MTO CAPE ENVIRONMENTAL/SOCIAL MONITORING PROGRAM

2020 - 2024

MTO | cape

March 2023 update
Prepared by: K. Kirkman

INTRODUCTION

The development and implementation of a holistic monitoring program is an essential management tool of any well managed business, to mitigate and manage impacts on the environment. Monitoring is essential to determine base-line information, detect possible change after a predetermined period and to monitor and implement adequate management changes, should they be required. Monitoring will ensure that standards are being maintained and that constant improvement is taking place, where needed.

This document is the publically available (free of charge) five year strategic environmental and social monitoring plan for MTO Cape from 2020 – 2024. The document covers monitoring as related to the environment and social components and does not include the daily monitoring of forestry silviculture or harvesting activities, which are covered by the company's Integrated Management System procedures and policies. Results of monitoring will be updated at least every two years to keep the document current. This is the 2023 update. Stakeholders wishing to receive an electronic or hardcopy version of this document can contact the General Manager (contact details at end of the document).

STRATEGIC MONITORING PROGRAM

Long term, goal-oriented and systematic trend assessment of process is needed as part of a strategic monitoring program. The monitoring of the impact of forestry on the different levels of the ecosystem, landscape and within communities is needed to monitor trends over time. The different levels at which this program is aimed are shown in Table 1. The monitoring programs initiated for each of these levels is shown and discussed further in this document.

Table 1. The strategic ecosystem levels to be monitored as part of this monitoring program.

Level of monitoring	Description	Identified and Implemented Monitoring Programs
	Environmental Monitoring	
Biodiversity pattern	Monitoring the extent, intactness, and health of identified ecosystems such as forest, wetlands and fynbos.	• Priority Conservation Areas Identification (High Conservation Value) • Priority Consevation Areas monitoring
Biodiversity process	Monitoring the potential of the site to function as a biological corridor that will enable the movement of plants and animals over ecological time-scales (e.g. seasonal movement), evolutionary time-scales (population differentiation and diversification) and in response to anticipated anthropogenic climate change.	• Natural Heritage site monitoring • Water Quality monitoring • Erosion monitoring • Weed eradication monitoring
Species Monitoring	The monitoring of identified rare, threatened and endangered species to determine and manage the impacts of forestry on these species over time.	• General Fauna and Flora monitoring. • Fish monitoring • Red Data Species Monitoring.
	Landscape scale Monitoring	
Fire Impacts	The monitoring of unplanned or wildfires. Documented records of past fires, which include: number of fires, extent of damage and examination of causes and analysis of trends	• Fire History monitoring

Soil trend/growth monitoring	The long-term monitoring of tree growth as a function of soil sustainability	• Long term growth trend monitoring
Impact of herbicide application	A new program to monitor the impact of herbicides, notably glyphosate on water runoff and underground water sources.	• Trends in herbicide use • Types of herbicides used • Diatom monitoring • Glyphosate/Herbicicde monitoring
	Socio-economic monitoring	
Areas of Special Interest Monitoring	The monitoring of identified cultural and historical sites listed on plantations, to monitor their status over time, and prescribe management actions as necessary.	• Areas of Special Interest Program.
Employment, Training and Contractor	Monitoring the long term employment, training and opportunities for contractors provided by the company	• Employment, Training and Contractor Monitoring.
Social and Economic development	Monitoring of provision of social economic development opportunities to communities.	• Socio-economic development monitoring.
Community Engagement	Monitoring engagement with local communities.	• Community engagement monitoring.

The monitoring program is aimed to provide sufficient information to make informative decisions but must also be affordable and general enough to be implemented easily over time. Quantitative and qualitative site monitoring, fixed point photo monitoring and site/habitat/species specific monitoring protocols are all tools that were considered when developing the strategic monitoring program for MTO Cape. Cost, the amount of information obtained, and the practical use of this information were also critical decision making components.

