

Business and Biodiversity Offsets Programme (BBOP) BBOP Pilot Project Case Study

Potgietersrust Platinums Limited (PPRust)





Forest Trends, Conservation International and the Wildlife Conservation Society provided the Secretariat for BBOP during the first phase of the programme's work (2004 – 2008).

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About this document

To help developers, conservation groups, communities, governments and financial institutions that wish to consider and develop best practice related to biodiversity offsets, the Business and Biodiversity Offsets Programme (BBOP) has prepared a set of Principles, interim guidance and resource documents¹, including pilot project case studies, of which this document² is one. All those involved in BBOP are grateful to the companies who volunteered pilot projects in this first phase of its work.

The ability to test methods and learn from practical experience in a set of pilot projects has played an important role in the development of the BBOP principles on biodiversity offsets and supporting materials during the first phase of the programme's work (2004 – 2008). Six organisations (five companies and one city council) volunteered to undertake pilot projects during BBOP's first phase, with some joining at the outset, and some at later stages. While BBOP has offered some support and technical advice to the individual pilot projects through its Secretariat and Advisory Committee, each pilot project has been directed and managed by a team employed or contracted by the companies and city council leading the respective projects. Each of the case studies prepared by the pilot projects explains the approach taken and how close the project has come to completing the design of the biodiversity offset concerned, and sets out the developer's current thinking on the most appropriate offset. This may change as the project teams finalise their offset design and start implementation. The nature of the guidance used by the pilot projects has varied according to which drafts of the evolving BBOP Handbooks were available to them at the time. This and the individual circumstances and context of each pilot project have affected the extent to which they have used or adapted the BBOP guidance. Consequently, the case studies do not necessarily reflect the range of interim guidance currently presented in BBOP's Biodiversity Offset Design Handbook, Cost-Benefit Handbook and Implementation Handbook.

Anglo Platinum is still working on the design of the proposed biodiversity offset discussed in this case study. Consequently, none of the suggested or projected activities based on fieldwork to date represent a commitment on the part of Anglo Platinum and its potential partners to proceed with the offset as described in draft form in this document. This commitment is the subject of continuing internal discussions. The information and data relating to possible offset sites, areas and activities are presented here to communicate the initial work that has been done on a potential offset design and to illustrate one possible approach to the design of a biodiversity offset intended to comply with the BBOP principles.

BBOP is embarking on the next phase of its work, during which we hope to collaborate with more individuals and organisations around the world, to test and develop these and other approaches to biodiversity offsets more widely geographically and in more industry sectors. BBOP is a collaborative programme, and we welcome your involvement. To learn more about the programme and how to get involved please:

See: www.forest-trends.org/biodiversityoffsetprogram/

Contact: bbop@forest-trends.org

¹ The BBOP Principles, interim guidance and resource documents, including a glossary, can be found at: www.forest-trends.org/biodiversityoffsetprogram/guidelines/. To assist readers, a selection of terms with an entry in the BBOP Glossary has been highlighted thus: BIODIVERSITY OFFSETS. Users of the Web or CD-ROM version of this document can move their cursors over a glossary term to see the definition.

² This case study was prepared by Marc Stalmans with contributions from Peter Coombes and Frank Pieterse.

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Executive Summary

This pilot project, as the name implies, was started early during the development of the BBOP methodologies. The pace of implementation of the pilot project was dictated more by local realities and expectations rather than by the pace of development of the methodologies. In particular alternatives and spatial planning were very much constrained by pre-existing conditions and local realities of land ownership and land availability.

Consequently, the PPRust pilot does not follow ‘perfectly’ the BBOP methodologies, which are only now reaching maturity. Nevertheless, the pilot study provides a good example of the usefulness of the BBOP methodology particularly with regard to the calculation of BIODIVERSITY LOSSES and potential GAINS using the ‘HABITAT HECTARES’ method.

Summary of the PPRust pilot project

Company	Anglo Platinum.
Project name	Potgietersrust Platinums Limited (PPRust).
Sector	Mining of Platinum Group Minerals.
Location	Overysel-Zwartfontein farms, Limpopo Province, South Africa.
Project description	Expansion of the existing mine. Opencast mining of platinum ore (pit ~400 ha), concentrator complex (~50 ha), waste residue facilities (1,412 ha), tailings dam (300 ha) and infrastructure (100 ha). The expanded mine will produce up to 1 million tonnes per month of platinum bearing ore that will be processed on-site before being transported to a local smelter for further enrichment.
Principal BIODIVERSITY components affected by the project	The area is made up of four main HABITATS. Only the mountain habitat with its <i>Rhus-Euphorbia-clerodendrum</i> woodland and <i>Croton-Combretum</i> Woodland (Mohlolo Hills) plant communities is in a relatively good state. The three other habitats have been profoundly impacted upon by previous land use practices resulting in a major loss in biodiversity. Five RED DATA plant species potentially occur, but their presence has not been confirmed. The Sandsloot watershed and Mogalakwena river system (in the project area) play a fairly limited role in the delivery of ecosystem services. Due to the very poor state of the habitats before the start of the project, the biodiversity impact is low to negligible for a project of this magnitude
Vegetation type	2,413 ha of Makhado Sweet Bushveld (according to Mucina and Rutherford (2006) classification) in the Savanna Biome.
Description of offset	5,398 ha of Makhado Sweet Bushveld, Central Sandy Bushveld and Waterberg Mountain Bushveld in the Savanna Biome. OFFSET ACTIVITIES will include a wildlife reserve with re-stocking of indigenous ungulate component, improved protection, active range management and REHABILITATION.
Partners (design phase)	School of Molecular and Life Sciences at the University of Limpopo on behalf of the appointed consultants, SRK Consulting Engineers & Scientists (EIA); Anglo Technical Services; Dr Marc Stalmans (consulting ecologist).
Partners (implementation)	Safety, Health and Environment (SHE) department of Anglo Platinum (game reserve management staff); Anglo Technical Division; Ekofocus Wildlife Consultants (wildlife management consultants); Dr Marc Stalmans (consulting ecologist).
Start of project	2005

Applying the BBOP principles

1. **No net loss.** The principle of NO NET LOSS was pursued in the offset by calculating the amount of biodiversity that would be lost through the mine development (after AVOIDANCE, minimisation and RESTORATION) and by offsetting this through sufficient gains in biodiversity in the close vicinity of the mine. The habitat hectare approach was used to quantify the amount of biodiversity lost through the project and gained by the offset. The loss of habitat due to the mining expansion was calculated taking into the account the degraded nature of the habitat. The potential gains in the offset area were calculated taking into account the improvement that can be made due to better management of the land. Six to ten ATTRIBUTES were used for each of the four habitats to calculate a current biodiversity score as well as the expected score post impact. A similar calculation was made for the POTENTIAL OFFSET SITES in terms of current score and potential score following better protection and management.
2. **Additional conservation outcomes.** There have recently been significant losses of biodiversity on neighbouring properties on communal land where no conservation actions such as the planned offset activity are taking place. The biodiversity offset is thus being planned against the sharp background rate of loss of biodiversity in the area. The resulting CONSERVATION OUTCOMES will therefore be additional to what would occur without the project and offset.
3. **Adherence to the mitigation hierarchy.** The project followed the mitigation hierarchy as follows:
Avoidance – the construction of the expansion project was planned in a way that would avoid activities taking place within 100 m of the Mohlasane and Sandsloot rivers. Instead of constructing additional access roads to the project site, use was made of existing roads. All sites determined to be sacred sites by the local community were identified during the impact assessments and these have been demarcated and will be protected. *Minimisation* – the site to which the village will be relocated was also previously disturbed by human activities. The site was chosen for the new village to minimise the project's overall FOOTPRINT on undisturbed land. Rather than developing a new smelter on-site, the existing mine and expansion project make use of a smelter in the town of Polokwane to beneficiate their concentrate. *MITIGATION* – AN ENVIRONMENTAL MANAGEMENT PLAN with detailed management actions to mitigate environmental impacts was drawn up as part of the legally required Environmental Management Program Report compilation.
4. **Limits to what can be offset.** The project area was very heavily impacted by existing settlements and communal grazing practices prior to the proposed mining activities. Therefore, the KEY BIODIVERSITY COMPONENTS (species and habitats) will be little affected by the project. They are also well represented in the surrounding area, including on the proposed offset sites. Consequently, virtually all the project's impacts can be offset.
5. **Landscape context.** The choices for the location of the offset were severely constrained by the land ownership pattern in the area. Most of the land is communally owned and not available for purchase. Two adjoining farms³ that were already owned by Anglo Platinum provide a very suitable offset having comparable habitats. Equally good alternative farms that were also owned by Anglo Platinum could not be evaluated as their ownership was transferred to the community as part of the land redistribution programme in the region.

