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Prof. Patricia M. Holmes (PhD), 20th October 2023

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Revised Brackenridge Estate Environmental Management Plan

Prof. Patricia M. Holmes (PhD)

20th October 2023

Photo 1. Old Fynbos vegetation above the Forest patch looking towards housing in Orchid Valley

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SECTION 1. CONTEXTUAL INFORMATION

1.1 Introduction

Brackenridge Estate is a private residential development in Plettenberg Bay covering 128 ha, of which 54% is preserved as open space and natural vegetation. The Estate was approved (Record of Decision 2000, Department of Environmental and Cultural Affairs and Sport) for the construction of 280 individual residential properties, mostly now completed, with 13 conditions of approval, including:

- The Estate will follow the principles of an "eco-estate" with the retention of 66.97 ha of private open space (Condition 1).
- An Environmental Management Plan (EMP) must be drawn up by a suitably qualified person and submitted to the (now) Western Cape Department of Environmental Affairs and Development Planning (DEA&DP; Condition 2).
- A Fire Management Plan must be an integral part of the EMP to ensure the long-term survival of the Fynbos vegetation in an ecologically acceptable way (Condition 8).

Legal status of the EMP

The original EMP was compiled to fulfil a condition of exemption in terms of the Environment Conservation Act, as well as the Land Use Planning Ordinance condition of approval (Planning Partners 2001). Therefore at that time there existed a legal obligation for the specifications of the EMP to be complied with.

Brief

The brief for this consultancy was to analyse and update the current operational Environmental Management Plan (Planning Partners, 2001) for Brackenridge Estate. This has been done using insights gained from conducting a concurrent Biodiversity Survey (Holmes 2023a) and Environmental Audit (EA) of the Estate (Holmes 2023b). The EMP describes management requirements to maintain the quality of the natural and man-made environment of the Estate, and to monitor activities on site which may have the potential to negatively impact on the environment. It is intended to ensure that any negative impacts on the existing natural surroundings are minimized throughout the existence of the Estate (Planning Partners 2001).

It is recommended that the EMP be updated every 3-5 years in order to keep abreast of any changes to the environment, Estate management policies and legislation. Furthermore, the 2023 EA and Biodiversity Survey revealed that the two major and most urgent environmental issues to be addressed are fire management (including fire protection and ecological prescribed burns) and invasive alien vegetation control. As these two management priorities interact with one another, it is recommended that an "Integrated Fire and Alien Species Management Plan" be drawn up as a subsidiary plan to this EMP. This Plan should be drafted as an Annual Plan of Operation (APO) and updated annually to specify and plan all actions, responsible personnel, budgets and proposed dates for implementation.

1.2 Biophysical Setting

Location

Brackenridge is located in Plettenberg Bay to the west of Beacon Island Estate. The main access to the property is gained via Piesang Valley Road, with a secondary access road linking the Estate with Robberg Road via Maplin Drive. The Estate has the Piesang River Valley to the north, Plettenberg Bay

Golf Course to the north and west, agricultural land and other erven to the west and south and the Klein Piesang River and Municipal Commonage along its eastern boundary. Note that the western riparian zone of the Klein Piesang River is part of Brackenridge Estate although it lies outside the east fence. As such its management remains the Estate's responsibility.

The Estate is located on a ridge that demarcates the southern boundary of the Piesang River Valley. This ridge forms part of the rocky headland that defines the half-heart bay and terminates at Robberg. Its altitude ranges from near sea level in the north-eastern corner (5 m) to just over 100 m on the western boundary. The housing development exploits mainly the upper eastern slopes for sea views, avoiding the steeper slopes and drainage courses.

Geology

Brackenridge Estate consists of consolidated conglomerate deposits belonging to the Enon Formation. These deposits, which are of Cretaceous to Tertiary age, were deposited in a structural basin underlain by less resistant Bokkeveld Shale sediments. The youngest deposits in the area consist of alluvial valley deposits found along the base of the ridge. Table Mountain Group Peninsula Formation sandstone outcrops are visible across the Piesang Valley.

Indigenous Vegetation & Flora

The broad-scale national vegetation type across most of the Estate comprises Garden Route Shale Fynbos (Rebelo et al. 2006), with wetland vegetation occurring in the lowest, northeast section adjacent to the Klein Piesang River. A finer-scale vegetation map of the Southern Cape by Vlok et al. (2008) classifies the Fynbos as Roodefontein Grassy Fynbos. It also maps a small area of the Piesang River Fynbos-Forest Mosaic on the steep slope above the main entrance. The wetland vegetation is typified as Groot Brak River Floodplain vegetation.

Owing to the current moribund state of the Fynbos owing to lack of fire, it was not possible to accurately delineate the finer-scale plant communities within each vegetation type (Holmes 2023a). However, it is likely that the Grassy Fynbos communities occurred on the hotter north and west-facing slopes, except where topography allowed the development of Forest or Thicket patches, and the wetter south and east-facing slopes supported Ericaceous Fynbos communities. Two small Forest community patches were identified on eastern aspects in stream ravines. The other plant communities identified were the Wetland Floodplain and Fynbos Riparian Scrub communities, both highly invaded by shrubs and/or alien trees.

