

**Environmental Management Plan:
Penryn College**

Final Draft

May 2009



Penryn College

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PREAMBLE

This Management Plan for Penryn College is compiled along the lines of the National Environment Management: Protected Areas Act No. 57 of 2003 (NEM: PAA). There are no clear guidelines available to guide the compilation of an Environmental Management Plan for educational institutions. This plan is thus based on norms and standards considered acceptable for an institution such as Penryn College.

A guideline has recently been developed for the development of management plans in terms of Act 57 of 2003 (Cowan 2006)¹. This includes specific requirements that must be contained in a management plan.

Whilst some of these specific requirements may not be expressed under the same heading, they are addressed as follows in the draft plan for PENRYN COLLEGE:

Required according to the framework (Cowan 2006) (section 41(2) of the Act)	Headings and sections in the draft PENRYN COLLEGE plan
Biodiversity management plan	5. Environmental objectives 6. Biophysical description 9. Habitat and environmental Management 12. Monitoring and research at Penryn
Coordinated policy framework	4. SWOT analysis 5. Environmental objectives 7. Guiding principles
Planning measures, controls and performance criteria	9.7. Resource monitoring 10. Infrastructure development and management
Implementation plan and costing	13. Time table 11. Community outreach
Procedures for public participation	3. Stakeholder expectations
Community based natural resource management (where applicable)	<i>Generally not applicable in the case of PENRYN COLLEGE, however addressed in</i> 11. Community outreach
Zoning plan	8. Zonation plan
Invasive species control and eradication strategy	9. Habitat and environmental management

The challenges for all involved (including the scholars, staff, parents and service providers) are to:

- Adhere to the legal requirements (letter of the law);
- Achieve the legal intent (spirit of the law);
- Realise an affordable and practically feasible plan.

Where an institution such as Penryn is concerned a Management Plan must not be so onerous and expensive to compile and so costly to implement that it ends up as yet another unused document on a bookshelf. This plan must importantly be used to provide learning opportunities for scholars in different learning areas using the natural resources that abound at Penryn.

1. SUMMARY

1.1. BACKGROUND

This document presents the Management Plan for Penryn College that consist of the following property/ies located in the Mbombela Municipal Area:

- Property Name (portion of Boschrand – currently 26 ha but proposed increase to 36 ha);

The Penryn College Mission has five focus points viz. Community Service, Academic Excellence, Christian Principles, Universal Effectiveness and Environmental Endeavour. The purpose of this plan is to document the environmental vision and goals of Penryn College and to provide the management guidelines by which these goals are to be achieved.

In examining the ecological context of Penryn, it is useful to investigate the factors that have shaped the savannas that make up this system. We recognise the socio-political changes and associated evolution in land use practices that have culminated in those that currently characterise this area. We are presented with a continuum of different land use areas of varying ecological potential and with differing objectives, each requiring timorous and effective proactive management. The need for clearly articulated objectives embedded in a comprehensive and periodically but formally reviewed management plan is clear. The Penryn Environmental Management Plan should be reviewed on an ongoing basis but formally at least every five years

1.2. WHY A MANAGEMENT PLAN?

A Management Plan serves several important purposes including:

- It adds value to Penryn with clearly defined environmental objectives and approaches. This guarantees continuity;
- A well-articulated plan ensures that environmental regulations are adhered to and ensures effective management and sustainable development of the property. It also ensures recognition by the relevant environmental authorities;
- The Management Plan assists in the yearly planning management tasks and the budgeting thereof;
- Enhancing the education of scholars to enable them to live in a sustainable manner that is sensitive to the environment.

1.3. STAKEHOLDER EXPECTATIONS

Penryn has stakeholders who have a direct or indirect interest in its management and the consequences thereof. These stakeholders are both internal and external to Penryn.

It is important for us at Penryn to duly consider the different expectations of all stakeholders. It must however be realised that some of these expectations are in conflict with other expectations. It is also not possible to fully realise all expectations within the

available natural and financial resources and without endangering some of the core attributes of Penryn.

Both the stakeholder (in particular the scholars) and natural asset base of Penryn relies heavily on the continued presence and dedication of competent and reliable staff.

1.4. SWOT ANALYSIS OF PENRYN COLLEGE

The classic Strengths, Weaknesses, Opportunities and Threat analysis, with a focus on those aspects related to Penryn management, should be applied as it provides a useful tool to identify those aspects that need to be addressed through management.

From the SWOT analysis, the following vital attributes can be identified that are key to Penryn, its conservation, management and development:

- Diverse mixture of Lowveld and Highveld elements;
- Semi-arid climate with large, mostly unpredictable and certainly unavoidable, variations that have impacts on the environment and on management requirements;
- Ecological functioning at relatively small spatial scales;
- Diversity of opinions on environmental issues.

1.5. ENVIRONMENTAL OBJECTIVES OF PENRYN COLLEGE

Conservation objectives can be defined in different ways depending on the main emphasis placed on the area. Penryn was not originally formed with the main objective of conserving a tract of pristine country and its natural biodiversity. Rather, the objective has been one of providing a centre of excellence in education while maintaining a natural area for the enjoyment and benefit of its scholars and other stakeholders.

It is essential that this broad objective is understood and accepted, because this underpins management decisions that may differ from those that would normally be made in a protected area that has as its primary objective pure conservation.

- **Environmental Endeavour** is one of the five primary objectives of Penryn.

There are several secondary objectives focussing particularly but not exclusively on Environmental Endeavour:

- To manage the Penryn ecosystem, landscapes and species populations so that a meaningful contribution will be made towards their conservation;
- To cost-effectively restore and conserve the landscapes, ecosystems and biodiversity of Penryn in a productive and aesthetic state that will achieve the primary objectives within the climatic and geological constraints of the area;
- To make opportunities available that are compatible with the primary objective and involve the participation of members of the local community wherever appropriate;
- Where possible, to provide direct employment to local communities and businesses;

- To manage the property without compromising the ecological and aesthetic objectives;
- To enlarge Penryn's positive sphere of influence by collaborating with adjoining properties;
- In accomplishing these objectives, 'Best Practices' will be implemented in natural resource management, and in forming constructive and beneficial relationships with the neighbouring communities and conservation bodies;
- To ensure that Penryn reduces its environmental impact wherever possible by implementing environmentally sustainable practices in the day to day running of the school.

1.6. BIOPHYSICAL DESCRIPTION

The biophysical description is essential to set the scene for the required management actions. A balance needs to be struck in terms of the level of detail of the biophysical description. An exhaustive review would not be appropriate as one could get overwhelmed by the level of available detail. On the other hand, sufficient information is required to enable one to grasp the essential facets of Penryn and the underlying determinants of its variability and complexity. In that regard, the management plan functions as a repository for available information.

The different elements of climate, soils, vegetation and fauna are briefly described.

Land use surrounding Penryn remains largely agricultural but with a move to housing development, recreational facilities in the form of a golf driving range to the south and some distance to the north an area of light to heavy industry.