MONITORING PROJECTS

1. BIODIVERSITY PATTERN

1.1 Priority Conservation Area Identification

1.1.1. Requirement for Monitoring

The High Conservation value process underwent change within the last 10 years, with the focus shifting away from High Conservation Value Forest to a focus on High Conservation Values. The current FSC® standard for South Africa (FSC-STD-ZAF-01-2017 V1-1) Principle 9 (High Conservation values) which came into affect in 2019, states:

The Organization* shall* maintain and/or enhance the High Conservation Values* in the Management Unit* through applying the precautionary approach*. (P9 P&C V4)
Criterion 9.1 "The Organization*, through engagement* with affected stakeholders*, interested stakeholders* and other means and sources, shall* assess and record the presence and status of the following High Conservation Values* in the Management Unit*, proportionate to the scale, intensity and risk* of impacts of management activities, and likelihood of the occurrence of the High Conservation Values*: **HCV 1** – Species diversity. Concentrations of biological diversity* including endemic species, and rare*, threatened* or endangered species, that are significant* at global, regional or national levels.

HCV 2 – Landscape*-level ecosystems* and mosaics. Intact forest landscapes and large landscape*-level ecosystems* and ecosystem* mosaics that are significant* at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.

HCV 3 – Ecosystems* and habitats*. Rare*, threatened*, or endangered ecosystems*, habitats* or refugia*.

HCV 4 – Critical* ecosystem services*. Basic ecosystem services* in critical* situations, including protection* of water catchments and control of erosion of vulnerable soils and slopes.

HCV 5 – Community needs. Sites and resources fundamental for satisfying the basic necessities of local communities* or indigenous peoples* (for livelihoods, health, nutrition, water, etc.), identified through engagement* with these communities or indigenous peoples*.

HCV 6 – Cultural values. Sites, resources, habitats* and landscapes* of global or national cultural, archaeological or historical significance, and/or of critical* cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities* or indigenous peoples*, identified through engagement* with these local communities* or indigenous peoples*. (C9.1 P&C V4 and Motion 2014#7)"

HCV in South African plantations

Pertaining to the application of Principle 9, the precautionary approach* has been interpreted as follows; *where there is reason to believe that management activities pose a threat of severe or irreversible damage to HCVs, the Organization* will take measures to prevent the damage, even when the scientific information is inconclusive*. However, P9 goes further than preventing severe or irreversible damage, in requiring the organization to maintain and/or enhance the HCVs occurring in the FMU. In order to understand how HCV, in the light of the precautionary approach is applied in the plantation context in South Africa, the following points must be noted:

As confirmed by the generic risk assessment, there is a significant risk of severe or irreparable damage only when new plantations are established.

For all management activities that take place in the production of timber, the impacts are mitigated through the application of the standard.

The conservation zones are managed with the principle objective to maintain or enhance the conservation values.

It follows that the requirement to identify outstanding conservation values only apply prior to *new* afforestation. Afforestation in South Africa is highly regulated. In order to afforest an area the following authorizations are required:

A water use license under the National Water Act (No. 36 of 1998).

An Environmental Impact Assessment under the National Environmental Management Act (No. 107 of 1998).

A heritage assessment under the National Heritage Resources Act (No. 25 of 1999).

Approval from the Department of Agriculture, Forestry and Fisheries under the Conservation of Agricultural Resources Act (No. 43 of 1983).

Authorization will not be granted if there is a risk of severe or irreversible impacts to HCV's. These processes guarantee protection of the HCVs in the following ways:

HCV1 - Species Diversity. During the EIA, approval is required from the Provincial Conservation Agencies. These agencies have provincial systematic conservation plans which are used to assist in the screening of applications. These plans have extensive species location data as well as the modelled distribution of species. Approval will not be granted for the conversion of areas that could be categorized as HCV 1. Comprehensive stakeholder input is required as part of the EIA process.

HCV2 - Landscape-level ecosystems. The systematic conservation plans consider landscape level ecosystems through the incorporation of, amongst other data, the National Critical Biodiversity Areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan.

HCV3 - Ecosystems and habitats. The systematic conservation plan incorporates the nationally protected ecosystems according to the National Environmental Management Act (No. 107 of 1998) and the national Vegetation-types (Mucina and Rutherford, 2006).