To date, following the August 2023 biodiversity survey, 235 plant species have been recorded on the Estate representing 66 plant families. Two species are considered Vulnerable under the IUCN criteria (Holmes 2023a). These data are likely to be large under-estimates as most species may only be identified when flowering during specific seasons. Secondly, the younger components of the Fynbos communities are largely missing through a lack of fire, and will only be evident after a fire.

Alien Vegetation

Invasive alien vegetation is scattered throughout the Estate and is moderately dense to dense in some areas. Prominent invader growth forms include trees, shrubs, forbs and grasses: to date 39 alien species of plants have been recorded (Holmes 2023a). Of particular concern for management are the invasive alien trees which alter ecosystem processes and replace the indigenous vegetation if not tackled effectively.

Trees such as pines, wattles and gums are problematic in Fynbos as they are also fire-adapted and can benefit from fires by dispersing and becoming denser. The following invasive alien tree species were noted: *Acacia mearnsii* (Black Wattle), *A. melanoxylon* (Blackwood), *A. saligna* (Port Jackson Wattle), *A. cyclops* (Rooikrans), *Pinus pinaster* (Cluster Pine), *P .radiata* (Monterey Pine), *Eucalyptus*

species (Gums), *Solanum mauritianum* (Bugweed) and *Schinus terebinthifolia* (Brazilian Pepper). Those with animal-dispersed seeds can invade both Fynbos and Forest vegetation.

Invasive alien shrubs recorded included *Hakea sericea* (Silky Needlebush) and *Lantana camara* (Lantana, Cherry Pie). The scrambling succulent, *Kalanchoe delagoensis* (Mother-of-Millions) was recorded close to the entrance and *Nephrolepis cordifolia* (Sword Fern) along the eastern fence line. These two species are likely to be garden escapees. Invasive alien grasses included *Cortaderia selloana* (Pampas Grass) which is especially invasive in the wetland and *Cenchrus clandestinus* (Kikuyu), usually escaped from gardens or from dumped garden refuse. Note that seeds of Pampas Grass can disperse widely by wind.

Planning Partners (2001) assert that past disturbance, such as farming activities, resulted in much of the alien invasion. Perhaps those areas are mostly now built upon, but other than the northeast wetland which is highly disturbed and may have been ploughed historically, and a few "parkland", mowed areas there are very few areas of the private open space that appear to have been ploughed (based on aerial imagery and flora assessment). The earlier invasive alien control programme has not yet brought these species under control. Effective control requires consistent follow-ups and long-term maintenance control once alien species' densities are reduced.

Fauna

The biodiversity report (Holmes 2023) lists faunal species documented for Brackenridge to date (25 vertebrates and 38 invertebrates). However, these lists remain large under-estimates for the Estate, especially for invertebrates which in Fynbos often mirror the high plant diversity. Faunal species are important as pollinators, seed dispersers, browsers and grazers and as such play key roles in ecosystem health. A comprehensive faunal list will require surveys over the seasons spanning several years and fire cycles, and is beyond the scope of this report. If desired, a faunal list can be created by volunteer residents using iNaturalist to obtain identifications and collate the data. This may take a decade or two.

SECTION 2. IMPLEMENTATION OF THE EMP

2.1. Organizational Structure

Home Owner's Association (HOA)

The HOA is a legal entity responsible for the management and maintenance of common property such as houses, services and amenities arising from the development as well as to ensure compliance with the Architectural and Landscaping Guidelines. The HOA operates according to the HOA constitution.

HOA members comprise the owners of erven, who are jointly liable for expenditure incurred in connection with the association. The HOA has been established to oversee management of private open space and private roads. In addition, the HOA monitors and enforces compliance by the individual owners and complies with the EMP to ensure long-term management of the development and the associated natural environment.

The HOA was originally responsible for establishing an Environmental Monitoring Committee (Condition 11) which was tasked with meeting on a regular basis in order to detect any deviations from the relevant approvals and the EMP. This committee is not in place, but the HOA recently established an Environmental Management Subcommittee (EMS) to oversee monitoring of

environmental aspects on the Estate. This Subcommittee reports to the HOA and Estate management.

Environmental Liaison Committee (ELC)

The Environmental Liaison Committee (ELC) no longer exists but was originally established as a condition of approval for the development (Condition 11) to oversee implementation of the EMP on site and to serve as a consultative forum to integrate the views of the community and review and update the EMP (Environmental Exemption Record of Decision, 22/6/2000; Planning Partners 2001). This committee had representatives from several organizations including the Plettenberg Bay Municipality, the Plettenberg Bay Community Environmental Forum, DEA&DP and Brackenridge Estate HOA.

The current Environmental Management Subcommittee (EMS) of the HOA does not yet fulfil the ELC function, and should be re-constituted as an Environmental Monitoring/ Management Committee that reports directly to the Board of Trustees in order to comply with Condition 11. Once appointed, the Environmental Control Officer (ECO) should also serve on this committee.

2.2 Environmental Monitoring

The purpose of monitoring is to ascertain the effectiveness of environmental management, including the methods employed, as well as the influence of external factors including people.

Veld Condition Monitoring

A qualitative assessment of the condition of indigenous vegetation, including accumulation of dead wood as result of ageing and alien plant invasions, should be done regularly by the Estate ECO and assisted if required by an independent specialist. Invasive alien species and their densities should be mapped spatially in order to inform the management actions required for their control. This information is essential for prioritizing areas for integrated alien control and prescribed burning.