1.7. GUIDING PRINCIPLES FOR MANAGEMENT

Based on the SWOT analysis and the identification of the vital attributes of Penryn, a number of guiding principles are formulated for the environmental management of the property. The most important ones are as follows:

- Management will be aimed at realising well-defined environmental objectives;
- An adaptive, manipulative management approach will be applied to ecological issues;
- 'Thresholds of Potential Concern' (TPC's) will be defined for species, communities and systems as upper and lower level indicators for monitoring (i.e. at what point do we become concerned about a particular environmental parameter);
- Zonation will be used to ensure sensitive development and resource use at Penryn;
- Active management efforts will concentrate on disturbed and transformed areas;
- Untransformed areas will be approached with a 'touch the earth lightly' approach;
- Invasive alien plant species will not be tolerated and a continuous effort will be made to control their spread and presence;

- Untransformed plant communities will be disturbed as little as possible in order to prevent the establishment and spread of alien plants.

1.8. ZONATION PLAN

The zonation of Penryn is to adopt a strategy to ensure that developments and human use of the area occurs in a manner that is sensitive to the environment.

In the broader conservation context, the zonation of Penryn should preferably be synchronised with that of the adjoining properties. This allows on the one hand to maximise the benefits from adjoining low intensity zones. On the other hand it would minimise the negative impact of a development zone if the adjoining zone on the other property has a similar or higher level of development and disturbance associated with it.

While the maintenance of 'natural areas' on the Penryn campus is perfectly acceptable it must be balanced with the requirements of the College as an academic institution. It is by the pragmatic balance of creating the sense of 'nature' and at the same time managing for impact that Penryn's environmental objectives will be achieved. At the same time it must be accepted that peripheral development is unavoidable.

1.9 HABITAT AND ENVIRONMENTAL MANAGEMENT

Aspects that are dealt with include soils, vegetation and various management inputs.

The primary objectives for these aspects are:

- To minimise the rate of accelerated erosion;
- To conserve indigenous plant populations and a representative variety of habitats occurring in Penryn;
- To initiate developments without affecting adversely the hydrology and consequent ecology of the area.

It is recommended that preliminary environmental TPC's for Penryn are set on the basis of measurable criteria such as presence, abundance and rates of increase or decrease of ecological variables. Should a population move outside the numerical limits of the TPC, the situation must be investigated and remedial action taken where possible.

A first approximation of the ecological diversity on the Penryn campus would provide us with a baseline from which to proceed (A survey of say mammals, birds, amphibians, reptiles, invertebrates, trees, grasses and other vegetation elements could be undertaken in summer and winter – one of these surveys should coincide with the International Biodiversity Day).

1.10. INFRASTRUCTURE DEVELOPMENT AND MANAGEMENT

Management policies and procedures must ensure that Penryn's infrastructure is maintained, renovated, upgraded and replaced at the required intervals according to specific design norms and standards, including national construction regulations, green building and 'touch the earth lightly' principles. Water saving measures should be incorporated and waste production should be minimised.

The following aspects are detailed in the management plan:

- Fences;

- Roads;
- Gardens;
- Energy;
- Buildings;
- Communications;
- Waste Management;
- Gardens;
- Procurement.

1.11. COMMUNITY OUTREACH

Being a privately-owned estate, Penryn may have few legal obligations towards any neighbouring or nearby community. However, one cannot ignore the socio-economic setting in terms of its long term impact on the integrity of Penryn and the positive or negative relationship with its neighbours both immediate and further removed.

The policy of Penryn with regard to its neighbouring and nearby communities is to:

- Assist, through development and management of the school, in improving the quality of life of the disadvantaged communities living nearby;
- Preference will be given to indirect rather than direct interventions (facilitation and provision of opportunities rather than outright financial support or resource utilisation);
- Transfer of knowledge, skills and opportunities aimed at strengthening community development (Penreach).

1.12. MONITORING AND RESEARCH – SCHOLAR INVOLVEMENT AT PENRYN COLLEGE

Monitoring and research are required on Penryn to provide the guidelines and answers to manage the Penryn environment and its components. Such challenges provide excellent opportunities for scholars to gain a better understanding of the ecosystem and the interactions within it

The policy with regard to research is to:

- Encourage and facilitate appropriate ecological and socio-economic projects necessary for the effective management of Penryn;
- Ensure that all data and information gathered either from a formal research or monitoring programme, or that result from historical enquiry, are properly archived and stored in a form that is easily accessible for future use.

1.13. TIME TABLE

A broad timetable on the management actions is required for annual planning and budgeting purposes.

1.14. ACKNOWLEDGEMENTS

A substantial number of parents and staff were involved in the compilation of this 'living document'.

1.15. REFERENCES

The descriptions and ideas contained in the management plan are backed by a number of references that provide additional information on Penryn and its environmental context.

1.16 APPENDIX A

The focus of this document is to identify, prioritise and implement pupil projects relating to the Penryn Environmental Management Plan and across all learning areas.

2. WHY AN ENVIRONMENTAL MANAGEMENT PLAN FOR PENRYN COLLEGE?

Why an Environmental Management Plan for Penryn College?

The Penryn College Mission includes as one of its five focus points, Environmental Endeavour. The purpose of this plan is therefore to document the environmental vision and goals of Penryn and to provide the management guidelines by which these goals are to be achieved. Importantly, the plan is aimed at creating learning opportunities for scholars across learning areas. The objective of a management plan is to ensure the protection, conservation and management of the area concerned in a manner which is consistent with the objectives of the area and for the purpose it was declared.

The Management Plan should be welcomed for the following additional reasons:

- It adds value to Penryn providing clearly defined objectives and approaches. This guarantees continuity;
- A well-articulated plan ensures recognition by the relevant Nature Conservation and Environmental authorities. This is important when issues of effective management, development and sustainable utilisation arise;
- The Management Plan assists in the annual planning of environmental management tasks and the budgeting thereof;
- The plan serves as a repository of information documenting management actions (e.g. tree planting, bush clearing etc) which will aid in adapting future management actions to achieve the desired results;
- The Management Plan can serve as a repository of the current knowledge about the natural environment of the property;
- It adds value to Penryn and provides opportunities for its scholars to better understand the natural environment that comprises Penryn and surrounds;
- Enhancing the education of scholars to enable them to live in a sustainable manner that is sensitive to the environment.

The Management Plan should be reviewed on an ongoing basis but formally at least every five years.

3. STAKEHOLDER EXPECTATIONS

Penryn has many stakeholders, both internal and external, who have a direct or indirect interest in its management and the consequences thereof.

It is important for Penryn to duly consider the different expectations by the different stakeholders. It must however be realised that some of these expectations are in conflict with other expectations. It is also not possible to fully realise all expectations within the available natural and financial resources and without endangering some of the core attributes of Penryn.

3.1 GOVERNMENT – NATIONAL AND PROVINCIAL

The vision of the Government's Environmental Management Policy is one of a society in harmony with its environment. The policy seeks to unite the people of South Africa in working towards a society where all people have sufficient food, clean air and water, decent homes and green spaces in their neighbourhoods that will enable them to live in spiritual, cultural and physical harmony with their natural surroundings.

The Department of Environment Affairs & Tourism stresses the need of promoting the education and empowerment of South Africa's people. This is in order to increase their awareness of, and concern for, environmental issues, and assist in developing the knowledge, skills, values and commitment necessary to achieve sustainable development.