HCV 4: Critical Ecosystem Services. The biggest impact of afforestation on ecosystem services is by reducing the amount of water available to downstream users. This is protected through the requirement for a water use license (described above) which is only granted once it has been determined that there is sufficient water available in the catchment. The EIA also considers the impact that water might have on water quality, soil erosion, availability of grazing and other resources, covering all potential HCV 4s in the South African context (Refer to the generic risk assessment in App 4). Furthermore the systematic conservation plans incorporate Ecological Support Areas. Ecological Support Areas are not essential for meeting biodiversity targets, but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic.

HCV 5: Community needs. Community needs are protected through the stakeholder engagement process which forms part of the EIA Process. Through this process, all community needs will be identified and considered.

HCV 6: Cultural values. The heritage assessment required by the National Heritage Resources Act (No. 25 of 1999) ensures that cultural values are protected from the impacts of afforestation.

All these processes require stakeholder engagement through the overarching EIA process.

Following the precautionary approach, and given that there is no reason to believe that management activities pose a threat of severe or irreversible damage to HCVs, it is therefore not necessary to conduct assessments for HCVs. In the South African context, measures required in the standard to protect conservation values are sufficient to maintain or enhance HCVs. The Standard requires that conservation values are prioritized and that planning and monitoring takes place proportionate to the potential impacts to the high conservation values. The SA standard describes where each of these values are protected. In conclusion: For new afforestation, the authorization processes required by legislation ensure that HCVs are protected. For existing afforestation the requirements of the standard ensure their maintenance and enhancement.

Plantation forestry areas within MTO Cape were planted many years ago, and no afforestation is planned in the short to medium term that may impact on converting areas of high conservation importance. As is stated in the Criterion 9.1, MTO Cape therefore followed the approach that: "**there is no reason to believe that management activities pose a threat of severe or irreversible damage to HCVs, it is therefore not necessary to conduct assessments for HCVs. In the South African context, measures required in the standard to protect conservation values are sufficient to maintain or enhance HCVs. The Standard requires that conservation values are prioritized and that planning, and monitoring takes place proportionate to the potential impacts to the high conservation values".**

For this reason, current and historical conservation planning of the company, combined with updated information from provincial, site specific and national spatial development tools was used to identify areas of high conservation values that need to be prioritized per plantation – these areas are identified as **Priority Conservation Areas** – areas with high conservation value in the local context. A document entitled, *MTO Cape Process to identify areas of High Conservation value and designate Priority Conservation areas (Version 1)* was developed by the company in March 2022 to explain the process of identification in further detail.

1.1.2. Monitoring Protocol

The 2017 Western Cape Biodiversity Spatial Plan (WCBSP) is a spatial tool that forms part of a broader set of national biodiversity planning tools and initiatives that are provided for in national legislation and policy. It comprises the Biodiversity Spatial Plan Map of biodiversity priority areas, accompanied by contextual information and land use guidelines that make the most recent and best quality biodiversity information available for use in land use and development planning, environmental assessment and regulation, and natural resource management. The biodiversity spatial plan provides a map of terrestrial and freshwater

areas that are important for conserving biodiversity pattern and ecological processes (Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs)).

The WCBSP is a core component of the Provincial Biodiversity Strategy and Action Plan (PBSAP) of the Western Cape as it is used to spatially prioritize conservation action (such as protected area expansion or investment into ecological infrastructure), or to feed spatial biodiversity priorities into planning and decision-making in a wide range of cross-sectoral planning processes and instruments such as development applications in terms of the National Environmental Management Act (NEMA), the Spatial Planning and Land Use Management Act (SPLUMA), the Western Cape Land Use Planning Act (LUPA), the Provincial Spatial Development Framework and municipal integrated development plans (IDPs), spatial development frameworks (SDFs), land use management schemes and environmental management frameworks (EMFs).

The 2017 WCBSP reflects important advances in biodiversity planning over the last few years. Importantly, the WCBSP: (1) provides, for the first time, a singular province-wide assessment; (2) utilizes more recent and accurate land cover data than previous assessments; (3) gives explicit consideration to ecological infrastructure and climate resilience; (4) responds to the need for greater conflict avoidance with urban areas; (5) identifies depleted ecosystem/environmental stocks; and (6) generally incorporates better quality and more up- to-date biodiversity data. The WCBSP is therefore a detailed plan that can be used to review HCV and identify PCA for plantations in the Western Cape.