3 The basic land parcel in South Africa is the 'farm'. Land ownership is linked to 'farms'. Farms are blocks of varying size, mostly of rectangular, triangular or parallelogram shape. Boundaries are generally determined by straight lines that link high points in the landscape. The 'farms' therefore mostly do not represent homogeneous ecological units as they cut across elevation gradients. In terms of South African law, the subdivision of these basic cadastral units requires due process. The 'farm' needs to be considered as a 'package' since sub-division along ecological lines is generally not easily feasible.

6. **Stakeholder participation.** The different stakeholders were identified during the ENVIRONMENTAL IMPACT ASSESSMENT (EIA) process. The most relevant stakeholders in the offset selection process are the local villagers who were either relocated or given alternatives enabling them to access natural resources lost through the mine expansion. The mine has a very well structured system working with communities over the long term, and this was used to guide engagement with the relevant stakeholders.
7. **Equity.** The stakeholder engagement undertaken by Anglo Platinum has aimed to ensure that those community members affected by the presence of the Project also benefit from its presence, and this philosophy extends to the biodiversity offset. Anglo Platinum is supporting local stakeholders so they benefit from the offset. For instance, the company is funding the development of the ECOTOURISM lodge that forms part of the offset, but will transfer ownership to the local community. The company is also paying for the training of villagers so they can run the lodge.
8. **Long-term outcomes.** The offset site was previously acquired by Anglo Platinum and there is no ongoing cost attached to acquiring the land. PPRust will provide the operational budget for the staff, equipment and work required to protect and manage the offset site for the long term.
9. **Transparency.** Anglo Platinum has worked with stakeholders to define and develop the plans for the offset, and continues to share the results to date locally and more widely through publications such as this case study.
10. **Science and traditional knowledge.** The scientific methods that have been followed to design the offset, including the recording of key biodiversity components that include identification of local communities' priority values and uses and the calculation of loss and gain, are summarised in this case study.

1. Project Description and Background

Potgietersrust Platinums Limited (PPRust) is a large mine owned by Anglo Platinum and worked for Platinum Group Minerals. In 2002, an ENVIRONMENTAL IMPACT ASSESSMENT (EIA) for a proposed PPRust North expansion was undertaken by the School of Molecular and Life Sciences at the University of Limpopo on behalf of the appointed consultants, SRK Consulting Engineers and Scientists (SRK 2002). The EIA was approved by the Regulating Authorities in January 2003.

A summer survey of the vegetation of the impact area was conducted in March 2003 to supplement the late autumn survey initially undertaken for the EIA (SRK 2003). Initial biodiversity information on the offset area was obtained through studies undertaken by Ekofocus (2004).

In 2005 a decision was taken to expand the existing mining operations (see Figure 1). The PPRust North Expansion project ('Overysel-Zwartfontein') will increase milling capacity at PPRust from the current 385,000 tonnes per month (tpm) to 985,000 tpm. This will increase annual platinum production from 200,000 ounces to 430,000 ounces. The expansion is linked to a biodiversity offset pilot project under the Business and Biodiversity Offsets Programme (BBOP).

Figure 1: Mining licence area and existing / future pits



2. Partners Involved in Offset Design and Implementation

The partners involved in the offset design phase were Anglo Technical Services and Dr Marc Stalmans (consulting ecologist).

The Safety Health and Environment (SHE) department of Anglo Platinum (wildlife reserve management staff), Anglo Technical Division, Ekofocus Wildlife Consultants (wildlife management consultants) and Dr Marc Stalmans (consulting ecologist) were involved with the practical implementation and assessment of the offset project.

3. Project Location and Description

PPRust is located approximately 25 km north-west of the town Mokopane in the Limpopo Province of South Africa (Figure 2). This is the fourth largest province in South Africa with the fifth largest population. More than 80% of the population resides in rural areas. The Province has a very high unemployment rate of over 40%. The economy is based on livestock farming, crop production, mining, wildlife farming, tourism and forestry (the latter in higher-rainfall areas). The greatest potential for employment and for economic growth occurs in the mining, agricultural and tourism sectors.

The impact area is situated in the northern savanna area of South Africa with an annual rainfall of 500 – 600 mm at an elevation of 1,080 – 1,300 m above sea level. Topography is generally gently undulating with some hilly outcrops. The 'natural' vegetation would have consisted of open to closed woodland with diverse tree flora with a canopy height of 5 – 10 m. The area would originally (more than 200 years ago) have supported the full range of the typical charismatic African megafauna including lion, elephant, buffalo and rhino. These large animal species, except in Protected Areas and newly stocked private reserves, have generally disappeared from the landscape in the larger PPRust area.

The land use is characterised by peri-urban settlement, subsistence dry-land farming, communal livestock grazing (cattle and goats) and the extractive use of other natural resources such as fuelwood (Figures 3 and 4).

The villages are of medium to large size. They are relatively densely packed but most residents still have a large yard with vegetable gardens and they may practice some dry-land cropping within the yard. Unemployment rates are high. Employed residents work at the nearby mine or commute daily to jobs in the town of Mokopane (40 km). Some people work in the bigger cities of Johannesburg and Pretoria (200 km) and may only return on a weekly or monthly basis. A large part of the population relies on social grants such as pensions.

Existing settlements have had a substantial negative impact on the biodiversity of the area, through conversion of the original woodlands to cropland and by communal grazing practices with high stocking rates (Figures 3 and 4). Firewood and medicinal plants are being harvested unsustainably. The remaining small to medium-sized antelopes and game birds are illegally hunted. These impacts pre-date mining in the impact area. However, they may be aggravated through an influx of people seeking employment at the new mine expansion at PPRust and at other platinum mines in the area.

As a consequence of a long and intense history of settlement, the impact area has few KEY BIODIVERSITY COMPONENTS (e.g. those that are considered of significant CONSERVATION value). Key biodiversity components are summarised in Table 1. The PPRust project is located in an area characterised by a high loss of natural HABITAT with the status of its terrestrial ECOSYSTEMS rated as 'vulnerable' to 'endangered' (Driver *et al.* 2005).

The following conclusions were made during the Impact Assessment study. The flora of the study area is not considered to be significantly sensitive or vulnerable in a regional context, however due to its being poorly documented it was assigned a moderate conservation value. The vegetation in the area was previously disturbed through activities such as overgrazing, wood fuel collection, trampling and dryland crop production. These pre-mining land uses left behind a few islands of natural vegetation which are thought to be a resource

of plants used by local people for medicinal purposes. Despite the degraded nature of the pre-mining environment, the specialists' opinion is that conservation across much of the extent of the plain's vegetation area of occurrence is inadequate and, due to the occurrence of mafic / ultramafic specialist species in this habitat, its conservation requires some focus. The local communities are dependent on healthy vegetation as a resource for many of their activities including medicinal use, firewood and as a food source. Hunting of wild animals using dogs is a notable existing impact on the fauna of the area. Wildlife hunted in this manner tends to take refuge on the inselbergs which occur in the area as hunting takes place in the open plains. Due to these hunting activities, the specialists conclude that it is highly unlikely that any viable or significant populations of wildlife will exist in the area. Common species of mammals, reptiles and bird species do occur and no evidence was found of threatened animals during the survey. However, the specialists state that the site provides the potential habitat for a number of RED DATA plant species, the presence of which could not be confirmed.

The proposed offset is located 8 km to the west of the impact area (see Figure 2). The offset area has similar environmental characteristics to the impact area although a larger proportion is mountainous. It has been subjected to much less subsistence farming; as a result it is much more wooded than the impact area.

The offset area is not intended in any way to offset any of the primary social impacts. However, long-term development, employment creation and provision of benefits delivered through the offset will add to the total social package associated with the mine development.