3.2 GOVERNMENT – LOCAL

The local government tier expects Penryn to fit its development and activities within its spatial development framework and to contribute to local economic growth and beneficiation of the local communities.

3.3 PENRYN FAMILY

The expectations of the 'Penryn Family' are generally expressed in the vision and objectives for Penryn. This can be summarised as follows:

- Scholars. Can expect a safe sustainable environment that enriches their education both academically and in terms of life skills needed to face living in world of limited and fragile environmental resources. Scholars can expect to be schooled within a physical environment that pragmatically and practically takes steps to address environmental concerns;
- Parents. Children to be educated in a holistic manner that will enable them to thrive and be effective in a world of limited and fragile environmental resources. To expose children to a range of environmentally sound practices.

3.4 NEIGHBOURS – PRIVATE LAND OWNERS AND LOCAL COMMUNITIES

The neighbouring local communities are expected to have the following main interests and concerns:

- Penryn to serve as a model on how to implement sustainable and environmentally sound practices within an educational environment.

3.5 THE GENERAL PUBLIC AND ENVIRONMENTAL GROUPS

- To see Penryn as a leader within the Lowveld and further afield not only on the educational front but from an environmental perspective as well.

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4. SWOT ANALYSIS

A Strengths, Weaknesses, Opportunities and Threat analysis, with a focus on those aspects related to Penryn's management, is useful in homing in on those aspects that need to be addressed through management.

4.1 STRENGTHS

The 'Strengths' of Penryn that are relevant to its management are as follows:

- Resources (parents, staff and knowledge) to create and implement a strong Environmental Management Plan;
- Scholars who are interested in environmental issues;
- Diverse environment (varied combination of geology, topography, soils and vegetation);
- Proximity to suppliers and service providers (renewables, recycling etc);
- Parents willing to actively support the process and give time to the projects;
- Autonomous in terms of decision making and management.

4.2 WEAKNESSES

The 'Weaknesses' of Penryn that are relevant to its management are as follows:

- Difference in opinion and vision between different stakeholders;
- Staff often very busy;
- Parents resistance to new knowledge/change;
- School unwilling to take on environmental sustainability;
- Lack of knowledge;
- Affluenza

4.3 OPPORTUNITIES

The 'Opportunities' of Penryn that are relevant to its management are as follows:

- Further expansion on its borders;
- Become a key role player in the greening of the area;
- Positive publicity for Penryn as green issues come to the fore;
- Penryn and its staff and scholars to be seen as leaders on the environmental front;
- Reduce carbon footprint;
- Reduce utility bills (water and electricity);
- Reduce cost of cleaning materials and reducing exposure to harmful chemicals;
- Expand educational experience for scholars
- Recycling to generate income;
- Reducing school waste;
- Producing own compost for school gardens (inc staff housing);
- Enhancing habitat for all species;
- Educate parents (multiplier effect);
- Penreach to positively impact on wider school community;
- Ensure new buildings/developments use best possible environmental practices;

- Improved physical health

4.4 THREATS

The 'Threats' of Penryn that are relevant to its management are as follows:

- Increase in development pressure from neighbouring properties and communal land (housing, other development activities);
- Parent/teacher fatigue/limited time;
- FAD committee;
- Ground Staff reluctance to act on green issues;
- Admin staff reluctance to to act on green issues;
- Scholar ego's;
- Costs of green technology;
- Changing set behaviours in terms of waste, electricity and water usage

4.5 VITAL ATTRIBUTES

From the SWOT analysis a limited number of vital attributes can be identified as key to Penryn, its conservation, its management and its development.

These vital attributes are as follows:

- Diverse mixture of Lowveld and Highveld elements;
- Diversity of opinions and skills on environmental issues

5. ENVIRONMENTAL OBJECTIVES OF PENRYN COLLEGE

Environmental objectives can be defined in different ways depending on the main emphasis placed on the area. Penryn was not originally formed with the main objective of conserving a tract of pristine country and its natural biodiversity. Rather, the objective has been one of providing a centre of excellence in education while maintaining a natural area for the enjoyment and benefit of its scholars and other stakeholders.

The setting of vision, missions and objectives are generally used to guide management. They move from broad-level to detailed statements.

It is essential that this broad aim objective is understood and accepted, because this underpins management decisions that may differ from those that would normally be made in a protected area that has the conservation of biodiversity as its primary objective.

- **Environmental Endeavour** is one of the five primary objectives of Penryn.

There are several secondary objectives:

- To manage the Penryn ecosystem, landscapes and species populations so that a meaningful contribution will be made towards their conservation;
- To cost-effectively restore and conserve the landscapes, ecosystems and biodiversity of Penryn in a productive and aesthetic state that will achieve the primary objectives within the climatic and geological constraints of the area;
- To make opportunities available that are compatible with the primary objective and involve the participation of members of the local community wherever appropriate;
- Where possible, to provide direct employment to local communities and businesses;
- To manage the property without compromising the ecological and aesthetic objectives; and
- To enlarge Penryn's positive sphere of influence by collaborating with adjoining properties;
- In accomplishing these objectives, 'Best Practices' will be implemented in natural resource management, and in forming constructive and beneficial relationships with the neighbouring communities and conservation bodies;
- To ensure that Penryn reduces its environmental impact wherever possible by implementing environmentally sustainable practices in the day to day running of the school.

6. BIOPHYSICAL DESCRIPTION

The biophysical description is essential to set the scene for conservation activities. An exhaustive biophysical review would not be appropriate as one could get overwhelmed by the available detail.

6.1 LOCALITY AND SIZE OF PENRYN

The Penryn Campus is located at 30°55'E 25°25'S to the NE of the confluence of the Crocodile River and Nelspruit. Penryn is located on a portion of the farm Boschrand and covers an area of some 26 ha (with the potential to expand to 38 ha).

6.2 TOPOGRAPHY

The Penryn campus is situated on an elevated plateau north of the Crocodile River valley at an elevation of around 950 metres above sea level. The topography slopes gently from north-east to south-west.

6.3. HYDROLOGY

There are no permanent streams on the campus. Rainfall drains in a SW direction with seep lines evident along and at granite faults. Small seasonal wetlands occur at the base of some seeps.

6.4 GEOLOGY

The Penryn Campus is underlain by the Nelspruit Suite consisting largely of ancient granites, exposed as domes in places.

6.5 SOILS

Most of the area is underlain by gneiss and migmatite of the Nelspruit suite (Mucina & Rutherford 2006). Both sandy and clay soils are present, and a large quantity of topsoil has been deposited for the extensive sports fields.

6.6 CLIMATE

6.6.1 Rainfall

Rainfall, in that it influences soil moisture and nutrient availability to plants, is a major factor in determining variation in the structure and composition of savannas. Rain is a principal determinant influencing vegetation in that it determines the amount of soil moisture available to the plant.

Penryn has a sub-tropical climate with hot wet summers and cool dry winters. The average rainfall is about 740mm per annum, with 80% of this falling between October and March.

6.6.2 Temperature

Penryn has hot summers and mild to cold winters. The mean maximum for July is about 24°C and the mean minimum in this mid-winter month is about 6.5°C. The mean maximum for January is about 30°C and the mean minimum in this mid-summer month is about 18.5°C.