The Eastern Cape Biodiversity planning outcomes, like the WCBSP was developed by specialists and the South African Biodiversity Insitute (SANBI) and was used to review the presence of HCV areas for plantations which fall within the Eastern Cape. The Eastern Cape Biodiversity plan (ECBP), which was completed in 2019 has been uploaded onto the SANBI website and is available at bgisviewer@sanbi.org. To determine Priority areas for MTO the Eastern Cape Biodiversity plan together with the spatial Terrestrial Biodiversity Land Use decision tool summary maps for Kouga and Kou-kamma municipalities (in which the Eastern Cape plantations fall) were also overlaid and reviewed. Within the ECBP areas important for biodiversity pattern and ecological processes are captured, and these are included as Critical Biodiversity Areas (CBAs). Terrestrial and aquatic CBA's have been identified and are included in the SANBI BGIS layers with more detail. These plans identify areas of high biodiversity value and are thus an ideal product to use for the identification of Priority Conservation Areas on MTO property in the Eastern Cape.

1.1.3. Summary of Results

With the update of Plantation Conservation plans, the PCA for each plantation were identified, using the Bioregional planning tools available (ECBP and WCBP).

From an assessment of criteria, the following PCA Areas are identified for MTO Cape plantations.

FSC HCV Criterion	Interpretation in the SA FSC standard (2018).	MTO Cape PCA interpretation
HCV 1 – Species diversity. Concentrations of biological diversity* including endemic species, and rare*, threatened* or endangered species, that are significant* at global, regional or national levels.	6.4.1 requires that priority species are identified 6.5.2 requires that conservation zones are prioritized according to conservation value. Areas with high species diversity will be accorded higher conservation value.	Identification of priority conservation units for relevant concentrations of biodiversity is included in regional biodiversity mapping and identification of critical biodiversity areas. Known critical sites were also included where appropriate.

HCV 2 – Landscape-level ecosystems and mosaics. Intact forest landscapes and large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.	No single conservation zone within an FMU is South Africa is large enough to be considered a landscape level ecosystem.	Not applicable.
HCV 3 – Ecosystems and habitats. Rare, threatened, or endangered ecosystems, habitats or refugia.	6.4.1, 6.5.1, 6.5.2 These indicators require that habitats/representative ecosystems are all designated as conservation zones and prioritized according to conservation value, guided by systematic conservation planning. Systematic conservation planning takes into account the conservation status of ecosystems, the presence of habitats and refugia, amongst many other data layers.	The Western and Eastern Cape Biodiversity Spatial Plans and National threatened ecosystems map were used to identify Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) to inform the identification of Priority Conservation Areas and units. Prior priority High Conservation Forests have also been included.
HCV 4 – Critical ecosystem services. Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.	The risk assessment in Annex 4 identified the following basic ecosystem services are associated with plantation forestry relevant to HCV 4. Water Quantity, Water Quality, Soil Retention. Any conservation values related to the supply of basic ecosystem services are identified in the following indicators- 6.7: Wetlands and riparian areas are identified as ecosystems associated with delivering quality water. 10.5.1 and 10.5.2 and 10.11.1: Soils sensitive to erosion are required to be identified. Soil erosion results in the loss of soil and causes sedimentation of natural water bodies.	The Western Cape and Eastern Cape Biodiversity Spatial plans and National threatened ecosystems map were used to identify Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) to inform the identification of Priority Conservation Areas and units, notably wetlands and riparian zones. Critical soils sensitive to erosion do not occur. Soil information is included in the Microforest plans of plantation and used to minimize impacts on soils and not included as priority areas.
HCV 5 – Community needs. Sites and resources fundamental for satisfying the basic necessities of local communities or indigenous peoples (for livelihoods, health, nutrition, water, etc.), identified through engagement with these communities or indigenous peoples.	These values are identified through compliance with the following indicators: 4.1.3 and 5.1.1	Not identified as Priority areas, as no known areas fundamental to satisfying basic necessities occur. General values are protected though Forestry industry standards.
HCV 6 – Cultural values. Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous peoples,	These values are protected by the implementing 4.7.2	HCV Not applicable. All local sites are included in the Areas of Special interest monitoring program.

identified through engagement with these local communities or indigenous peoples. (C9.1 P&C V4 and Motion 2014#7)"

A list of PCA areas per plantation, the main aspect for which they were chosen, and the monitoring implemented for them is shown below.