Figure 2: Locality map of PPRust

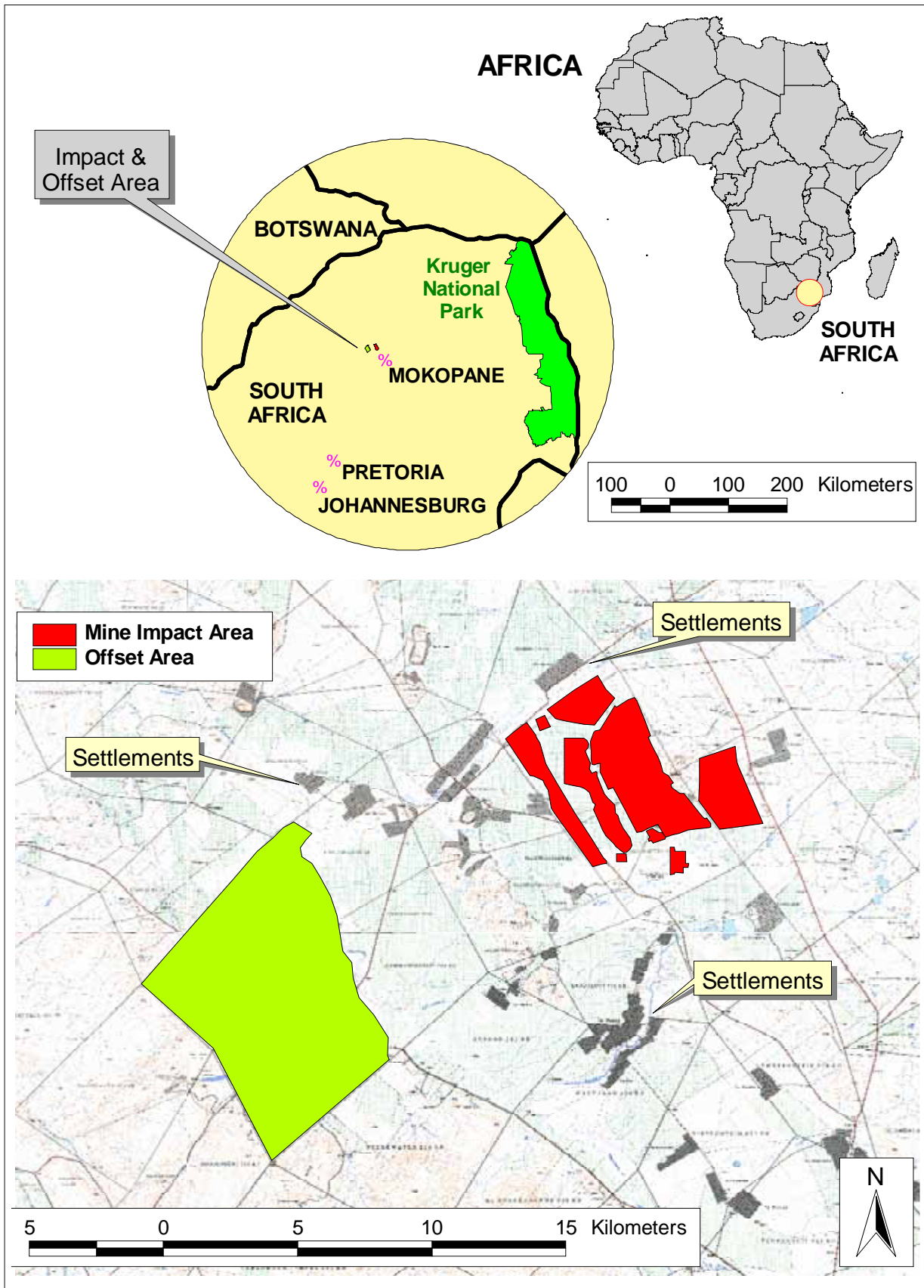
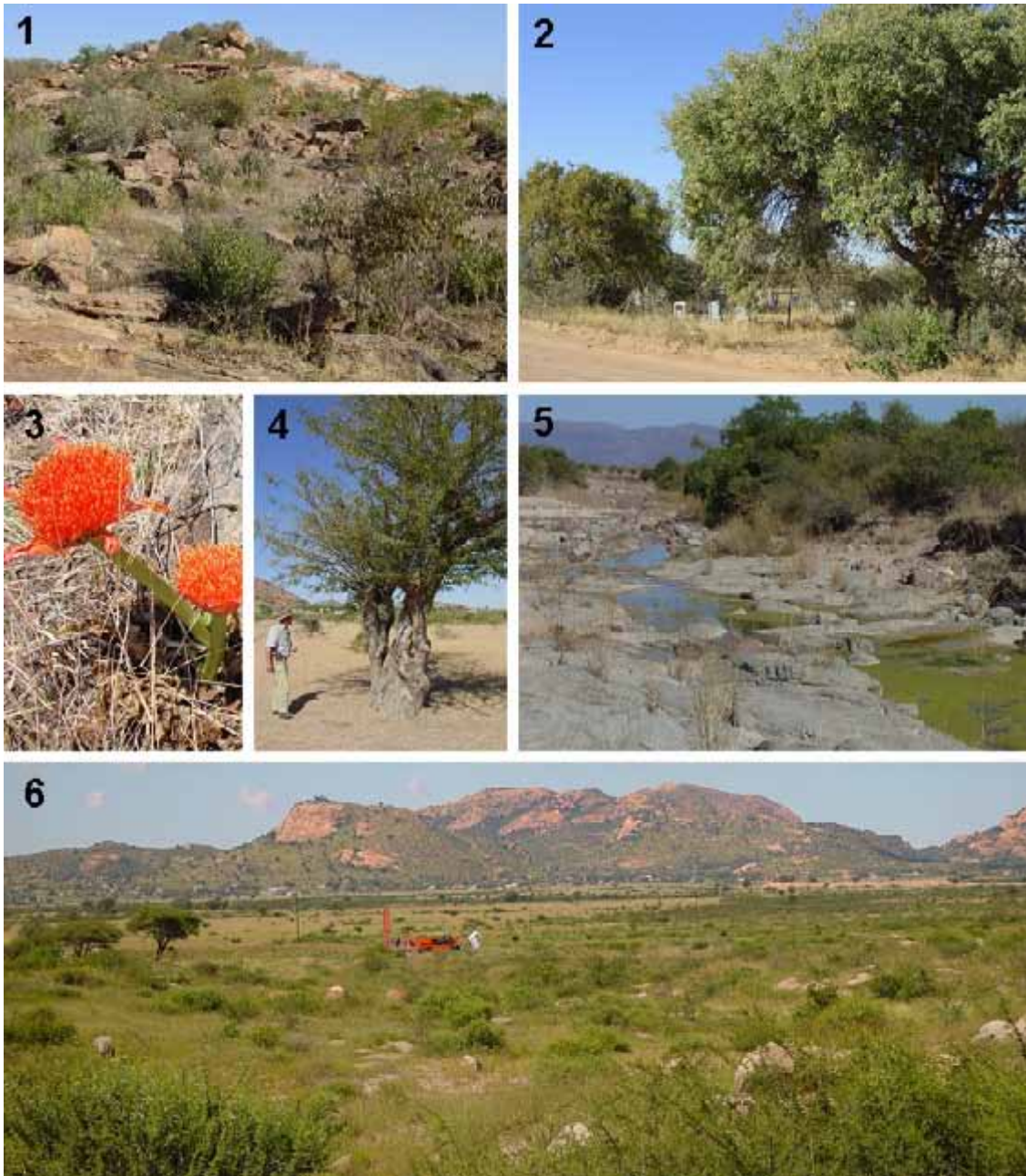


Table 1: Key biodiversity components at PPRust (see Figure 3 for a visual representation)

Component	Intrinsic values	USE VALUES	CULTURAL VALUES
Animal species <ul style="list-style-type: none"> Potential occurrence of Red Data species – not confirmed 	<ul style="list-style-type: none"> Rarity – conservation value (potential only – not confirmed) 	<ul style="list-style-type: none"> Illegally hunted with domestic dogs 	
Plant species <ul style="list-style-type: none"> Potential occurrence of five Red Data species, but not confirmed Large diversity in mountainous habitat Hardwoods in <i>Acacia</i> and <i>Terminalia</i> woodlands 	<ul style="list-style-type: none"> Rarity – conservation value (potential occurrence only – not yet confirmed) 	<ul style="list-style-type: none"> Medicinal use Fire wood and construction wood 	<ul style="list-style-type: none"> Medicinal and magical plants
Habitats within the Makhado Sweet Bushveld vegetation <ul style="list-style-type: none"> Microphyllous (<i>Acacia</i>) woodlands on clay Macrophyllous (<i>Terminalia</i>) woodland on sandy soils derived from granite Mountainous habitat Riverine habitat 	<ul style="list-style-type: none"> Potential habitat for 5 listed Red Data plants species (presence not observed) <i>Rhus-Euphorbia-clerodendrum</i> woodland and <i>Croton-Combretum</i> Woodland (Mohlotlo Hills) (mountain habitat) 	Valued by local people for: <ul style="list-style-type: none"> Residential purposes Land for subsistence cropping Grazing and browsing resource for cattle and goats Firewood Building wood Thatch grass (roof covering) Medicinal plants 	<ul style="list-style-type: none"> Habitat for medicinal and magical plants
ECOSYSTEM SERVICES <ul style="list-style-type: none"> Water catchment (limited role) Sandsloot watershed/ Mogalakwena river system 	<ul style="list-style-type: none"> Mountain habitat acts as BIOTIC corridor between Waterberg and Pietersburg Plateau 	The woodlands perform the following functions: <ul style="list-style-type: none"> Water catchment (limited) Carbon sequestration (limited in impact area due to low biomass) 	

Figure 3: Key values of the impact area



Key to Figure 3

1. Mountainous habitat.
2. Large hardwoods (mostly confined to culturally protected areas).
3. *Scadoxus punicea* (Blood Lily – bulbous herb with medicinal value).
4. *Albizia anthelminctica* (Worm-cure Albizia) on bottomlands.
5. Sandsloot seasonal river.
6. General view of impact area with ‘Microphyllous woodland habitat on clay soils’ in foreground (heavily impacted with extensive cutting of trees and fallow lands) and ‘Mountainous habitat’ in background. Note settlements at the foot of the mountains.