6.7 ENVIRONMENTAL MONITORING/RESEARCH AT PENRYN

Environmental learning (monitoring and research) should be focussed on and across the main learning areas within the curriculum. Monitoring should be aimed at detecting trends that conflict with the environmental objectives of the school. Once a trend has been identified it may result in the initiation of a more in-depth research programme. In this way we learn more about the way the system is structured and how it functions.

6.8 VEGETATION

The study area is situated entirely in the Savanna Biome. Acocks (1988) classifies Penryn as having elements of both Lowveld (north) and Lowveld Sour Bushveld (south), while Low & Rebelo (1996) classify the area as Sour Lowveld Bushveld. According to the latest South African classification (Mucina & Rutherford 2006) Penryn is classified as dominated by Legogote Sour Bushveld but potentially having elements of Pretoriuskop Sour Bushveld and Malelane Mountain Bushveld (confirmation of these vegetation units would make an excellent scholar project).

6.8.1 Vegetation patterns in Penryn at the landscape scale

The plant communities and landscapes represented in the study area include:

- OPEN WOODLAND dominated by Paperbark Thorn (*Acacia sieberiana*) with Marula (*Sclerocarya birrea*), Mobolo Plum (*Parinari curatellifolia*) and Kiaat (*Pterocarpus angolensis*) among other characteristic trees. Grasses include *Themeda triandra*, *Hyperthelia disoluta*, *Setaria* spp and *Cymbopogon* spp.;
- CLOSED WOODLAND occurs on slopes with short, closely-spaced trees such as Velvet Bushwillow (*Combretum molle*), Weeping Bushwillow (*Combretum collinum*), Broad-leaved Beechwood (*Faurea rochetiana*), Willow Beechwood (*Faurea saligna*), Lowveld Chestnut (*Sterculia murex*) and Lavender Tree (*Heteropyxis natalensis*);
- DENSE THICKETS occur along drainage lines and at the base of rocky areas, with scrambling shrubs such as Flame Thorn (*Acacia ataxacantha*), Pride-of-De Kaap (*Bauhinia galpinii*) and Thorny Rope (*Dalbergia armata*) being typical. Invasive alien plants such as Lantana (*Lantana camara*) and Guava (*Psidium guajava*) form similarly-structured thickets and may out-compete indigenous species;
- EXPOSED GRANITE ROCKS support specialised plant species which thrive in the shallow soils and fire- safe environment. Mountain Fig (*Ficus glumosa*), Red-leaved Fig (*Ficus ingens*), Large-leaved Coral Tree (*Erythrina latissima*) and Candelabra Tree (*Euphorbia cooperi*) are among the larger trees, with Lebombo Aloe (*Aloe spicata*), Rock Aloe (*Aloe petricola*) and Kudu Lily (*Pachypodium saundersii*) flourishing in rock crevices;
- 'CAMPUS WOODLAND' is the natural open woodland habitat that has been cleared to construct classrooms and other school buildings. This differs from Open Woodland in that the understory of grasses and shrubs has been replaced with lawns and paving. A variety of southern African tree species have been planted alongside the locally native trees. Flowerbeds and hedges consist exclusively of

indigenous plant species such as *Tecoma*, *Carissa*, *Plumbago* and *Agapanthus*;
and

- SPORTS FIELDS are completely open areas with closely cropped lawn of L.M.Grass (*Dactyloctenium australe*) which is indigenous to the South African Lowveld.

At Penryn there are currently ongoing surveys on the diversity of: indigenous woody plants (trees and shrubs); indigenous soft-stemmed (herbaceous) plants; and other cultivated plants. These lists will be included in the potential scholar projects document.

6.8.2 The current state of the vegetation component

As stated, an ecological monitoring programme is aimed at furthering understanding of savanna functioning and the potential to set up a 'state of the environment' at Penryn while providing learning opportunities for our scholars:

The following is measured during the vegetation part of an ecological monitoring programme:

- **Survey site selection**
- The herbaceous layer
- Herbaceous Standing Crop
- The woody layer

6.8.3 Trends in the vegetation component

Trends will become apparent once the ecological monitoring programme is initiated.

6.9 FAUNA

6.9.1 Diversity and numbers

Historically, Penryn is expected to have carried a full complement of the megafauna traditionally associated with savanna ecosystems.

At Penryn there are currently ongoing surveys on the diversity of: mammals; birds; reptiles; amphibians; and invertebrates. These lists will be included in the potential scholar projects document.

7. GUIDING PRINCIPLES FOR MANAGEMENT

The following guiding principles will be used for the environmental management of Penryn:

- Management will be aimed at realising well-defined environmental objectives;
- An adaptive, manipulative management approach will be applied to ecological issues;
- 'Thresholds of Potential Concern' (TPC's) will be defined for species, communities and systems as upper and lower level indicators for monitoring;
- Zonation will be used to ensure sensitive development at Penryn;
- Active management efforts will concentrate on disturbed and transformed areas;
- Management of untransformed areas will mostly rely on a responsible approach to management;
- Invasive alien plant species will not be tolerated and a continuous effort will be made to control their spread and presence; and
- Untransformed plant communities will be disturbed as little as possible in order to prevent the establishment and spread of alien plants.

All of the above principles present Penryn scholars with learning opportunities.

8. ZONATION PLAN

8.1. ZONATION IN GENERAL

The zoning of an area is not a visible element in the landscape (although it is generally guided by landscape characteristics), but only exists in the manager's or planner's mind. It is a tool that assists in dealing with the effects of land use decisions on the ecological and social environment and allows for the realization of potential use whilst at the same time providing protection of sensitive resources and elements.

In spite of differences in the various existing systems of zonation, they all developed around a common interest, i.e. to provide a framework within which the essential qualities and intrinsic values of an area can be protected and perpetuated, and for any development to take place within specified limits.

8.2. ZONATION AT PENRYN COLLEGE

The zonation of Penryn is to adopt a strategy to ensure that development and human use of the area occurs in such a way that these impact as little as possible on the natural environment ('touch the earth lightly principle').

In the broader conservation context, the zonation of Penryn should preferably be synchronised with that of the adjoining properties. This allows on the one hand maximise the benefits from adjoining different intensity use zones. Penryn has a relatively high density of roads and infrastructure, and would be zoned as a high intensity use zone. Although there is a relatively high degree of development at Penryn there is still room for biodiversity conservation if developments and activities adhere to best practices.

The desire for a natural environment is a perfectly acceptable value judgment. It must however be balanced with practicalities of the situation in which we find ourselves. It is by the pragmatic balance of creating the sense of 'natural environment' and at the same time managing for biodiversity and a learning environment that Penryn's objectives will be achieved.

8.3. APPLICATION OF ZONATION AT PENRYN COLLEGE

The zonation criteria may be as follows:

'High Intensity' – A substantially modified natural environment. Sights and sounds of man are readily evident and concentration of users is often moderate to high.– most of the property;

'Low intensity' zone – Limited sensitive basic infrastructure for accessibility and enjoyment of the area;

'Quiet' zone – Can provide a sense of solitude of a smaller scale and relative sense of solitude can be experienced.