Fire Monitoring

The purpose is to keep records of all fires occurring on the Estate. The ECO (with assistance of Fire Protection Association (FPA) representatives) will be responsible for mapping the extent of the fires and keeping records on the following for all fires occurring on Brackenridge Estate:

- Date of fire occurrence
- Duration of the fire
- Weather conditions during the fire
- Origin of the fire
- Cause of the fire
- Area burnt in ha (mapped at a scale no coarser than 1:10,000)
- Damage to property
- Costs incurred in managing or conducting the fire (especially useful for a prescribed burn to inform future fire planning).

To facilitate fire management and veld condition monitoring the burn areas should be mapped and accompanying information recorded for each fire event and/or management block. The critical

elements to record are veld age (or date of last fire), dangerous fuel loads (especially alien woody species) and the proposed next scheduled prescribed burn, fire belt status and any high fire risk areas in the event of wild fires.

Erosion Monitoring

The purpose is to detect early signs of erosion, determine the need for erosion control and repairs as well as to determine the success of erosion control methods. All roads, road verges, footpaths and storm water culverts should be monitored at least once annually, but preferably after each heavy rain storm event, for signs of erosion.

Monitoring can be done by casual observation, for example during fence line patrols. If any signs of erosion are detected, immediate action must be taken to remove the cause of erosion and prevent further damage and to repair the existing erosion damage.

This is ongoing maintenance and does not require any formal monitoring or management action.

Minor Infrastructure Monitoring

The condition and effectiveness of minor infrastructure, such as fire hydrants, information boards and footpaths, should be checked regularly, when and where required (e.g., fire hydrants and related equipment before the start of the main fire season, paths at the start and end of the rainy season for erosion and bush encroachment). However, standard management following any reported issues by staff and residents should suffice in most cases.

2.3 Environmental Audit (EA)

Although the initial 2021 EMP stated that an environmental audit should be carried out annually to ensure that management and conservation objectives are successfully achieved, this frequency could be lessened in line with the updates of the EMP on a 3-5 year cycle. A suitably qualified ECO appointed to manage the open space areas should be able to assist Estate Management in this task. Alternatively, an independent specialist should be appointed to conduct the audit.

Audits may be carried out by means of a checklist and will focus on areas of indigenous vegetation, rehabilitated areas, alien plant control, fire management, condition of the storm water system, minor infrastructure and private properties. The EA should be reviewed by the Environmental Management Committee to ensure all concerns raised during the process have been addressed.

2.4 Review of EMP

The EMP document should be reviewed every three to five years by the appointed Estate ECO, with assistance from Estate Management and the HOA. This will ensure that it remains relevant and capable of dealing with current requirements. However, it is recommended that an EMP subsidiary "Integrated Fire and Invasive Species Management Plan" should be updated annually (as an Annual Plan of Operation; Appendix 1) in order to facilitate implementation of the actions required to reduce fire risk and restore the natural open space areas.

2.5 Financing Implementation of the EMP

Financing of environmental management requirements as outlined in this document, is the sole responsibility of the HOA. Required funds should be raised as part of the levy paid by all property owners. An environmental management fund should be established for this purpose

SECTION 3. SPECIFICATIONS FOR ENVIRONMENTAL MANAGEMENT

3.1 Vegetation Management

Indigenous vegetation, mainly Fynbos, has been retained wherever possible and according to the 2000 RoD should be managed to conserve its biodiversity, including an appropriate burning regime.

Objective: To maintain healthy Fynbos, Forest and wetland ecosystems in accordance with the precepts and motivations upon which the development was approved.

Approach: To conserve and restore (where needed) all viable vegetation outside building zones on the Estate. Indigenous vegetation in the open space system may only be removed if considered absolutely essential, and only with approvals from the Municipality and the DEA&DP.

Although invasive alien vegetation reportedly has been cleared in the past, this management has been unsuccessful in bringing several invasive alien species under control and renewed effort is urgently required in this regard, both from fuel reduction and Fynbos conservation perspectives.

Furthermore, no ecological prescribed burning programme has been implemented and the Fynbos is in a degraded and moribund state across most of the Estate owing to the absence of fire. Lack of fire has also resulted in invasion by local Thicket and Forest species into the Fynbos, increasing fuel loads. As a result the vegetation supports unnaturally high, woody fuel loads combined with flammable moribund and dead Fynbos vegetation. This situation threatens the fire safety of the houses as well as the Fynbos biodiversity and urgently needs to be addressed.

Urgent Actions required:

- Invasive alien species control. (See 3.3 Alien Vegetation Management for further details).
- Drafting, implementing and regular updating of a subsidiary “Integrated Fire and Alien Species Management Plan” (Appendix 1.). (See sections 3.2 & 3.3)
- Fuel reduction through removal of heavy woody material from the Fynbos areas prior to burning (alien and indigenous trees). (See 3.2 Fire Management).
- Urgent prescribed ecological burning. (See 3.2 Fire Management). Ongoing action required.
- Regular prescribed ecological burning. (See 3.2 Fire Management).