4. Business Case for a Biodiversity Offset

The offset project fits within the Safety, Health and Environment policy framework of Anglo American plc and more specifically that of Anglo Platinum, namely to:

- Conserve environmental resources;
- Prevent or minimise adverse impacts arising from Anglo's operations;
- Demonstrate active stewardship of land and biodiversity;
- Promote good relationships with, and enhance capacities of, the local communities of which Anglo is part;
- Respect people's culture and heritage.

The BUSINESS CASE for investing in a biodiversity offset has been driven mainly by the desire to assist the local communities in improving their quality of life in a sustainable fashion. With high unemployment rates in the region and a lack of conventional employment, the community has to look at alternative ideas to generate income.

The mine and offset areas are in close proximity to the Waterberg Biosphere Reserve, which is a popular tourist destination for both local and international tourists. This market relies on the natural beauty of the area, its wildlife resources and the opportunity to undertake a variety of leisure activities. These may include trophy hunting (typically by overseas hunters) and so-called biltong hunting (typically by South African hunters). The potential exists to tap into these non-consumptive and consumptive markets. At the same time the mine's management wants to prevent further expansion of degraded areas that have resulted from the community's non-sustainable use of the natural environment.

The Savanna Biome (in which the impact area is located) is not in itself a threatened or sensitive biome at a national scale. However, at a local level, over-utilisation of the area through human activities such as wood collection, grazing and dryland crop production has had a significant impact on the ECOSYSTEMS. High unemployment rates in the area place further pressure on the already degraded ecosystem as people remain dependent on the local biodiversity for their survival needs. For these reasons, the CONSERVATION importance of the remaining undisturbed areas has increased.

Based on the above, the specific aims and objectives of Anglo Platinum for the biodiversity offset were as follows:

- Offsetting the biodiversity losses from the impact area;
- Ensuring that the offset takes the form of an ecologically viable entity;
- Achieving long-term sustainability through the implementation of an appropriate land use model that underpins a financially viable operation for the benefit of the local community.

5. Offset Design and Implementation

5.1 Quantifying impact losses and potential offset gains

5.1.1 Mitigation hierarchy and residual impact on biodiversity

PPRust is an operation under the Anglo Platinum umbrella. Anglo Platinum in turn operates in compliance with Anglo American (AA) plc policies and standards. The AA plc strategy for biodiversity commits the company to active stewardship of biodiversity, wise use of environmental resources and minimising adverse impacts arising from the operation's activities. This strategy supports the AA plc Safety, Health and Environment Policy which, in addition to the above commitments, aims to promote good relationships with, and enhance the capacities of, the local communities of which the company (operation) is a part.

It is under these high level commitments that the PPRust SHE (safety, health and environment) policy was drafted. The PPRust policy commits the operation to minimising impacts associated with the business and ensuring that action is taken to eliminate, minimise and control the risks associated with the business. These commitments are made in support of the mine's focus on continually improving the management of environmental issues.

PPRust obtained ISO 14001 certification in October 2003. During 2005 the operation completed a Biodiversity Action Plan (BAP), as required by AA plc. This BAP will operate within the framework of the ISO 14001 environmental management system which requires the company to continually assess and manage the environmental impacts associated with its activities, products and services. This risk-based approach is aimed at ensuring management attention is appropriately focused on the most significant impacts (positive and negative) associated with the operation.

As a result of the above systems and commitments, PPRust is focused on achieving a state of no net biodiversity loss as a result of their activities.

The mine is open cast and as such requires the complete removal of all vegetation / overburden in order to access the ore body. The obvious result of this is a disruption and destruction of the ecosystem in the area of the mining FOOTPRINT. Specialist studies conducted prior to mining indicated that most of the area on which the mine was planned was already disturbed due to agricultural activities (trampling and dryland crop production, overgrazing and fuel wood collection). These activities resulted in a low BASELINE diversity and natural mitigation for some of the impacts to be caused by the development.

The no-go option was rejected on the basis that if the project did not continue then the positive impacts of the mine on the local impoverished and underdeveloped community would be lost. These include, amongst others, the following:

- Direct and indirect economic benefits on a local and regional level;
- Further cumulative developments which would arise due to the climate of development confidence which is created by an operation of this magnitude;
- Improved quality of life of inhabitants of the area; and

- Increased bulk service and infrastructure provision will be required to service the mine and in turn would facilitate opportunities to provide these services to communities in the area.

Furthermore, the no-go option would not lead to any lesser impact on the natural environment. In fact, continued over-reliance on natural resources and their over-exploitation would almost certainly lead to further biodiversity losses.

The environmental impacts at the PPRust mine were quantified as part of the EMPR process that was undertaken prior to commencement of construction of the mine. The significance of impacts (post mitigation) relating to biodiversity issues ranges from 'low' to 'high' (Table 2) with certain areas and biodiversity facets being completely altered (Table 3) (SRK 2002).

Table 2: Significance of impacts (post mitigation) relating to biodiversity issues

Impact	Significance rating
Generation and potential release of dirty water leading to surface water pollution	Moderate
Loss of catchment reducing availability of water to downstream users	Low
Changes to water courses	Low
Acid rock drainage potential of mine residue deposits	Moderate
Dust generated from near surface (<20m) open pit mining	High
Dust generated from tailings dams	Moderate
Dust generated from waste residue management facilities	Low
Dust generated from deeper (>20m) open pit mining	Low
Dust generated from crushing	Low
Risk of losing unknown biodiversity	High
Loss and fragmentation of important habitats	High
Loss or disturbance of fauna populations and their migration paths	High
Loss of plant diversity (important plant populations)	High
Loss / disturbance of aquatic biota	Low
Loss of soil resources due to surface disturbance during construction and operation	High
Loss of arable land due to construction and operation	Low
Increased soil erosion due to construction and operation	Low
Contamination of soils due to leaching of contaminants during operation and decommissioning	Low
Visibility of mine from surrounding areas	Low

Table 3: Specific elements that are impacted upon (directly and indirectly)

Kind of impact	Size	Brief description	ECOSYSTEM TYPE
			Vegetation type
DIRECT IMPACT: 2,400 ha			
Concentrator plant	40 ha	<ul style="list-style-type: none"> • End 2007 	<ul style="list-style-type: none"> • Old field used for grazing
Waste facilities	1,412 ha	<ul style="list-style-type: none"> • After 45 years 	<ul style="list-style-type: none"> • Old fields used for grazing • <i>Dichrostachys-Urochloa</i> – Acacia Scrubland • <i>Rhus-Euphorbia-clerodendrum</i> woodland (Mohlottlo hills) • <i>Croton-Combretum</i> Woodland (Mohlottlo Hills) • Watercourse fringing vegetation
Tailings facilities	300 ha	<ul style="list-style-type: none"> • Tailings dams and waste rock dumps to be constructed 	<ul style="list-style-type: none"> • Old fields used for grazing • <i>Lopholaena -Terminalia</i> open woodland • Mixed Bushveld • Watercourse fringing vegetation
Open pit [pre-pit temporary 40 ha contractors camp]	~400 ha	<ul style="list-style-type: none"> • Area to be completely altered for the construction of pit • Contractors camp area to be mined after initial construction 	<ul style="list-style-type: none"> • Old fields used for grazing • Watercourse fringing vegetation
Infrastructure	100 ha	<ul style="list-style-type: none"> • Roads, conveyor belts (pre 2009), office blocks and amenities, landfill site 	<ul style="list-style-type: none"> • Old fields used for grazing
Resettlement area		<ul style="list-style-type: none"> • New site for location of community • 950 households to be moved 	<ul style="list-style-type: none"> • Clay Thorn Bushveld • Mixed Bushveld • All areas previously used for grazing or communal lands
Conveyers belts		<ul style="list-style-type: none"> • Conveyor belts (>2009) 	<ul style="list-style-type: none"> • Old fields
Possible rail line from mine to town		<ul style="list-style-type: none"> • Construction of railway line as alternative to road system 	<ul style="list-style-type: none"> • Feasibility study still to be done
INDIRECT IMPACT	DESCRIPTION		
In-migration	<ul style="list-style-type: none"> • 94% of present employees come from within the area so in-migration should be limited 		
CUMULATIVE IMPACT of mining companies	<ul style="list-style-type: none"> • Additional mining activities could take place due to large platinum reserves in this area • These could be sited on both disturbed and undisturbed lands • Involvement in the biosphere reserve and establishment of conservation criteria for mining companies could influence behaviour of other mining companies • Direct interaction by the conservation authorities with new mining ventures could also influence their behaviours 		