Translating this zonation scheme into a map format will require a comprehensive mapping of all existing infrastructure. Special or sensitive areas need to be delineated based on objective criteria. This again presents opportunities for learning.

8.4. IMPLICATION OF THE PENRYN COLLEGE ZONATION

The zonation scheme only serves as a broad guideline for the planning and management of Penryn. Regardless of the zonation adopted, due process still needs to be followed for development.

The setting up of infrastructure and its impact on the habitat plays a very important ecological role in the wider landscape in terms of its 'natural' areas and in interrupting functional linkage zones or corridors for wildlife.

This requires fine-scale planning that probably goes beyond the scale of planning possible within the broad Management Plan.

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9. HABITAT AND ENVIRONMENTAL MANAGEMENT

Penryn is located in a savanna ecosystem which has gently to sloping upper pediment slopes with dense woodland and includes medium to large shrubs (Mucina & Rutherford 2006). Short thicket areas occur where it is less rocky and the exposed granite domes have low vegetation cover. The following provides excellent opportunities for scholar involvement and the project document will be closely linked to this section.

9.1 Soils

An integrated land management plan should be aimed at conserving soil moisture by minimising rainfall runoff into drainage lines and maximising rainfall penetration into the soil. Erosion potential is low to moderate.

The primary soils objective is to minimise the rate of accelerated erosion through the following approach:

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
<p>Erosion reclamation</p> <p>Responsible persons: Groundsman; ground staff; scholars</p>	<p>To identify and control (if practicable), or at least minimise, accelerated erosion;</p> <p>To identify and attend to erosion which is threatening unique, valuable or sensitive features</p>	<p>Identify and map gully erosion;</p> <p>Identify and map extensive sheet eroded areas and erosion (map);</p> <p>Draw up a priority programme for erosion reclamation as part of the integrated habitat rehabilitation programme. (based on the map)</p> <ul style="list-style-type: none"> • Stabilise headward gully erosion into bottomlands; • Reduce water run-off and increase infiltration on sodic patches and sheet eroded areas; • Attend to soil erosion caused by misplaced roads and tracks
<p>Roads and tracks - (includes erosion from roads and tracks and communication links)</p> <p>Responsible persons: Groundsman; ground staff; scholars</p>	<p>To identify areas of active erosion resulting from the road and track network and (if practicable) to prevent, or at least minimise, such erosion by the correct alignment, drainage and (if necessary), closure and reclamation of roads and tracks.</p> <p>To maintain all roads and tracks in a state which minimises their impact on surrounding hydrology, soil erosion, and biologically sensitive areas;</p> <p>To provide an all weather, low impact road system that allows for</p>	<p>Do a systematic assessment of roads and tracks;</p> <p>Map areas of active erosion and recommend appropriate measures to minimise erosion;</p> <p>Prioritise roads and tracks for erosion reclamation measures;</p> <p>Reroute roads and tracks which are placed on sodic areas, other erodible</p>

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
	effective property management	soils and on active seeplines (if practicable)
Quarrying Responsible persons: Groundsman; ground staff;	Utilise quarry material for the surfacing of key road and tracks with the minimum of disturbance to the environment and to the aesthetics of Penryn	Identify sources of quarry outside of Penryn which can be exploited; Employ contractors to bring in suitable quarry material for the key roads and tracks; Where applicable, investigate the use of the surplus gravel from the pits dug to dispose of rubble, litter and refuse; If no other alternative can be found, then identify suitable quarry site/s within Penryn ; Assess the quality of available quarry material

9.2 Vegetation

The biotic state variable of interest in this section is the vegetation comprising the woody and herbaceous layers as influenced by soil physical and chemical properties including soil moisture (rainfall is an indirect measure of soil moisture).

The primary vegetation objective is to conserve indigenous plant populations and a representative variety of habitats occurring in Penryn using the following approach:

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
Vegetation monitoring (including habitat description) Responsible persons: Staff and scholars	To facilitate an understanding of the dynamics of specific plant species and the vegetation as a whole in particular in its relation to biotic and abiotic drivers; To quantify the status and relative trend of rare and endangered plant species at Penryn; To detect changes in the vegetation which conflict with the Penryn environmental objectives	Monitor the effect of management and environment on vegetation composition and structure; Monitor the extent and effect of the habitat rehabilitation programme
Fire management – Including firebreaks To control the use of fire so that it can fulfil its role as a management tool and maintaining grass layer vigour and promoting diversity (if	To remove excessive litter and old growth in order to maintain a diverse and vigorous herbaceous sward; To retard woody plant growth (achieve a good topkill of encroaching woody plant species); To retard or reduce the risk of detrimental wild and/or arson fires	Monitor fuel loads, proportion of moribund grass during a pre-burn survey for late season fires (July to September); Implement a control burning programme; Monitor the effect of control burns during a post-burn

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
<p>practicable);</p> <p>To achieve the above within the constraints of legal provisions regarding the use of fire and the requirement of ensuring the safety of people, infrastructure and property.</p> <p>Responsible persons: Groundsman; ground staff; staff and scholars</p>		<p>Record and map burns annually;</p> <p>Synthesise all information on past burning</p> <p>Clear peripheral fire breaks as a high priority;</p> <p>Training - ensure that staff receive adequate training with particular focus on personal safety;</p> <p>Emergency plan: - an emergency plan will be compiled by the reserve manager to handle any unplanned fire (including firstly the decision making process as to whether control or <i>laissez faire</i> is appropriate),</p>
<p>Control of indigenous problem species</p> <p>Responsible persons: Groundsman; ground staff; staff and scholars</p>	<p>To reverse bush encroachment on areas which were previously open woodlands;</p> <p>Target those woody plant species and age classes actually responsible for man- induced encroachment (structural considerations)</p>	<p>Monitor vegetation condition and trends in the areas where bush thinning is done and review the success of previous coppice control;</p> <p>Record: Location and GPS reference; Species and approximate number or area of plants; Treatment details (including chemical application information); Costs (transport, man hours, chemicals etc); Dates and weather (NB. It is important to note rainfall details as this can impact on the efficacy of chemical applications);</p> <p>Follow-up observations and treatments.</p> <p>Continue with the integrated habitat management programme;</p>
<p>Control of alien species</p> <p>Responsible persons: Groundsman; ground staff; staff and scholars</p>	<p>To control, and eradicate if practicable, plants which are alien to the reserve, particularly those which threaten the indigenous the vegetation;</p> <p>To control the future introduction and spread of invasive alien species;</p>	<p>Phase out alien trees in gardens and replace with indigenous trees. The only exception will be lawn grasses;</p> <p>Record: Map location and extent of existing alien plant infestation (prioritise species which invade rapidly and have a wide distribution)</p> <p>Follow-up observations and treatments;</p> <p>Prioritise species and implement control programme;</p> <p>Monitor results</p>
<p>Consumptive utilisation</p> <p>Responsible persons:</p>	<p>To encourage human use of indigenous vegetation while keeping it to a level which has no appreciable effect on the population dynamics of the species involved</p>	<p>Do ethno-botanical assessment of key species, their conservation status and the extent to which they can be harvested sustainably;</p>

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
Groundsman; ground staff; staff and scholars	and the dynamics of associated species	Based on above make available indigenous medicinal plants/other plant products (e.g. thatching grass) that can be utilised on a sustainable basis

9.3 Water

Penryn has no permanent perennial water source. The primary water objective is to maintain the hydrology and resultant ecology of Penryn.