Longmore

PCA	Hectares	CBA Aspect	Monitoring
Longmore Forest	29,31	Forest	Weed monitoring
Bulk river catchment	618,92	Riparian	Weed monitoring
Stinkhout kloof	3,39	Forest	Weed monitoring, Forest
Van Stadens Heritage site	1884,46	Biodiversity	Weed monitoring, Heritage site, rare species
Sand River catchment	903,66	Riparian	Weed monitoring
Van Stadens catchment	317,64	Riparian	Weed monitoring
Hewitts Ghost Frog Geelhoutboom river	301,19	Biodiversity	Weed monitoring, HGF main
Hewitts Ghost Frog Martins river	141,87	Biodiversity	Weed monitoring, HGF occasional
Hewitts Ghost Frog Klein river	97,61	Biodiversity	Weed monitoring, HGF occasional
Total area	4298,05		

Witelsbos

PCA	Hectares	CBA Aspect	Monitoring
Indigenous Forest K23	6,77	Forest	Weed monitoring
Indigenous Forest K24 (Klein Witelsbos)	93,05	Forest	Forest, Weed monitoring
Indigenous Forest L86	52,48	Forest	Weed monitoring
Corridor J80	136,62	Biodiversity Forest	Weed monitoring
Koomansbos Corridor	40,42	Biodiversity Forest	Weed monitoring
Indigenous Forest A33	23,88	Forest	Weed monitoring
Corridor B74	4,33	Biodiversity	Weed monitoring
Corridor C74	224,20	Biodiversity Forest	Weed monitoring
Indigenous Forest C74	11,53	Forest	Weed monitoring
Corridor C77	189,47	Biodiversity Forest Riparian	Weed monitoring
Woodlands Corridor C79	137,92	Biodiversity	Weed monitoring
Indigenous Forest M1	5,19	Forest	Weed monitoring
Riparian Zone D35	12,19	Riparian	Weed monitoring
Kareedouwberg	401,36	Biodiversity	Weed monitoring, NHS site monitoring
Kromme River rip Zone 1	38,95	Riparian	Weed monitoring
Kromme River rip Zone 2	187,10	Riparian	Weed monitoring
Kromme River rip Zone 3	76,27	Riparian	Weed monitoring
Total area	1644,73		

Lottering

PCA Name	Hectares	CBA Aspect	Monitoring
Indigenous Forest S68	3,81	Forest	Weed monitoring
SanParks Forest Buffer 1	53,33	Forest	Weed monitoring
SanParks Forest Buffer 2	15,18	Forest	Weed monitoring
Kleinbos River North	57,78	Riparian	Weed monitoring
SanParks Forest Buffer 3	39,30	Forest	Weed monitoring