Rehabilitation of Degraded Areas

The biodiversity survey of Brackenridge Estate (Holmes 2023a) indicated that most of the Fynbos areas should self-restore spontaneously provided that an integrated plan for prescribed ecological burning and invasive alien control is implemented as soon as possible. However, in the unlikely event of any areas failing to recover post-fire, the following rehabilitation and active restoration principles should be applied, as appropriate. These guidelines are also appropriate to any areas degraded by erosion, emergency construction and other unnatural disturbances.

- Source only locally indigenous plant species for ecological restoration purposes, using the nearest available source of seeds and/or cuttings to ensure genetic integrity and adaptation to

local conditions. Such material will need to be requested specifically for any Estate project using an indigenous vegetation rehabilitation contractor, as plant nurseries usually only stock hybrids and cultivars which mostly are non-local. Material from Brackenridge Estate itself will likely be the most appropriate to use.

- The optimal planting season for rootstock is April-May following the first heavy autumn rains, which allows the plants access to natural irrigation with rainwater for the first season.
- Sowing is best done post-fire onto bare soil ahead of the main rainy season: February-March in the Plettenberg Bay area. If the target area has not been burnt, seeds should be pre-treated with smoke or smoke extract prior to sowing to stimulate germination once the rains arrive. Note however that bare soil will be required for Fynbos species to germinate.
- For highly modified bare soil areas on slopes, adequate soil protection should be planned, e.g., organic soil binders combined with sowing a suitable indigenous pioneer seed mix, in addition to any comprehensive seed mix sowing or rootstock planting, in order to minimize soil erosion.
- Fertilisers are toxic to Fynbos, except for very dilute solutions of organic fertiliser such as Kelpak or Seagrow. Provided topsoil remains in place, it is unlikely that fertiliser will improve plant establishment.
- Watering of restoration sites generally is not practical, but if spring rains fail to materialize some watering to extend the establishment period during the first year of restoration would be beneficial. However, it is not recommended to extend watering into the hot summer months.
- Maintenance of revegetated areas and restoration sites should include alien species control and repair of any soil erosion areas.
- An experienced indigenous vegetation rehabilitation contractor should be appointed to manage the revegetation or active restoration project.

Time Frame: Ongoing; action as required.

Responsible Parties: HOA, EMC, Contractor.

3.2 Fire Management

The nationally Endangered Garden Route Shale Fynbos is the predominant vegetation type on site. Fynbos is both fire-prone and fire-dependent, therefore in the absence of wild fires the Estate is responsible for conducting regular prescribed ecological burns to conserve this biodiversity. To date this has not been done and currently most Fynbos areas are in a degraded, moribund state with the high fuel loads, creating a high fire risk for housing on the Estate. Invasion by indigenous Thicket and Forest elements and alien trees into the Fynbos has further exacerbated the high fuel loads.

Prescribed ecological burns should be planned and implemented in separate open space management blocks identified spatially on a map (minimum scale 1:10,000; Figure 1, Table 1.). Such actions will help to circumvent wild fires which could occur under severe weather conditions and be difficult to control, even with fire belts in place.

Objective: To use fire as a management tool for the regeneration and maintenance of Fynbos conservation and to minimize fire risk to the development.

Approach:

- Conduct pre-emptive prescribed ecological burns on a 10-15 year cycle, according to an "Integrated Fire and Alien Species Management Plan" (Appendix 1.).
- Minimize fuel loads on site through control of invasive alien trees and invading Thicket and Forest trees and remove large fuel prior to a prescribed burn.
- To mitigate against possible catastrophes (drought, high rainfall, disease, etc.) affecting Fynbos recovery post fire, the Estate should be managed as 3-8 blocks burned at least two years apart, and not all in one year.
- Establish and maintain fire breaks along the boundaries of the site. These must be maintained annually where the adjacent veld is four years post-fire age or older.

3.2.1 Fire Prevention

Management Requirements:

- No property owners will be allowed to burn any materials anywhere on the site; including on private erven.
- Outdoor fires will only be allowed for cooking purposes, in fireplaces designed for this purpose.
- General garden refuse, and all dead or waste plant material resulting from vegetation clearance, is to be removed from the site.
- All property owners are to be made aware of the risks of fire in the area.
- The HOA is to identify any other activities that may pose a fire risk or sources of fuel load on site, and advise property owners on suitable management practices to prevent fires.
- The HOA is to impose penalties on property owners for any contravention of the stated fire precaution and prevention requirements.
- HOA to provide property owners with instructions of procedures to follow in the case of a fire, including emergency contact details.
- In the event of a fire the local fire department must be alerted at **tel (044) 533-5000** (all hours).
- The HOA is responsible for ensuring that firefighting facilities and equipment on site are regularly and appropriately maintained.
- The following fire precautions are to be strictly adhered to:
  i. Owners should familiarize themselves with the position of fire hydrants and hose reels on the site (as indicated on a map provided by the HOA) and with any rules and procedures regarding the use of fire-fighting equipment laid down by the HOA.
  ii. Fire hose reels are to be mounted in a convenient position that is visible from the road.
  iii. All owners are encouraged to install sprinkler irrigation systems on the area surrounding the house, and possibly on the roof. Any PVC pipework for these systems should be buried a minimum of 400 mm deep.
  iv. The flues of fireplaces are to be fitted with brass mesh to prevent sparks escaping.
  v. Braai places shall be built with flues.