INDIRECT IMPACT	DESCRIPTION
Increased traffic during construction	<ul style="list-style-type: none"> • Larger volume of construction vehicles through the area must be controlled to minimise their impact on local communities as well as ensuring vehicles stick to designated routes
Contractors (tree-cutting offsite)	<ul style="list-style-type: none"> • Contractors to be managed to ensure tree cutting does not take place
Tertiary impacts: climate change	<ul style="list-style-type: none"> • Industrial operations such as mining, which is energy intensive, create carbon emissions which contribute to climate change and climate change is one of the most significant threats to biodiversity. Anglo American is working on the issue of climate change at the corporate, divisional and business unit levels. Energy use and carbon emissions are quantified, recorded, and reported to the AA plc database for consolidation

Prior to an offset being considered, the MITIGATION HIERARCHY was followed to avoid, minimise and reduce RESIDUAL IMPACTS:

- *AVOIDANCE* - the construction of the expansion project was planned so that activities within 100 m of the Mochlasane and Sandsloot rivers would be avoided. Instead of constructing additional access roads to the project site, use was made of existing roads. All sites considered as sacred by the local community were identified during the impact assessments and these have been demarcated and will be protected.
- *Minimising* - the site to which the village will be relocated was also previously disturbed by human activities. The site was chosen for the new village to minimise the project's overall footprint on undisturbed land. Rather than developing a new smelter on-site, the existing mine and expansion project make use of an existing smelter in the town of Polokwane to process the mine's output (a platinum-bearing concentrate).
- *MITIGATION* – an ENVIRONMENTAL MANAGEMENT PLAN with detailed management actions to mitigate environmental impacts was drawn up as part of the legally required Environmental Management Program Report.

The predicted unavoidable residual impacts following the application of the mitigation hierarchy are low and not significant due to the heavy degradation of the 2,413 ha of Makhado Sweet Bushveld prior to the commencement of mining. No unique, irreplaceable elements of biodiversity are known to occur on the impact area. The residual biodiversity impact can thus be regarded as theoretically OFFSETABLE.

5.1.2 Identification of potential offset areas and establishing 'like-for-like' (in-kind) conservation outcomes

The choice of offset area was constrained by land availability. Several options identified early in the process could not be pursued for this reason. Most of the area around the mine is either privately owned (and not available for purchase) or communally owned (which means that ownership and land use cannot be readily changed). Converting this land to an offset would therefore be very difficult and complex (socially and institutionally).

Two farms (Mooihoek and Groenfontein), however, had been acquired by Anglo Platinum in 1999. This acquisition formed part of a larger landholding at that time. The farms Mooihoek and Groenfontein were protected and managed as a game farm⁴ since acquisition. In 2005, Anglo Platinum⁴ decided to use these farms for the offset. By that time, the other sections of Anglo Platinum's original landholdings around PPRust

⁴ Within the South African context, a 'game farm' generally consists of a privately or company owned piece of land that is generally fenced and stocked with a range of wildlife species. Such a farm is used solely or in combination for wildlife viewing, trophy hunting, production of wildlife meat, the breeding of animals for live sales, conservation of rare species etc. In the year 2000, there were already an estimated 7,000 privately owned game farms in South Africa with a total surface area of 16 million ha.

were no longer available for offset purposes as they were disposed off to the local community as part of the land restitution process.

Although partially impacted, the farms are some of the few remaining examples in the area of habitat of the Savannah Biome in a relatively good condition. Being the surface rights owner, the mine has full management control over these offset areas. A study was previously undertaken to determine the potential of Mooihoek and a section of Groenfontein for game ranching. The study included evaluating the land for the identification of potential habitat areas for game, investigating the potential for the introduction of game, investigation of possible REHABILITATION strategies for the area and defining a management plan for future rehabilitation and management of the area. The veld (range) CONDITION assessment concluded that a total of 286 large game units could be accommodated on the properties. The study also concluded that the area was previously mismanaged through cattle farming, large parts of the property are bush encroached and some areas show signs of poor grass species composition from the previous over-utilisation.

The selected POTENTIAL OFFSET AREA and the IMPACT SITE appear quite different (visually) as the vegetation of the impact area has been extensively transformed in the past through subsistence cultivation, livestock grazing and extractive use of natural resources such as fuelwood. The question was therefore legitimately posed as to whether the selected offset area would enable 'LIKE-FOR-LIKE' (IN-KIND) conservation relative to the impact area (i.e. would enable the conservation (through the biodiversity offset) of the same type of biodiversity as that affected by the project).

A thorough assessment (Stalmans 2006) was done to determine whether the habitats and vegetation of the impact area in its 'original' state would have been similar to that of the proposed offset area. The assessment analysed:

- **Abiotic factors.** These were compared for the impact and potential offset sites. Use was made of available GIS information such as geology, land type, elevation etc. These were mostly 'coarse' data as this information was compiled on a national (large-scale) basis.
- **Existing vegetation classifications.** Vegetation classifications (that is the formal manner in which the vegetation of South Africa is described) were compared at impact and potential offset areas. As for abiotic factors, these are fairly broad as they were compiled at a large scale.
- **Current vegetation patterns.** The impact and offset areas were compared in the field with respect to current vegetation patterns. The rationale is that in situations of similar impact and land use, a similar (or dissimilar) remnant vegetation composition and structure or similar (or dissimilar) 'reaction' to the impact would indicate that the original state in both areas was likely similar (or dissimilar). The mining area, as well as Mooihoek and Groenfontein farms that constitute the offset area, were assessed in August 2006. A total of 39 sites were surveyed in terms of landscape position, land use history, vegetation structure, dominant woody and grass species, alien species etc.
- **Internal differences in vegetation.** Differences within the potential offset area (often manifested as a marked 'fence line' contrast) were assessed. These differences are mostly linked to land use history. The presence of a certain vegetation remnant on the impact site similar to the remnant found in the offset site would indicate that (in all likelihood) the point of departure at the impact site was similar to that found in the 'natural' context of the offset site.

The results of the analysis allowed an evaluation of whether the pre-settlement impact area and the potential offset area were similar or dissimilar. If the two areas were dissimilar, then obviously the identified offset area would not offer a valid 'in-kind' offset and it would need to be evaluated differently. However, if it is considered

likely that the impact and offset areas were originally fairly similar; the identified offset area can provide a suitable in-kind offset.

The conclusion from the initial evaluation (Stalmans 2006) was:

“The Mooihoek and Groenfontein areas represent a suitable offset for the area impacted upon by the PPRust Mine. The current vegetation on the offset site can be used to reconstruct a ‘SYNTHETIC BENCHMARK for the impact area.”

5.1.3 Quantifying losses and gains in the impact and offset areas

A stepwise approach was used for the quantification of losses and GAINS (see Figure 4 and Stalmans (2007) for further information). The HABITAT HECTARES approach was used throughout. This approach was developed by the Victorian stage government in Australia in 2002 and has since been adapted by BBOP. The habitat hectares method uses benchmarks, or reference sites to create a multi-attribute scoring index against which losses and gains are measured.

The original method quantifies and offsets impacts by first evaluating the existing biodiversity at the project site, considering the potential project impacts to biodiversity and then developing an offset with a replacement value that directly correlates to the amount of biodiversity lost. BBOP has adapted this, broadening the concept to cover fauna as well as flora, to quantify the structural and compositional components at impact and offset sites, and selecting some ATTRIBUTES that are also good proxies for functional aspects of biodiversity.

The available vegetation maps for the impact area (SRK 2002) and the offset area (Ekofocus 2004) were updated and expanded using newly collected field data. The habitat and vegetation units identified for the two areas were combined in order to find common ground that allowed direct comparison between the two areas (Figures 5 and 6). The maps were incorporated in a GIS environment (ArcView / ArcGis) (Figure 6). A synthetic benchmark was defined for each of the units in the impact area using information from the offset area. This approach is considered valid following the evaluation of the degree of similarity between the two areas prior to settlement and cultivation of the impact area (as noted in Section 5.1.2 above). The benchmark takes into account the fact that the offset area itself is not ‘pristine’ and has suffered some degradation.

A range of 6 to 10 attributes was identified for each of the four habitats. A limited number of ‘attributes’ can, together, capture the inherent quality of the ECOSYSTEM, serving as good proxies not only for its structure, but also for its function.

The current CONDITION of the impact area relative to the benchmark was determined. The expected loss of biodiversity from mining-related impacts (relative to the current status) was estimated for the impact area. For the sake of this evaluation it has been assumed that there will be no residual biodiversity value after mining for the habitats that fall within the impact area. This results in a score of ‘0’ for all attributes. This is an exaggeration of loss as there are areas where some residual biodiversity will occur after rehabilitation (such as the stockpiling area for top soil and even part of the waste rock dumps). The loss of biodiversity was then translated into ‘habitat hectares’ (equivalent to the change in condition multiplied by the area affected by that change).

The current CONDITION of the offset area relative to the benchmark was similarly assessed. The potential gains through improved management were calculated and translated into habitat hectares. The loss that would be likely to occur in the absence of the offset area being established and formally protected, was used to calculate the additional biodiversity benefit accruing from ‘averted risk’ (through the prevention of future risks of harm to biodiversity).