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
Rainfall Responsible persons: Staff and scholars	To monitor the effect of rainfall on the vegetation and hydrology of Penryn Rain water collection	Collect rainfall data on a regular basis (at least monthly); Summarise and use for interpretation of savanna system functioning on an annual basis Collect rain water for school use

9.4. Wildlife

The guiding principles for wildlife management at Penryn:

- The management of wildlife populations at Penryn will be to conserve, where possible, populations of those animal species that are indigenous to the Lowveld
- Thresholds of Potential Concern (TPCs) will be established, on a general level for all species and a species specific level;

9.5 IMPLEMENTATION

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
Population monitoring Responsible persons: Staff and scholars	To quantify on an annual basis the absolute or relative trends of selected species; To quantify other population parameters (such as sex and age structure) which will help in understanding the population dynamics of key species	Undertake counts on an annual basis; Present report on numbers and species mix proportions; Monitor sex and age structures; Monitor behaviour
Damage causing animals Responsible persons: Groundsman and ground staff	Take appropriate action for the control of damage causing species	Identify species which in relation to habitat and/or other animal species, can be considered to be problem The policy for damage causing animals will be as follows: "...problem animals must be removed as humanely and swiftly as possible"
Priority species Responsible persons: Staff and scholars	To identify those animal species which are rare or endangered in South Africa and which are in need of special protection or conservation measures within the reserves	

9.6. SETTING THE THRESHOLDS OF POTENTIAL CONCERN (TPCS)

The importance of setting the limits of acceptable change has been emphasised by alarming trends in many Lowveld areas of increases or declines in species. There must be pre-agreed TPCs or 'amber lights' that will trigger management actions to remedy the situation (really good learning opportunity). Should a population move outside the numerical limits of the TPC, the situation must be investigated and remedial action taken where necessary.

9.7. RESOURCE MONITORING

9.7.1. Purpose of monitoring

The ongoing monitoring of biotic variables and performance is essential to be able to determine whether a population is doing well or not and if not, whether it is likely to reach a TPC. The intensity of monitoring of species will be related to their ecological importance.

The importance of the vegetation-monitoring is apparent, as any change in the vegetation and interaction with climatic conditions will influence the animal component and visa versa.

9.8. REINTRODUCTIONS

The following policy for reintroduction of animals onto PC should be considered:

- That only species known to have formerly occurred in the area will be introduced and only if suitable habitat still exists to support a viable population;
- That each introduction will be thoroughly planned and particular emphasis will be placed on the monitoring and management of the reintroduction; and
- That all relevant veterinary and legal protocols are observed.

9.9. DOMESTIC ANIMALS

An audit of domestic animals is required. Dogs must be kept under control must have valid inoculations for rabies (now considered endemic in Nelspruit and White River), distemper, parvo-virus and any other potentially harmful/transmittable disease.

Because of the threat of hybridisation with any African Wildcats that may occur, and the risk of transmission of diseases, domestic cats should be neutered and vaccinated for rabies and cat flu. All domestic animals should be sterilized in order to combat an increasing population of stray dogs and cats.

10. INFRASTRUCTURE DEVELOPMENT AND MANAGEMENT

Management policies and procedures must ensure that Penryn's infrastructure is maintained, renovated, upgraded and replaced at the required intervals according to specific design norms and standards, including national construction regulations, green building and touch the earth lightly principles. Water saving measures must be incorporated and waste products minimised. It is recommended that an integrated Development Plan be drafted. This plan should address the position of Penryn in the context of the Lowveld and should recommend an appropriate strategic direction for the future of Penryn's development taking into account geographical position, situation and anticipated future environmental sensitivities, current developments and stakeholders expectations and rights.

10.1. FENCES

A 'hard' edge between Penryn and surrounding communities is required.

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
<p>Adequate perimeter fence</p> <p>Responsible persons: Groundsman; ground staff</p>	<p>Ensure that an adequate perimeter fence is maintained around Penryn</p> <p>Clearly delimit Penryn as a private property, preventing illegal access and regulating legal access</p>	<p>Ensure that the fence line is kept clear to prevent fire damage as well as to ensure that the electrical wires are not shorted and remain effective;</p> <p>Mechanical (if practicable) and chemical methods can be used to keep the fence line clear;</p> <p>Patrolling – regular full circuit to check for any breaches;</p> <p>Daily check-up on voltage (if electrified);</p> <p>Minor repairs to be done immediately;</p> <p>Major breaches to be sealed immediately and permanent repairs to be done as soon as possible;</p> <p>Rescue any wildlife that may become stuck under the bottom electrical wire (if electrified).</p>

10.2. ROADS

See also 9.1 'Roads and Tracks'

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
<p>Adequate road system</p> <p>Responsible persons: Groundsman; ground staff</p>	<p>Maintain all roads and tracks in a condition necessary for the optimal fulfilment of their respective functions;</p> <p>Maintain all roads and tracks in a state which minimises their impact on surrounding hydrology, soils and biota;</p> <p>Plan any new roads and tracks with due consideration to their functional requirements, erosion danger and required maintenance levels;</p> <p>Regulate access and traffic in terms of vehicle types and numbers in order to minimise erosion and maintain road standards; and</p> <p>Adherence to the law in terms of Environmental Impact Assessment (EIA) relating to road construction</p>	<p>Regular assessment of the existing road network and formulation of maintenance program with priority ranking and costing (manpower/machinery/budget);</p> <p>Implementation of maintenance program;</p> <p>No new roads and tracks should be developed without approval by Council based on a detailed proposal by management with details on:</p> <ul style="list-style-type: none"> • Purpose of new road; • Soils and plant communities that will be traversed; • Maintenance requirements; • Source of gravel. <p>The road alignment should avoid areas with potential erosion hazard or that could accelerate the drainage from seep lines; Realignment of the existing road and any internal tracks will be made for those parts that would require extensive inputs to bring the infrastructure to a maintainable standard;</p> <p>The road must be provided with appropriate camber and adequate drainage systems including mitre drains with bolsters to shed water;</p> <p>Gravel for road maintenance and construction need to be sourced sensitively;</p> <p>New gravel pits will only be developed based on the outcome of a proper process (assessment, proposal, submission and authorisation);</p> <p>Report back on progress, problems and results to Council and down to LEAF</p>

10.3. ENERGY

Over 90% of South Africa's electricity is supplied by coal fired plants in Mpumalanga. This form of electricity generation is considered one of the least environmentally friendly available. Further disturbing statistics show that worldwide average CO₂ emissions per person is 4 tons, for Africa is 2.5 tons and for South Africa 10 tons. At Penryn we need to ensure that our emission levels are closely monitored and reduced.

The provision of energy is vital for the smooth functioning of Penryn, for the living comfort of staff and scholars. Although much progress is being made with alternative sources of energy (such as solar power), ESKOM remains the most effective supplier.