vi. It is recommended that gutters are not installed, as the leaf matter that can collect is a fire risk. Where gutters are not used, storm water runoff must be dealt with in an alternative manner. Gutters should be fitted with mesh guards to prevent leaf matter collecting or else cleaned regularly to prevent flying embers igniting leaf litter and burning into the roof space. Plastic gutters should not be allowed.

vii. Flammable vegetation should be removed from within 2 m of the walls and roofs of houses and along the inside garden perimeter adjacent to any natural vegetation to augment the fire belt. Suitable fire-retardant landscaping should be used in these areas, e.g., lawns, paving, succulents and other non-flammable bedding plants below ankle height. The succulent hedge plants *Aloe arborescens* (Krantz Aloe) and *Portulacaria afra* (Spekboom) are permissible along garden boundaries.

viii. An electronic alert system should be installed.

Time Frame: Ongoing

Responsible Parties: HOA, Property Owners, FPA representatives

3.2.2 Fire Belts

Management Requirements:

- Create a continuous fire belt between housing and natural vegetation areas using brush cutters.
- Relocate current fire belts cut away from housing borders to be adjacent to them, so that there is no indigenous vegetation between the fire belts and the property boundaries (e.g., along sections adjacent to Orchid Valley).
- Cut a 5m-wide fire belt: ideally only 3m-wide should be cut in the natural open space areas to minimize loss of biodiversity, with the other 2m cut by the adjacent home owners on their properties (fire management should be a shared responsibility). Fire belts in gardens can comprise mown lawns, low (ankle-height) non-flammable bedding or ground cover plants, paving or - if some privacy is required - a succulent hedge of non-flammable Spekboom (*Portulacaria afra*) or Krans Aloe (*Aloe arborescens)*.
- Improve fire belts where less than a 3m-wide space is available between the Estate fence and housing, e.g., west of Erica Heath: at least 2m of adjacent gardens must be landscaped as fire belt along the edge closest to the fence where the adjacent land outside the Estate comprises flammable vegetation.
- Remove flammable trees and shrubs from within 2m of housing walls and gutters to minimize the risks of embers igniting these and burning down houses;
- Clear any roof gutters of leaf litter regularly to minimize the risk of embers igniting the roof space;
- Cut fire belts annually, ahead of fire season (by end October), where adjacent vegetation is older than four years post-fire.
- Additional temporary fire belts should be cut ahead of planned prescribed burns where needed on the boundaries of internal fire management blocks.

Time Frame: Initial Fire belt clearing: Immediately where required.

Maintenance: Annually before the main fire season (by end of October unless a dry winter requires earlier cutting) where adjacent vegetation exceeds four years post-fire age.

Responsible Party: HOA with input from FPA representatives; contractor.

3.2.3 Prescribed Ecological Burns

It is recommended that an "Integrated Fire and Alien Species Management Plan" be developed as a subsidiary plan to the EMP and implemented as a matter of urgency. It is necessary to integrate these two management spheres because they directly impact on one another. For example, fuel reduction is advisable before a management block is burnt, through removal of large fuel (large invading alien and Thicket/Forest trees and shrubs) and initial control of all invasive alien species should be done pre-fire to minimize proliferation post-fire. Fire will also trigger alien recruitment and resources need to be assigned to tackle this problem as part of the burning plan.

Vegetation management blocks should be as large as possible to avoid negative edge effects of fires impacting on Fynbos recovery, i.e., 3-8 vegetation management blocks, depending on decisions about how many of the five small remnants to burn. If all eight remnants are to be managed for Fynbos conservation then all will require prescribed burning. To improve efficiency, two or three of the small remnants could be burnt on the same day, or consecutive days, while fire-fighting equipment is on site. After the Estate has conducted its first cycle of prescribed burning throughout, the boundaries between Forest patches and Fynbos should become more obvious.

To maintain biodiversity the Fynbos sections should be managed on a staggered burning cycle, with a 10-15 year interval to prevent the vegetation becoming moribund and invaded by Thicket and Forest species. This fire frequency would conserve biodiversity and ensure that fuel loads are kept to a manageable level. A longer fire interval to 20 years is acceptable, but may increase the risk of uncontrolled fires. However, a fire cycle of less than 10 years is not acceptable for Fynbos maintenance.

Management Requirements: This will require separating the most urgent interventions (e.g., first five years) from the longer term maintenance plans.

- Delineate the vegetation management blocks (e.g., Figure 1.) and prioritize blocks for burning (including proposed dates).
- Draft and regularly update the "Integrated Fire and Alien Species Management Plan" as an Annual Plan of Operation.
- Implement the fire preparation and post-fire actions (e.g., fire belt cutting, large fuel removal, alien follow-up) and appoint experienced contract teams where required.
- Apply for an ecological burning permit well in advance of the proposed burning date to allow for all permissions to be aligned (e.g., Air Pollution Control, local Municipality, adjacent residents and neighbouring landowners approvals).
- Prescribed ecological burns should be done in summer where possible (hot, dry conditions) to optimize Fynbos recovery and minimize negative impacts on animals which also are adapted to summer fire. The latest month to conduct a prescribed burn should be March, ahead of the first significant autumn rains.