Finally, the predicted loss (in habitat hectares) in the impact area was compared to the expected gains through management and protection (averted risk) (in habitat hectares) in the offset area.

Three of the four habitats are sufficiently offset (Table 4). There is a considerable gain for the woodland on clay flats. This is quite important as those particular woodlands, although not very diverse, are under great pressure because of their suitability for cultivation and grazing. They are therefore a high conservation priority for the area. There is a shortfall of 158 habitat hectares for the mountainous habitat. This shortfall is not considered to present a serious negative conservation impact, because this mountainous habitat is very well conserved in the adjoining Waterberg Biosphere. Support of the Limpopo Tourism & Parks Board on the nearby Witvinger Nature Reserve would benefit a similar habitat.

Table 4: Summary of loss and gain at the impact and offset areas

	Impact area total loss (habitat hectares)	Offset area total gain (habitat hectares)	Balance (habitat hectares)
Woodlands on clay flats	401	831	430
Woodlands on sand flats	81	108	27
Woodlands in mountainous terrain	265	107	-158
Riverine woodlands	51	55	4
Total	798	1,101	+303

This generally positive outcome is dependent on overexploitation risks being averted in the offset area and on targeted range management actions reversing previous degradation of the habitat (Figure 7). A strong institutional model with sufficient financial support is thus necessary (see Section 5.3).

The offset represents a change in land use from the previous livestock grazing and occasional hunting on the two farms that make-up the offset (Figure 7). A number of the originally occurring megafauna species have already been reintroduced to the offset. Further management actions that are required include the restoration of the required fire regime (higher frequency and intensity desired compared to the past), thinning of bush-encroached woodlands, rehabilitation of eroded road and tracks, removal of invasive alien species, planting of native species, and fuelwood lots with local communities to address underlying causes of loss of biodiversity in the area (poverty and overuse of timber for fuelwood). The improved natural resource base will be used to support limited trophy hunting and potentially the operation of a game lodge.

During 2007, an EIA was conducted to evaluate the proposed development of a game lodge on the offset. The EIA for the lodge was approved by the Regulating Authorities during September 2008. This has allowed the design and tender process to continue. The final design for the lodge has been completed and tenders submitted. A suitable Black Economic Empowerment company was selected for the construction of the lodge. Unfortunately, due to the current negative price of platinum and the slump in world markets the building of the lodge has been put on hold.

If and when the lodge is built, its ownership will ultimately be transferred to the local community within the framework of the Social Plan for the mine. This therefore ties the social and biological offsets together.

Figure 4: Flow chart summarising the approach followed

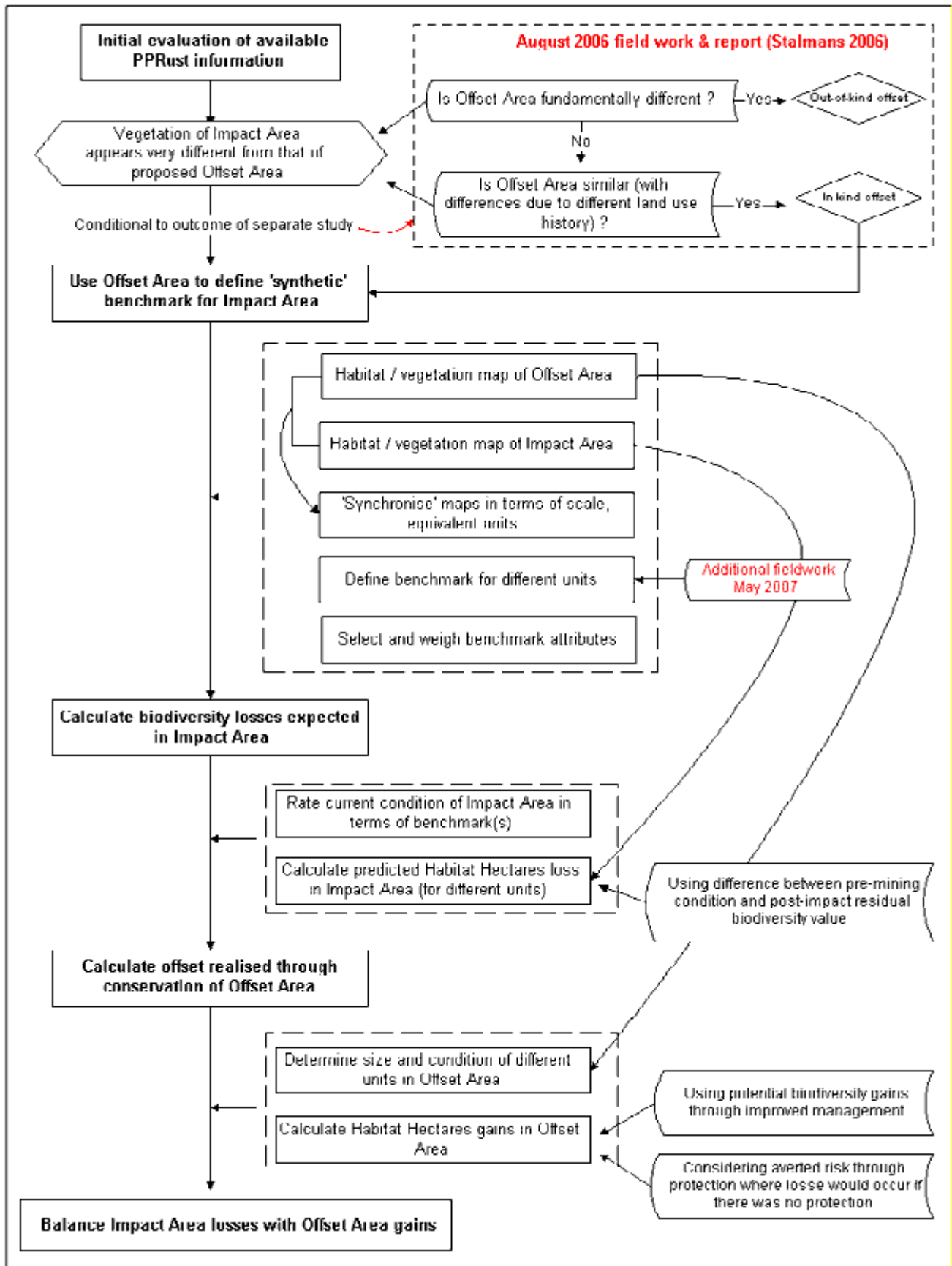
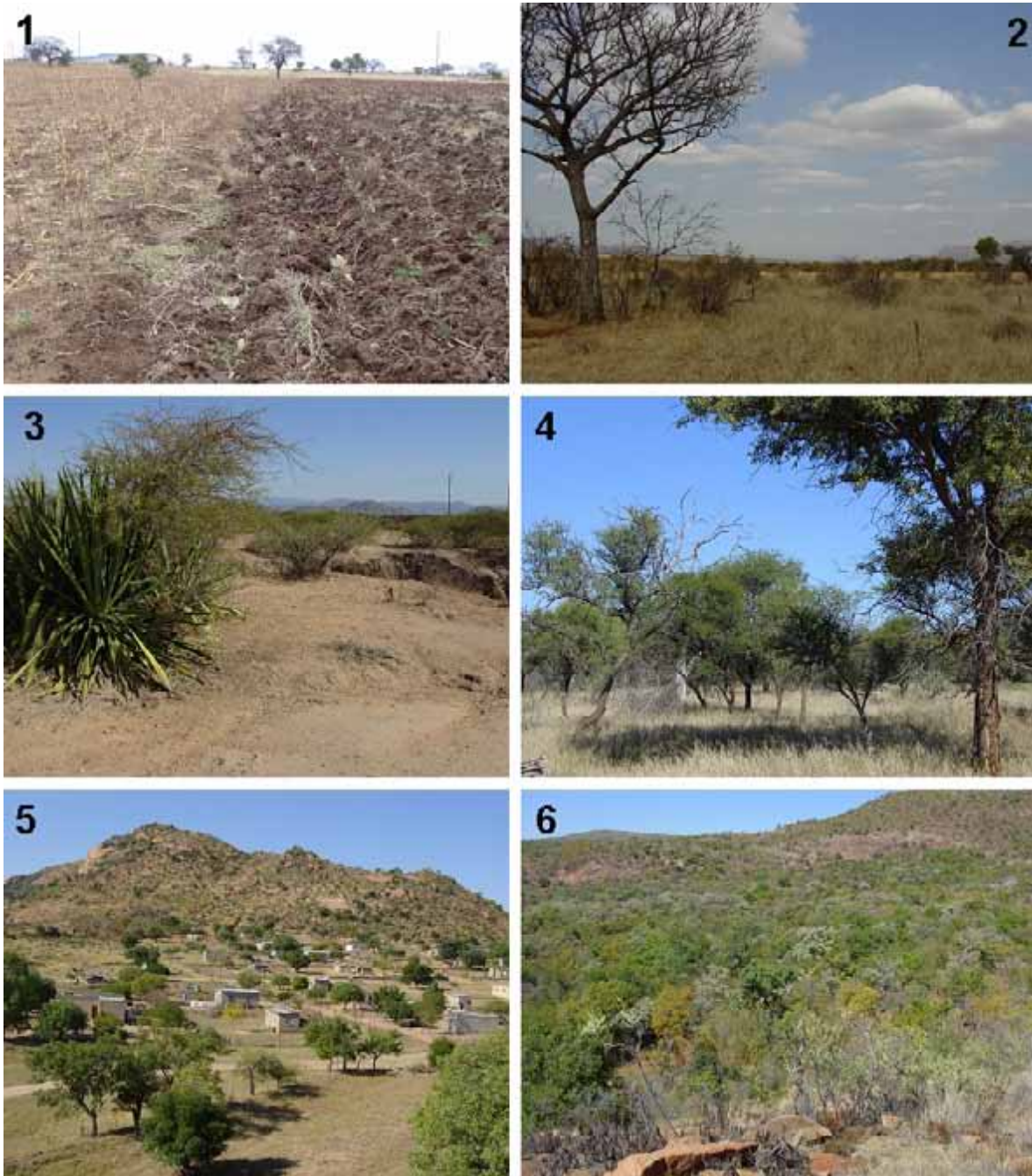