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
<p>Effective responsible energy use</p> <p>Responsible persons: Everyone at Penryn</p>	<p>The provision of power must be done in an environmentally sensitive manner;</p> <p>Alternative sources of energy and energy-saving designs should be considered.</p>	<p>Penryn should try and minimize light pollution;</p> <p>Wherever possible, energy saving options should be incorporated into design and management of all new buildings including:</p> <ul style="list-style-type: none"> • Efficient air flow through buildings; • Low watt compact fluorescent bulbs; • Solar water heaters/solar cooling • Solar panels • Gas

10.4. BUILDINGS

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
<p>Effective planning and building</p> <p>Responsible persons: Groundsman; ground staff; contractors</p>	<p>Buildings must blend in with the local landscape.</p>	<p>Regular maintenance is key to the upkeep of buildings;</p> <p>buildings should be set against a natural backdrop;</p> <p>Exterior colours should be natural and earthy to blend with the site;</p> <p>Buildings must not be higher than the surrounding tree-line;</p> <p>New infrastructure must not be located where it may have a potentially negative effect on important existing infrastructure;</p>

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
	<p>Light and sound pollution must be minimized in the location, design, structure and management of all buildings and infrastructure;</p> <p>Emphasis must be placed on water and energy saving devices and processes (including procurement).</p>	<p>The structures must be planned around large trees and must minimize the need for the removal of trees;</p> <p>Any new buildings for staff accommodation should be along norms and standards;</p> <p>Wherever possible, energy saving options should be incorporated into design and management of all new buildings including:</p> <ul style="list-style-type: none"> • Efficient air flow through buildings; • Low watt compact fluorescent bulbs; • Solar water heaters/solar cooling • Solar panels • Gas

10.5. COMMUNICATIONS

The maintenance of reliable internal communications within Penryn is a priority both for maintaining security in the area and for assisting in emergencies that may arise with scholars, staff or visitors. A reliable external communication network is important.

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
<p>Reliable internal and external communication system</p> <p>Responsible persons: School management</p>	<p>Ensure adequate external communication channels (land line and cellphone) to those who require these services</p>	<p>Internal communication network:</p> <p>External communication network</p> <p>No new overhead land lines except if very peripheral and not without due EIA process;</p> <p>No new cellphone repeater towers without due EIA process.</p>

10.6. WASTE MANAGEMENT

Production of solid waste should be minimized and recycling maximized. Waste must be split at source, rather than having to be sorted later. To this end an effective recycling site was initiated during 2008. When one considers that for every metric ton of paper recycled 17 trees are saved with a resultant energy saving of 40% energy and 50% water (paper Recycling Association of South Africa). Glass is 100% recyclable and by recycling 1 ton of glass represents a saving of 1.2 tons of raw materials (The Glass Recycling Company). Cans are also 100% recyclable and when melted down are used to make new steel. This reduces the need to mine iron ore. 36 000 tons of high-grade steel is recovered for re-

smelting each year (Collect-a-can). At Penryn an encouraging start has been made with recyclable materials divided into paper, glass, plastics and tins.

A certain volume of waste is generated and this may further increase over time as the school expands.

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
<p>Effective responsible energy use</p> <p>Responsible persons: All at Penryn</p>	<p>To minimise all forms of pollution and the effects thereof.</p>	<p>Rubbish bins must be emptied regularly and surrounding areas kept tidy;</p> <p>If practicable all non-recyclable solid and chemical waste should be removed from the campus to an authorized landfill;</p> <p>A proactive attitude towards waste management will be promoted amongst scholars, staff, parents and visitors;</p> <p>Waste derived from catering facilities can possibly be recycled for e.g. the worm farm;</p> <p>Grey water should be kept separate from sewerage and recycled where possible;</p> <p>Sewage disposal systems must be located at the legally and environmentally required distance from streams;</p> <p>The use of french drains and septic tanks will only be allowed for smaller systems where reed beds or other waste systems are not feasible;</p> <p>Contractors will dispose of all waste and litter and will clean up building sites to the satisfaction of the groundsman. Waste must be properly disposed of.</p>

10.7. GARDENS

The primary objective is to encourage the planting of indigenous plant species associated with the variety of habitats occurring at Penryn.

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
<p>Gardening with</p>	<p>To promote the planting of</p>	<p>Only plants indigenous to the area</p>

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
indigenous plant species at Penryn Responsible persons: All at Penryn	<p>indigenous plant species associated with the various habitats represented at Penryn</p> <p>To control, and eradicate if practicable, plants which are alien to the reserve, particularly those which threaten the indigenous the vegetation;</p> <p>To control the future introduction and spread of invasive alien species;</p> <p>Compost site – to stimulate biological activities of fungi and bacteria to decompose organic material.</p>	<p>should be permitted in the Penryn grounds including accommodation facilities. The only exception will be lawn grasses;</p> <p>Phase out alien trees in gardens and replace with indigenous trees;</p> <p>Record: Map location and extent of existing alien plant infestation (prioritise species which invade rapidly and have a wide distribution); Location and GPS reference; Species and approximate number or area of plants; Treatment details (including chemical application information); Costs; Dates and weather (NB. It is important to note rainfall details as this can impact on the efficacy of chemical applications);</p> <p>Follow-up observations and treatments;</p> <p>Prioritise species and implement control programme;</p> <p>Monitor results;</p> <p>Ensure sufficient: moisture on site, adequate aeration, nutrient supply in the form of plant material and monitor temperature.</p>

10.8. PROCUREMENT

Penryn College, through its strong commitment to environmental protection, is attempting to develop working practices and policies that give primary consideration to environmental concerns. Included in this important objective are matters related to the type of products purchased.

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
To utilize to the fullest extent possible environmentally friendly products Responsible persons: All at Penryn	<p>To introduce environmental factors into the procurement procedure;</p> <p>To communicate a green purchasing policy to a wide range of stakeholders, including present and future suppliers,</p>	<p>Source products and services that where practicable offer 'greener' alternatives that are: easily obtainable, durable, not more expensive, non- or minimally toxic, recyclable, biodegradable and energy efficient;</p>

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
	<p>service providers or contractors;</p> <p>Raise the profile of our 'green policy' among all stakeholders at Penryn</p>	<p>Ensure contract specifications encourage service providers to supply environmentally friendly products;</p> <p>Use total life-cycle costing to promote environmental considerations (i.e. saving costs and the environment);</p> <p>Staff making purchases should be given legal, financial and environmental knowledge they require to make sound decisions when introducing environmental factors into the procurement procedure;</p>

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11. COMMUNITY OUTREACH

11.1. RATIONALE

The Penreach Whole Schools Development Programme was established to serve as a beacon of hope that could become a catalyst for improving the quality of education throughout the area. The goal of Penreach is to upgrade the skill levels of educators. The programme is the largest school based outreach programme in Africa (from www.penreach.org.za). Further as a member of the greater Nelspruit/White River community Penryn has an important role to play in environmental issues. The above must all take place within the constraints of available funding and staff resources.