- Appoint an experienced Fynbos prescribed burning contractor to conduct the prescribed burns.

Time Frame: Immediate and ongoing.

Responsible Party: Estate Management, HOA, Contractors, ECO, EMC, FPA representatives.

3.3 Alien Vegetation Control

Invasive, alien plant species require long-term management owing to their ability to produce large quantities of long-lived seeds and in some cases to resprout from underground rootstocks, especially if treated inappropriately. Regular follow-up clearing must be scheduled to deal with this regrowth, and especially after a fire as most of the alien species in Fynbos are fire-adapted.

The most urgent aliens to control are the invasive species that alter ecosystem processes (e.g., fire behaviour), particularly alien trees in Fynbos, such as wattles, gums and pines. To address this, it is recommended that a subsidiary "Integrated Fire and Alien Species Management Plan" is drawn up and appended to the EMP, to be updated every year as an "Annual Plan of Operation".

For large alien trees it may be necessary to appoint an experienced tree feller. Once the initial clearing of the mature alien trees and shrubs has been done, annual follow-up of seedlings and saplings should be done to prevent new seed set. Suitable methods of control for each life-cycle stage are listed in Table 2. Herbicide use should be kept to a minimum as this negatively impacts on native species, but if necessary to use in alien control (e.g. for strongly suckering or resprouting species) must be used with extreme care. Only herbicides registered for treating the particular species should be used. Similarly, application of chemicals should only be done by those suitably trained in the handling of the chemicals and the tools for their application.

Objectives:

To control the growth and spread of alien plant species on site using the most appropriate methods for initial and follow up control for the different species and to reduce woody fuel loads.

Approach: This will require separating the most urgent interventions (e.g., first five years) from the longer term maintenance plans.

- Draw up an "Integrated Fire and Alien Species Management Plan" and update every year as an "Annual Plan of Operation".
- Include maps of areas of priority invasive species (with estimates of alien densities to assess workloads and costs) for each management block.
- Include pre- and post-fire invasive alien species control requirements.
- Appoint a skilled operational team to implement the alien control and fuel reduction (removal) actions prior to the block burn, if needed.
- Appoint a skilled operational team to implement the post-fire alien control, ideally when plants are still small enough to be pulled and lopped.

Time Frame: Ongoing; as required.

Responsible Parties: HOA, ECO, EMC, contractor.

3.4 Management of modified open space

Private open space within the development includes all portions of land outside the privately owned erven, including roads, other service infrastructure, and areas on steeper slopes containing tracts of fynbos and scrub forest. Management of the general open space will be the responsibility of the HOA, which is to ensure that these portions of the site are maintained to the standard specified by the Council in the approval of the rezoning and site development plan.

Objective:

To maintain an aesthetically pleasing and ecologically viable environment which fulfils the functional requirements of the development.

Approach:

- Maintain roads and services to a standard acceptable to the local authority.
- Control erosion on steep slopes.
- Control the management of waste on site.

3.4.1 Maintenance of Roads, Services and Pedestrian Network

Management Requirements:

- All roads and other infrastructure on site are to be maintained to an acceptable standard, in keeping with the specifications of the site development plan.
- Reinstatement by the local authority, as a consequence of service system repairs of roads, footpaths, verges, open spaces, etc, will be undertaken only to standards normally applicable to non-private townships. Thereafter, the HOA is to reinstate brickwork, paving blocks, planting, etc to the originally specified and constructed standards and is to bear the cost of such additional work.
- The HOA is to indemnify Council (or duly appointed agent) against any responsibility or payment for repairs of any damage to roads, walls, fences, verges, etc, which may be occasioned by Council's vehicles or staff within the development.
- Any construction works required for the repair or reinstatement of services is to be undertaken according to the basic specification of the construction phase EMP, a copy of which is to be kept by the HOA. The HOA will be responsible for ensuring that suitable environmental management practices are implemented during construction.
- Infrastructure and signboards associated with the pedestrian network must be maintained.
- Informal footpaths must not be allowed to develop. Areas where trampling by pedestrians occur off pedestrian routes must be identified and measures taken to rectify the problem, e.g., by providing appropriate fencing and sign boards, or alternative routes. This will be monitored by the HOA.

Time Period: Ongoing.

Responsible Parties: HOA, Estate Management, ECO.

3.4.2 Erosion Control

Steep slopes in certain areas of the site may be subject to erosion if not suitably stabilised and protected. During ongoing construction, areas identified as likely to experience erosion, e.g. cut slopes, will have been stabilized. If erosion adversely affects the functioning or wellbeing of streams on site, eroded or eroding areas must be immediately stabilized.

Management Requirements:

- Excess storm water runoff may damage adjacent vegetation and cause erosion. If the storm water system does not function satisfactorily, the HOA must find an alternative solution that prevents this happening.
- Erosion on site is to be monitored by the HOA, particularly after heavy rainfall.
- The cause of any erosion must be identified and the most appropriate method of stabilisation employed, such as logging, soil replacement, mulching and revegetation (see 3.1). In this regard, a suitable contractor must be appointed to implement the rehabilitation.
- Areas that are unstable or susceptible to erosion are to be suitably stabilized.
- Areas that have been stabilised to prevent erosion are to be monitored and maintained.

