Alien invasive management must be undertaken across the property and not only the areas that are identified for orchards or cultivation.

## 7. REFERENCES

Macfarlane, D.M. (2016). Desktop tool for the determination of preliminary aquatic impact buffer zone requirements. Version 1.0. Water Research Commission, Pretoria.

## 8. APPENDICES

### 8.1 Knysna Sand Fynbos Description (FFd10)

#### FFd 10 Knysna Sand Fynbos

VT 4 Knysna Forest (85%) (Acocks 1953). LR 2 Afromontane Forest (72%), LR 4 Dune Thicket (24%) (Low & Rebelo 1996). BHU 100 Knysna Afromontane Forest (72%) (Cowling et al. 1999b, Cowling & Heijnis 2001).

**Distribution** Western Cape Province: Garden Route coastal flats from Wilderness, generally to the north of the system of lakes, several patches around the Knysna Lagoon, with more isolated patches eastwards to the Robberg peninsula near Plettenberg Bay. Altitude 40–300 m.

**Vegetation & Landscape Features** Undulating hills and moderately undulating plains covered with a dense, moderately tall, microphyllous shrubland, dominated by species more typical of sandstone fynbos.

**Geology & Soils** Deep, acid Tertiary sand inland of coastal dunes forming regic sands and soils of Lamotte form. Land types mainly Hb and Ga.

**Climate** MAP 670–1 090 mm (mean: 850 mm), with a slight peak in autumn and spring. Mean daily maximum and minimum temperatures 27.3°C and 7.3°C for February and July, respectively. Frost incidence 2 or 3 days per year. See also climate diagram for FFd 10 Knysna Sand Fynbos (Figure 4.57).

**Important Taxa** Small Tree: *Widdringtonia nodiflora*. Tall Shrubs: *Cliffortia linearifolia*, *Leucadendron eucalyptifolium*, *Metalasia densa*, *Passerina corymbosa*. Low Shrubs: *Anthospermum aethiopicum*, *Berzelia intermedia*, *Cliffortia drepanoides*, *Clutia rubricaulis*, *Erica diaphana*, *E. glandulosa* subsp. *fourcadei*, *E. glumiflora*, *E. sessiliflora*, *Helichrysum asperum* var. *asperum*, *Lachnaea diosmoides*, *Leucadendron salignum*, *Leucospermum cuneiforme*, *Lobelia coronopifolia*, *Morella quercifolia*, *Muraltia squarrosa*, *Oedera imbricata*, *Protea cynaroides*, *Stoebe plumosa*, *Tephrosia capensis*. Herbs: *Geranium incanum*, *Helichrysum felinum*. Graminoids: *Aristida junciformis* subsp. *galpinii*, *Brachiaria serrata*, *Cynodon dactylon*, *Eragrostis capensis*, *Ficinia bulbosa*, *Heteropogon contortus*, *Ischyrolepis eleocharis*, *Tetraria cuspidata*, *Thamnochortus cinereus*, *Themeda triandra*, *Tristachya leucothrix*.





**Conservation** Endangered. Target 23%. Patches are statutorily conserved in the proposed Garden Route National Park (about 3%) as well as 2% in several private nature reserves. Almost 70% already transformed (pine and gum plantations, cultivation, Knysna urban sprawl, building of roads). Alien *Acacia melanoxylon*, *A. mearnsii* and *A. longifolia* occur locally at low densities. Erosion very low and moderate.




**Remark** This is a very poorly researched vegetation unit.

**References** Taylor (1970b), Drews (1980a).

**8.2 Common plants found in riparian zones on 1/182**

Table 2. Table of alien and indigenous vegetation found in riparian zones of the Klein Wolwe River (from Klein Wolwe River Management Plan, Confluent Environmental)

Botanical name	Common name	Aien / Indigenous	Image
<i>Acacia mearnsii</i>	Black wattle	Alien	
<i>Acacia melanoxylon</i>	Australian blackwood	Alien	
<i>Solanum mauritianum</i>	Bugweed	Alien	
<i>Eucalyptus</i> spp.	Gum trees	Alien	
<i>Pterocelastrus tricuspidatus</i> (middle to upper storey)	Candlewood	Indigenous	
<i>Rapanaea melanophloeos</i> (upper storey)	Boekenhout, Cape-beech	Indigenous	
<i>Halleria lucida</i> (middle storey)	Tree fuschia	Indigenous	
<i>Searsia</i> spp. (middle storey)	Crowberry	Indigenous	

<p><i>Osteospermum moniliferum</i> (middle storey)</p>	<p>Bietou Tree</p>	<p>Indigenous</p>	
<p><i>Dietes iridoides</i> (basal cover)</p>	<p>African iris</p>	<p>Indigenous</p>	
<p><i>Helichrysum petiolare</i> (basal cover)</p>	<p>Silver bush</p>	<p>Indigenous</p>	
<p><i>Chlorophytum comosum</i> (basal cover)</p>	<p>Hen and chickens</p>	<p>Indigenous</p>	