Figure 5: Habitats of the impact area (left hand photographs) and offset area (right hand photographs)



Key to Figure 5

1. Cultivated field in impact area (originally Microphyllous woodland on clay).
2. Formerly cultivated field in offset area.
3. Overgrazed and eroded Acacia woodland in impact area (note alien *Agave* in foreground at left).
4. *Acacia* woodland on clay in offset area.
5. Mountainous habitat with settlements on lower slopes in impact area.
6. Original mountainous habitat in offset area.

Figure 6: Comparison of habitats mapped on the impact and offset areas. Note that ‘Woodlands on clay’ habitat has been totally transformed to ‘Cultivated and fallow (on clay)’ in the impact area

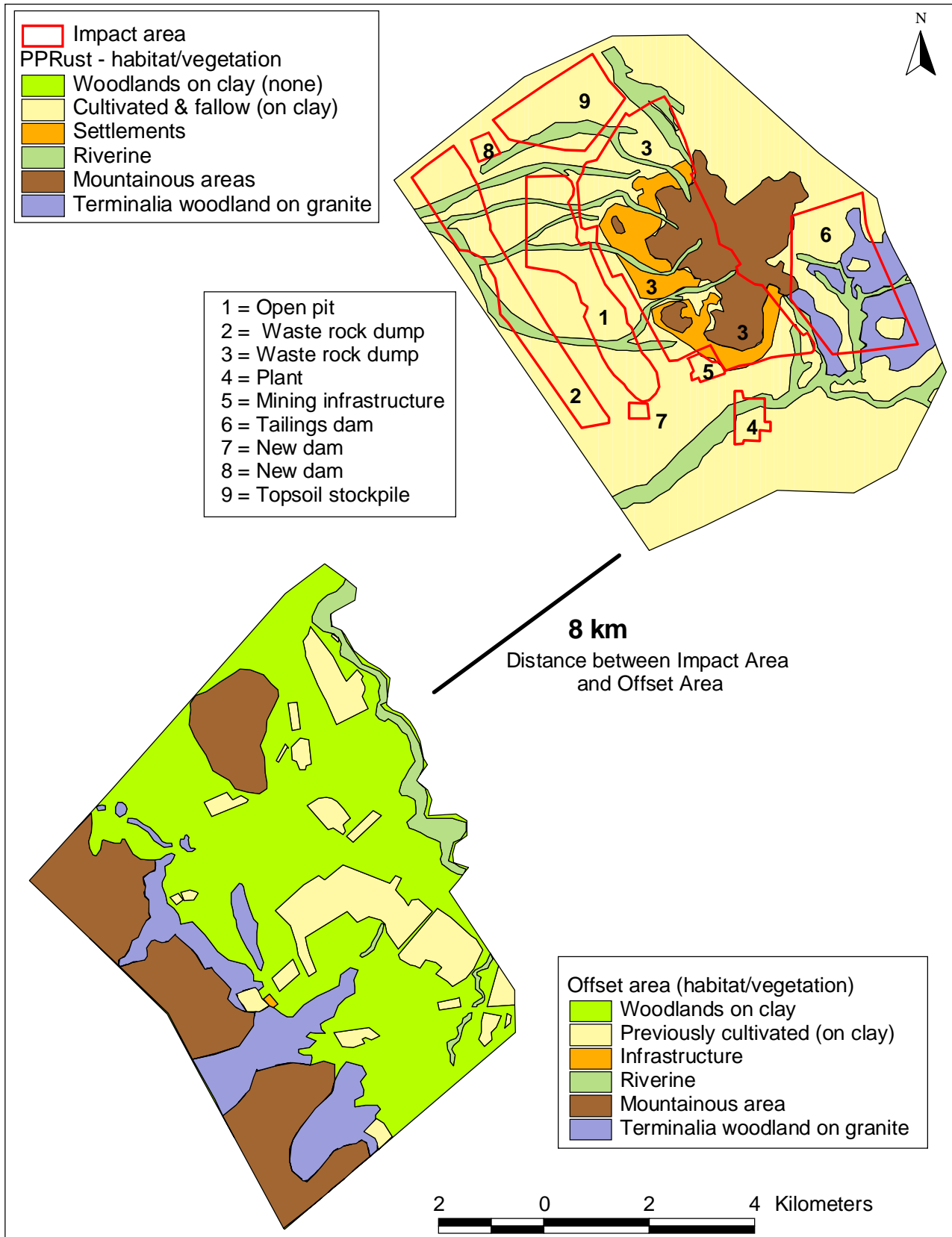
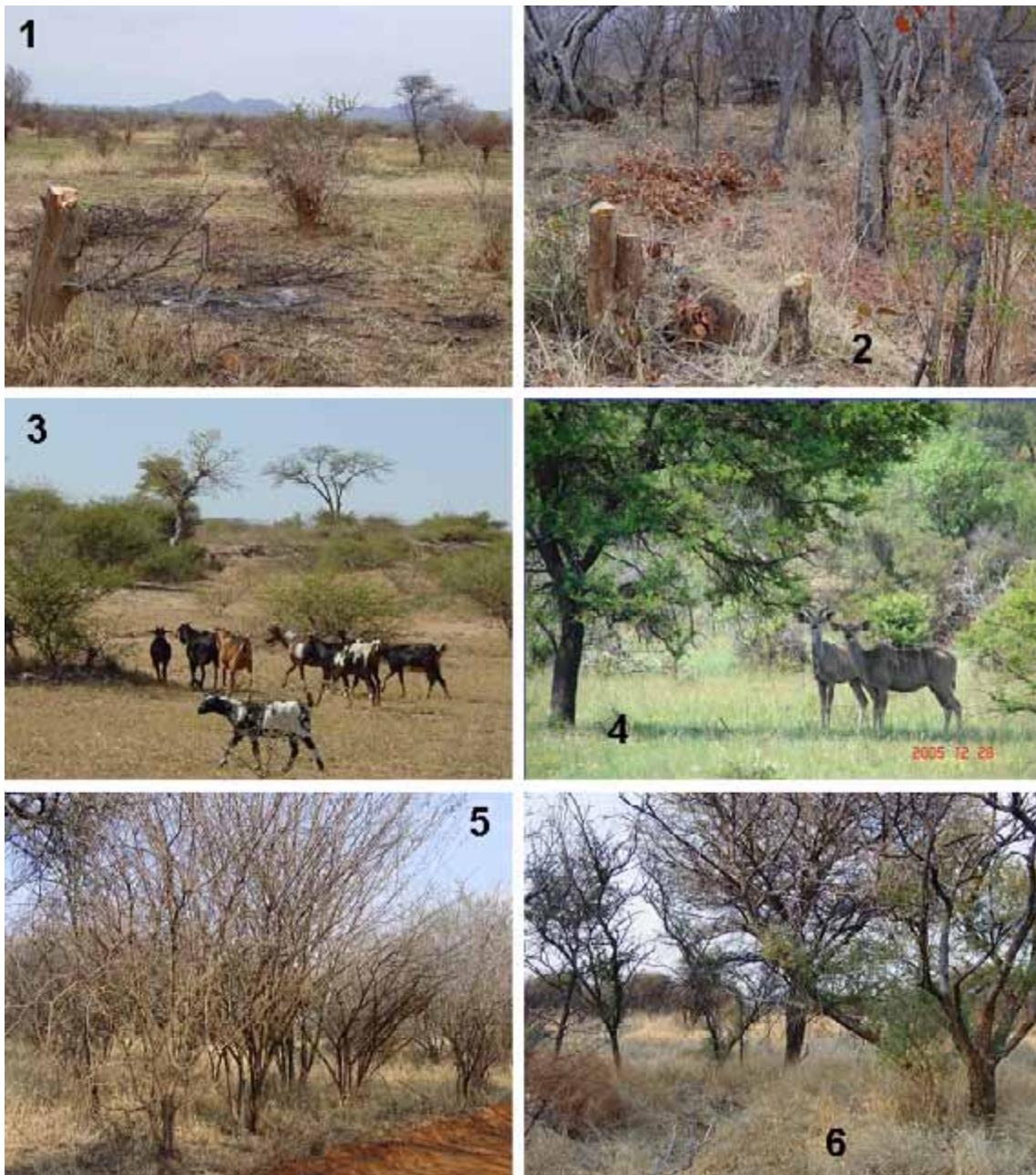