Time frame: Ongoing.

Responsible party: HOA, ECO, EMC.

3.4.3 Waste and Litter Control

Uncontrolled littering and dumping of waste materials of any nature on the site will detract from the aesthetic quality of the development, and will impact on aspects of the natural environment associated with the development.

Management Requirements:

- Wastes and liquids must be disposed of in a satisfactorily way that causes no nuisance or any other health hazard (i.e., not into sewerage or storm water systems).
- Household waste must be placed in plastic refuse bags, which will be taken to a refuse room, in a location to be agreed upon with Council. All refuse removal and disposal from this point will be undertaken by the local authority.
- No waste material of any nature may be dumped or stored in any communal area inside the development, including the natural environment.
- Should dumping occur, the HOA is to ensure that the responsible party removes the material as soon as possible, and that a penalty is imposed on the responsible party.
- All refuse bins are to have secured lids, and are to be stored in such a position that they are not accessible to scavengers.

Time Frame: Ongoing.

Responsible party: Estate Management, ECO.

References & Further Reading

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Rebelo, A.G., Boucher, C., Helme, N.A., Mucina, L., Rutherford, M.C., et al., 2006. Fynbos biome. In: Mucina, L., Rutherford,M.C. (Eds.), The Vegetation of South Africa, Lesotho and Swaziland: Strelitzia, 19, pp. 52–219.

Figure 1. Example of Potential Private Open Space Vegetation Management Blocks (see also Table 1)

Table 1. Example of Private Open Space Management Blocks with Dimensions.

Management Block	Perimeter (km)	Area (ha)
Block 1	2.24	11.8
Block 2	2.57	19.5
Block 3	1.83	8.85
Block 4	0.60	1.74
Block 5	0.71	1.68
Block 6	0.97	3.00
Block 7	1.10	2.97
Block 8	0.70	2.1

Table 2. Major invasive alien plant species at Brackenridge Estate and recommended treatments. Please refer to the latest approved herbicide list for the best one to use in each circumstance if required (i.e., alien species, life-cycle phase (seedling versus resprout) and clearing method (e.g., stump treatment, frilling).

Species	Common Name	Growth Form	Invading status	NEMBA^ category	Clearing method alternatives
Acacia cyclops	Rooikrans	Small tree	Invasive	1b	Seedling – hand pull. Sapling – popper; cut low. Tree – ringbark; or cut low.
Acacia melanoxylon	Black Wood	large tree	invasive	2	Seedling – hand pull. Sapling – ring bark or frill. Tree – ring bark or frill. Resprouts (suckers) – ring bark; stump treat or foliar spray if mother plant has been treated effectively.
Acacia mearnsii	Black Wattle	tree	Invasive	2	Seedling – hand pull. Sapling – popper; cut below root crown; or cut low & stump treat. Tree – ringbark; frill; or cut low & stump treat. Resprouts – cut lower & stump treat; or foliar spray.
Acacia saligna	Port Jackson Wattle	Tree	Invasive	1b	Seedling – hand pull. Sapling – popper; cut below root crown; or cut low & stump treat. Tree – ringbark; frill; or cut low & stump treat. Resprouts – cut lower & stump treat, followed by foliar spray of new sprouts.
Cortaderia selloana	Pampas Grass	Grass	Invasive	1b	Seedling – grub out. Tussock – grub out entire plant; foliar herbicide.
Eucalyptus species	Bluegum	Tree	Invasive	Several spp listed as 1b in Fynbos (2 for plantations)	Seedling – hand pull. Sapling – popper; cut below root crown; or cut low & stump treat. Tree – ringbark; frill; or cut low & stump treat. Resprouts – cut lower & stump treat, followed by foliar spray of new sprouts, or for larger trees foliar spray when foliage 0.5m high.
Hakea sericea	Silky Needle Bush	Shrub	Invasive	1b	Seedling – hand pull. Sapling – popper; cut low below needles or buds.

					Shrub - popper; cut low below needles or buds.
Lantana camara	Lantana	Shrub	Invasive	1b	Seedling – hand pull. Sapling – popper; grub out, including roots. Shrub – cut then grub out roots; cut low stump-treat.
Pinus pinaster	Cluster Pine	Tree	Invasive	1b (2 for plantations)	Seedling – hand pull. Sapling – popper; cut low below needles or buds. Tree – ringbark; or cut low. Resprouts – cut lower below all regrowth.
Pinus radiata	Monterey Pine	Tree	Invasive	1b (2 for plantations)	Seedling – hand pull. Sapling – popper; cut low below needles or buds. Tree – ringbark; or cut low. Resprouts – cut lower below all regrowth.
Solanum mauritianum	Bugweed	Tree	Invasive	1b	Seedling – hand pull. Sapling – popper; or cut low & stump treat. Tree – ringbark; frill; or cut low & stump treat. Resprouts – cut lower & stump treat, followed by foliar spray of new sprouts.

^NEMBA refers to the National Environmental Management: Biodiversity Act, Invasive Species Listing (2014). Category 1a – must be removed; Category 1b – must be controlled; Category 2 – must be controlled and permit required to grow the species.