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
<p>Community outreach</p> <p>Responsible persons: Staff</p>	<p>Improve the quality of life of the disadvantaged communities living nearby;</p> <p>Preference will be given to indirect rather than direct interventions (facilitation and provision of opportunities rather than outright financial support);</p> <p>Transfer of knowledge, skills and opportunities towards strengthening development will be favoured.</p>	<p>Employment opportunities to people living nearby;</p> <p>A database of locally available skills will be compiled;</p> <p>Purchases of goods will as far as possible (within the constraints of price, quality and reliable supply) be sourced locally;</p> <p>Services particularly those that are labour intensive will as far as possible be sourced locally;</p> <p>Supporting and assisting any conservation actions on land bordering Penryn.</p> <p>Skills transfer - Penreach;</p> <p>Leveraging donor or government intervention in terms of community conservation or environmental education.</p>

12. MONITORING AND RESEARCH – SCHOLAR INVOLVEMENT AT PENRYN COLLEGE

12.1. RATIONALE

Monitoring and research opportunities for scholars on a campus such as Penryn are abundant. The chance to learn about the biotic and abiotic components that make up the Lowveld ecosystem and the interactions within it provide an exciting challenge in many learning areas to staff, scholars and parents.

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
<p>Monitoring and research at Penryn</p> <p>Responsible persons: Staff and scholars</p>	<p>To encourage and facilitate appropriate ecological and socio-economic research and monitoring by scholars as a tool for learning and as a contribution to conserving the natural resources of the Lowveld;</p> <p>To ensure that all data and information gathered by scholars involved in the monitoring/research programme are properly archived and stored in a form that is easily accessible for future use.</p> <p>Encourage scholars to publish the results of their work.</p>	<p>All monitoring/research must be done within a curriculum learning area;</p> <p>Scholars should be encouraged to publish popular and scientific articles;</p> <p>Penryn, with input from role players (e.g. the South African Environmental Observation Network (SAEON), teachers, parents, scholars) will identify critical issues and formulate relevant projects for scholars (Project document <i>in prep.</i>);</p> <p>Scholars should provide digital/written progress reports and copies of their final report to the Penryn council/LEAF to be lodged in the library;</p> <p>A centralized database will be designed and maintained for the storage and filing of data. It will be maintained to the following standards:</p> <ul style="list-style-type: none"> • Both hard copy and electronic copies will be kept; • The database must be accessible to internal and external stakeholders; • The data will be stored and presented in formats that are easily interpreted and appreciated by all stakeholders; • The collection of data is

OVERALL OBJECTIVE	SPECIFIC OBJECTIVE	ACTIONS
		promptly stored and filed in the centralized data system (ideally immediately after collection).

The link established between Penryn and the Southern African Environmental Observation Network (SAEON) which is linked to the SANParks (Kruger National Park database) must be strengthened. The opportunities offered in terms of research and monitoring guidance for Penryn scholars by these organisations as well as for data collation and storage will prove invaluable.

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13. TIMETABLE

A broad timetable on the actions is required for annual planning and budgeting purposes. It is recommended that a formal system with required outputs be designed to assist the staff in the annual planning and budgeting. Each project proposed in the 'Penryn College – Environmental Management Plan – Projects' document titled 'POTENTIAL PROJECTS RELATING TO PENRYN COLLEGE ENVIRONMENTAL MANAGEMENT PLAN' will have a timetable linked to it.

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14. ACKNOWLEDGEMENTS

What should we put here – list of contributors?

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APPENDIX A:

POTENTIAL PROJECTS RELATING TO PENRYN COLLEGE ENVIRONMENTAL MANAGEMENT PLAN

16.1. RATIONALE

The focus of this document is to identify, prioritise and implement scholar projects relating to the Penryn Environmental Management Plan and across all learning areas.

16.2. PROJECTS

All projects are described under the following headings: Project number; Topic; Learning area; Cross reference to document 'Penryn College – Environmental Management Plan – March09 ©'; Class; Responsible Teacher; Name of Scholar/s; Method; Penryn obligation; Approximate cost; Priority; Timeline; Signed off/ongoing; lodged in library.

Project number	1
Topic	What proportion of the Penryn campus is aesthetically pleasing?
Learning area	Life Orientation, Geography, IT, Life Science, Dramatic Arts, Visual Arts, Accounting, Business Studies, Mathematics, English, Afrikaans, Physical Science
Type of Study	Questionnaire/qualitative
Cross reference to document 'Penryn College – Environmental Management Plan – March09 ©'	Part 3 – Stakeholder Expectations
Class	
Responsible Teacher/s	
Name of Scholar/s	
Variables measured	Location on Penryn campus: Date/season Ranking 1 (pleasant) – 5 (unpleasant); If you like it why?; If you dislike it why?.
Results	Location on Penryn campus: Name/GPS Number (percentage) of people who liked the area; Number (percentage) of people who disliked the area; Which are the most aesthetically pleasing/unpleasant areas at Penryn;;
Conclusions	List the features that make the area pleasing/unpleasant How do we improve unpleasant areas and maintain further improve aesthetically pleasing areas
Recommendations	
Penryn obligation	
Approximate cost	
Priority	
Timeline	
Signed off/ongoing	
Lodged in library – reference number	

Project number	2
Topic	An assessment of bird diversity at Penryn
Learning area	Mathematics, Geography, IT, Life Science, Dramatic Arts, Visual Arts, Accounting, Business Studies, English, Afrikaans, Physical Science, Life Orientation
Type of Study	Survey/quantitative
Cross reference to document 'Penryn College – Environmental Management Plan – March09 ©'	Part 9 – Habitat and Environmental Management 9.5 Population monitoring
Class	
Responsible Teacher/s	
Name of Scholar/s	
Variables measured	Route walked - GPS Location on Penryn campus – Name/GPS: Date/season Species; Number of sightings; Indigenous/exotic; Activity; Nesting sites;
Results	Species and distribution; Frequency and Abundance; Biodiversity index; Observed vs. expected Is the bird biodiversity at Penryn satisfactory?
Conclusions	How can we attract more indigenous species to the Penryn campus?
Recommendations	How do we manage exotic species?
Penryn obligation	
Approximate cost	
Priority	
Timeline	
Signed off/ongoing	
Lodged in library – reference number	

Project number	3
Topic	An electricity audit of Penryn
Learning area	Physical Science, Business Studies, Mathematics, Geography, IT, Life Science, Dramatic Arts, Visual Arts, Accounting, English, Afrikaans, Life Orientation
Type of Study	Survey/quantitative
Cross reference to document 'Penryn College – Environmental Management Plan – March09 ©'	Part 10 – Infrastructure Development and Management 10.3 Energy
Class	
Responsible Teacher/s	
Name of Scholar/s	
Variables measured	Location on Penryn campus – Name/GPS: Date/season Total use (daily (overnight), weekly;
Results	Total cost; Emission of greenhouse gases; Cost per scholar
Conclusions	Is electricity used efficiently at Penryn?
Recommendations	Ideas for reducing electricity use at Penryn
Penryn obligation	
Approximate cost	
Priority	
Timeline	
Signed off/ongoing	
Lodged in library – reference number	

References and other reading

NSW Department of Education and Training. 2001. Implementing the Environmental Education Policy in Your School.

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