Figure 7: Land use practices and management interventions on the impact and offset areas



Key to Figure 7

1. Illegal cutting of firewood on the offset area (Microphyllous woodlands on clay).
2. Illegal cutting of the hardwood *Combretum apiculatum* on the lower slopes of the Mountainous habitat in the offset area.
3. Livestock in the impact area.
4. Wildlife in the offset area.
5. Undesirable bush encroachment (= woody thickening) by *Dichrostachys cinerea* in the offset area.
6. Desired density and species composition of the woodlands in the offset area (which can be achieved through the control of *Dichrostachys cinerea* and the application of an appropriate fire regime).

5.2 Stakeholder engagement

Broad STAKEHOLDER engagement was undertaken during the mine's Environmental Impact Assessment and authorisation process. This did not include discussions relating to biodiversity offsets as this process pre-dated the project's involvement with BBOP as a pilot project. However, biodiversity protection was high on the mine's agenda and in 2005 the mine's management began to seriously consider biodiversity offsetting as a means of addressing RESIDUAL IMPACTS and supporting sustainable development within the communities in which the company operates.

With the decision being taken to set aside the Mooihoek and Groenfontein farms as potential offsets stakeholder interaction began to increase. Much of this interaction was on an informal and selective basis. This was necessary to avoid building up expectations (for example with regard to the development of a lodge and the creation of employment) before sufficient funding had been secured by the company.

At a scientific level the Anglo Platinum team has worked with the BBOP secretariat and a number of ecologists from southern Africa. At a local level, the Mogalakwena District Municipality, Entabeni Private Nature Reserve (Waterberg Biosphere Reserve) and adjoining landowners have been notified and involved.

From a community perspective the interaction has up until this stage been very low key and restricted to certain community leaders. The reason for this low key approach is that the community leaders need to first agree to what is being planned and in some cases implemented. They then use their own local structures to take these matters to the affected communities. The interaction with the Kgoshigadi (queen) and her son, the future tribal leader, on the current status and what is planned for the Mooihoek and Groenfontein farms has been very positive.

As far as community access to the offset area is concerned, Anglo Platinum has for a number of years allowed access for the sustainable collection of firewood. At present a group of 30 – 40 local women from surrounding villages cut and collect firewood from the offset area on an ongoing basis. This practice is strictly controlled and managed by the mine personnel on the site.

The future use of botanical resources, (e.g. harvesting of medicinal plants) is still to be investigated, but the collection of firewood and selective hunting of game to improve the integrity of the area will continue as per the existing management plan.

The mine has recently also identified and trained 10 young people from the surrounding community in aspects related to horsemanship, horse management and tracking techniques. They have been trained by professionals in the different fields and are now ready for duty as game guards in the offset area. The seven week training course was very comprehensive and will add much value to the offset project.

5.3 Financial and institutional arrangements for long-term sustainability of the offset

All of the costs for the management of the offset, including the building of a lodge have originally been budgeted under the mine's environmental and sustainable development budget. However, the current financial turmoil is resulting in uncertainty regarding this funding. Money has been budgeted for the capital projects, such as fencing, the lodge and associated infrastructure. A budget for operational costs is provided based on requirements set out in the management plan. Sufficient financial provision has been made to effectively manage the area. However, as yet no model has been developed for the sustained financial support of the offset once mining comes to an end in 80 years' time.

Monitoring programmes for the offset areas are still being developed. Monitoring at this stage is focused on achieving the existing management requirements as stipulated in the management plan, e.g. preventing wildlife populations exceeding carrying capacity, control of invasive alien plant species etc. Monitoring programmes that can assess whether the anticipated biodiversity gains are actually being realised still need to be designed and implemented.

The Mooihoek / Groenfontein offset area was not developed using the BBOP tools but was developed based on mine management and community needs. Any planning and monitoring is thus based on the mine's requirements in relation to its reputational risk and in relation to its desire to establish a sustainable project for communities. Although this means that certain BBOP guidelines might not have been used, in general the BBOP principles were followed.

At present it is difficult to estimate whether any cost savings have occurred directly or indirectly as a result of the offset. The mine does not have a model in place to monitor this. Moreover, the reason for pursuing a biodiversity offsets is linked to social rather than financial motives. Developing a sustainable project for the benefit of communities has far greater social responsibility benefits than financial benefits for the company. While the offset project costs the mine a substantial amount of money on a yearly basis, the social benefits of a project of this nature, in an area of high poverty, are very important to Anglo Platinum.

6. Lessons Learned

With the benefit of hindsight and having more refined BBOP guidance available now, compared to that available at the outset of the offset process, it is useful to highlight the lessons learned during the offset design and implementation process (summarised in Table 5), particularly where these can be used to improve the outcome or where they might prove useful to other similar projects in future.

Table 5: Lessons learned during the design and implementation of the PPRust offset

Aspect	Description	Remedial action
Company (internal dynamics)	First exposure of the company to the biodiversity offset process. Although the company has staff with conservation management experience it was difficult to accommodate the time requirements within the very busy schedule of the SHE department.	Compile a management plan for the offset that clearly sets out requirements and allocates responsibilities.
Stakeholders (external)	<p>Communities have no prior experience of integrated natural resource management, nor are they familiar with running a wildlife farm and game lodge.</p> <p>No formal dialogue yet with Provincial conservation authorities with regard to supporting Witvinger Nature Reserve (to address the offset shortfall in the mountainous habitat).</p> <p>The offset site is susceptible to a possible land claim. If the claim is successful and the new community landowners are not interested in the planned management and development of the area for wildlife and tourism, the offset could be lost.</p>	<p>Identifying key people in the community.</p> <p>Training and capacity building.</p> <p>Set up formal liaison and decision-making channels with affected community.</p> <p>Engage Provincial conservation authorities.</p> <p>Demonstrate similar models to the communities and their representatives where communities extract higher values through non-traditional uses of their local natural resource base (through involvement in ECOTOURISM, hunting and other forms of sustainable natural resource utilisation).</p>
Offset management and development	No formal plan yet to realise planned biodiversity gains.	<p>Compile a management and development plan (see above).</p> <p>Develop standards, monitoring and assessment procedures to measure effectiveness of protection and management and to determine whether expected biodiversity gains are being realised.</p>
Financial sustainability	No long term mechanism is in place yet to ensure continued funding of protection and management efforts.	Mine management together with community committee to decide on a suitable mechanism. The mine will continue to fund the project for the foreseeable future.
Institutional sustainability	No mechanism in place yet for a formal management structure.	Mine management together with community committee to decide on suitable mechanism. Sustainability will be the main requirement.

7. Final Comments

This pilot project, as the name implies, was started in the early stages of the development of BBOP guidance. Consequently, the PPRust pilot does not lay any claim to ‘perfectly’ following the guidance. The pilot project provides a good example of the usefulness of the BBOP guidance particularly with regard to the calculation of biodiversity losses and potential gains at offset sites. In this particular case, much of the decision-making in terms of offset location and addressing social issues was dictated by pre-existing conditions and local realities in the context of land availability and land ownership.

The value of the offset areas does not only lie in their size, but in the overall amount of biodiversity gained (improved quality and CONDITION, as well as area). The offset will result in a gain of 1,101 HABITAT HECTARES, compared to the project’s loss of 798 habitat hectares: a net gain of 303 habitat hectares. Thus, rather than surface area, the value of the offset area is seen to lie in:

1. The anticipated net gain in habitat hectares;
2. The fact that the offset areas contains representative examples of the once extensive Microphyllous woodlands on clay;
3. The opportunity that the offset provides for generating income for the local community through community owned projects. It is hoped that these will begin to reduce the reliance of the communities on the remaining natural resources, which could in turn open the way for Savannah Biome REHABILITATION projects within the surrounding area; and
4. The opportunity that the areas provide for educating the local communities on the benefits of ECOSYSTEM maintenance and management.

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To learn more about the BBOP principles, guidelines and optional methodologies, go to:
www.forest-trends.org/biodiversityoffsetprogram/guidelines