Appendix 1. Example of an Integrated Fire and Alien Species Management Plan (Annual Plan of Operation) template. Note that the most urgent tasks should be tackled first: control of invasive alien trees and prescribed ecological burns for moribund Fynbos vegetation. These should be integrated as pre-burn, prescribed burn and post-burn tasks. Once the vegetation blocks have been through one fire cycle, the longer-term maintenance plans for each block can be scheduled. Planning should be done in consultation with Estate Management (Staff), HOA and for fire including FPA representatives.

ACTION MANAGEMENT BLOCK 1		**RESPONSIBLE PARTY/ STAKEHOLDER INVOLVED**	**BUDGET ITEM**	**BUDGET AMOUNT**	**JUNE**	**JULY**	**AUG**	**SEPT**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APRIL**	**MAY**	**JUNE**
PRE -BURN YEAR 1																	
1	Invasive alien control	ECO, Staff, Contractor	Contractor, tools, herbicide	R													
2	Fire belt cutting	ECO, Staff, Contractor	Contractor, tools	R													
3	Obtain permits for prescribed burn	ECO, Staff	Staff time	-													
4	Communications – Estate & surrounds	ECO, Staff	Staff time														
4	Fuel reduction (large wood)	ECO, Staff, Contractor	Contractor; equipment	R													
5	Prescribed burn	ECO, Staff, Contractor	Contractor; equipment	R													
6	Mopping up after burn to prevent flare-ups	ECO, Staff	Staff time	-													
POST-BURN YEAR 2			**BUDGET ITEM**	**BUDGET AMOUNT**													
1	Monitor for soil erosion; repair erosion runnels	ECO, Staff	Staff time	-													

2	First alien species follow-up control	ECO, Staff, Contractor	Contractor; equipment	R														
3	Monitor for areas of poor Fynbos recovery	ECO, Staff	Staff time	-														
4	Etc.																	
5																		
6																		

Addendum to the 2023 Brackenridge Environmental Management Plan (EMP)

Prof. P M Holmes

13th May 2025

Terms of Reference

During preparations for a planned prescribed burn in Block 1 in March 2025 it was noted by forester George von den Bussche that some riparian forest patches were present in two drainage lines, and in addition, a few large, ancient *Apodytes dimidiata* (Witpeer) trees were present nearby. This raised the questions of:

1. Whether a prescribed ecological burn of the entire Block 1 is appropriate, and
2. Whether the recommended burning season of January to March could be extended.

I was therefore asked by the Brackenridge Environmental Committee (EMC) to revisit the vegetation mapping and prescribed burning recommendations and to update these recommendations based on this new information as an addendum to the EMP.

1. Updated vegetation communities and prescribed burning of Block 1: EMP Figure 1.

As described in the Holmes (2023) Biodiversity Survey Report, Block 1 is predominantly endangered Garden Route Shale Fynbos, mapped as a grassy fynbos community at finer scale, with some fynbos/thicket mosaic on the lower slopes above the estate entrance. However, owing to the moribund state of the vegetation by fire exclusion and invasion by thicket elements and alien trees, it was difficult to map the historical communities. The two drainage lines were recently noted to support forest elements and may historically have supported either a Fynbos Riparian Scrub or Forest community. These patches have been indicated in Figure 1 below based on Steve Ritki's communication and the latest available imagery on Google Maps (updated from the EMP Figure 1 as 'For 3' and 'For 4').

A counter proposal received by the EMC to exclude 50% of Block 1 from prescribed burning in order to promote the development of thicket and forest vegetation is not supported from a biodiversity perspective. Doing so would represent a loss to an endangered fynbos type which needs fire to maintain its rich biodiversity. Furthermore, allowing thicket elements to densify would increase standing woody biomass and this could pose a far higher risk of severe fire close to upslope properties in the event of a future wild fire.

A reasonable compromise would be to conduct prescribed burning of the fynbos around the delineated forest patches (Figure 1.). A narrow fire belt (2m-wide) could be cut around the forest patches to slow the fire in their vicinity while allowing the fire to burn into other encroaching thicket vegetation elsewhere in Block 1. The separate, ancient Witpeer trees may be treated in the same way – with an under bush cut - so that they experience a cooler fire. Block 1 is now indicated as 3 sub-blocks (1a, 1b, 1c) for ease of communication in case it is more practical to burn these sections separately or on consecutive days.

The suggestion to fell some of the alien trees and thicket species to dry out their wood ahead of the prescribed burn and thus facilitate clean burning of Block 1 is supported. However, it is recommended that the proposed date for the burn should first be agreed with the authorities and Southern Cape FPA and then the felling done only a few weeks ahead of the burn. This suggestion is

to avoid the dry fuel lying too long and increasing the fire risk from a wild fire should it occur in the area.

2. **Seasons for prescribed burns: EMP Section 3.2.3 Prescribed Ecological Burns; Management Requirements bullet 5.**

In the Southern Cape, prescribed ecological burns may be conducted between the months of October and April while the vegetation is in a dry condition (optimally between January and March, to be ahead of the autumn rains). However, care should be taken to avoid burning during Berg wind conditions in the shoulder seasons, that may lead to runaway fires.

Figure 1. Updated map (from EMP Figure 1) indicating positions of purported forest patches (For 3, For 4) in Block 1. Block 1 is shown as three sections (1a, 1b, 1c) for ease of reference in prescribed burn plans.