Indigenous Forest D87	401,57	Forest	Weed monitoring
Ratelsbos Forest C48	15,55	Forest	Forest, Weed monitoring
Elandsriver Corridor	122,19	Biodiversity	Weed monitoring
Lottering River Corridor North	68,48	Biodiversity	Weed monitoring
Lottering River Corridor South	32,59	Biodiversity	Weed monitoring
SanParks Forest Buffer 4	2,81	Forest	Weed monitoring
Lottering Riparian zone 1	15,79	Riparian	Weed monitoring
Indigenous Forest E50	72,31	Forest	Weed monitoring
Lottering Riparian Zone 2	29,38	Riparian	Weed monitoring
Lottering Riparian Zone 3	10,47	Riparian	Weed monitoring
Lottering Riparian zone 4	9,23	Riparian	Weed monitoring
SanParks Rugbos forest Buffer	47,98	Forest	Weed monitoring
Lottering Riparian Zone 5	3,87	Riparian	Weed monitoring
Bloukrans Gorge	166,98	Biodiversity	Weed monitoring
SanParks Toll Bridge Forest buffer	7,78	Forest	Weed monitoring
SanParks Forest Buffer 5	2,62	Forest	Weed monitoring
Forest K24 – Klein Witelsbos	16,19	Forest	Weed monitoring, forest
Lottering Riparian zone 6	24,60	Riparian	Weed monitoring
KB Hek se Bos	355,51	Forest	NHS monitoring, Weed monitoring
KB Sanparks Wiskey Creek Buffer	26,69	Forest	Weed monitoring
KB Indigenous Forest N36	51,20	Forest	Weed monitoring
KB Riparian zone 1	20,47	Riparian	Weed monitoring
KB Riparian zone 2	5,61	Riparian	Weed monitoring
KB Riparian zone 3	51,78	Riparian	Weed monitoring
KB Rondebos Forest	1,03	Forest	Forest, Weed monitoring
Maatjiesfontein Forest Corridor	176,60	Forest	Forest, Weed monitoring
Total area	1908,89		

Kruisfontein

PCA	Hectares	CBA Aspect	Monitoring
Indigenous Forest A14	24,13	Forest	Weed monitoring
Fynbos Corridor A16	14,02	Biodiversity	Weed monitoring
Indigenous Forest A22	4,96	Forest	Weed monitoring
Indigenous Forest B10	24,41	Forest	Weed monitoring
Indigenous Forest C15	4,72	Forest	Weed monitoring
Sand plein fynbos reserve	67,60	Biodiversity	Fynbos, Weed monitoring
Indigenous Forest C15	7,45	Forest	Weed monitoring
Indigenous Forest D54	19,52	Forest	Weed monitoring
Indigenous Forest D56	7,07	Forest	Weed monitoring
Indigenous Forest D57	19,76	Forest	Weed monitoring
Indigenous Forest D67	40,37	Forest	Weed monitoring
Indigenous Forest G22 (Noetzie)	15,35	Forest	Forest, Weed monitoring
Block K corridor	530,51	Biodiversity	Forests (Klein Gouna), Weed monitoring
Total area	779,87		

Garcia

PCA	Hectares	CBA Aspect	Monitoring
Indigenous forest patches	29,41	Forest	Weed monitoring
Meulen river catchment	295,15	Forest	Forest, Weed monitoring
Koppies river riparian zone	38,34	Riparian	Weed monitoring
Erica ixanthera habitat	6,68	Biodiversity	Rare species, Weed monitoring
Total area	269,58		

Jonkershoek

PCA	Hectares	CBA Aspect	Monitoring
Block 2 Fynbos	20,68	Biodiversity	Weed monitoring
Block 1 Fynbos and burnt forest	60,48	Biodiversity	Weed monitoring
Eerste river corridor	21,13	Riparian	Weed monitoring
Heuningkloof forest and riparian corridor	22,21	Forest	Forest, Weed monitoring
Indigenous forest M62	4,15	Forest	Forest, Weed monitoring
M67 riparian corridor	4,38	Riparian	Weed monitoring
M68 Forest and riparian corridor	33,00	Riparian	Weed monitoring
Abdolskloof	10,64	Biodiversity	Weed monitoring
M77 Riparian corridor	11,41	Riparian	Weed monitoring
Block 3 Fynbos	70,36	Biodiversity	Weed monitoring
Indigenous forest M85	12,63	Forest	Forest, Weed monitoring
Total area	271,07		

1.1.4 General Management Recommendations

Below is a review of the impacts that could be faced by Priority Conservation Areas and a summary of how these risks will be managed and minimised.

Potential impact	Risk Mitigation and management
Fragmentation	PCA areas not to be converted or transformed. Development reliant on implementation on the Environmental Impact Assessment Management procedure (MP). Where improvements are identified to layout, and changes are possible that will lead to significant improvement to layout these will be considered.
Illegal activities (poaching, illegal harvesting)	MTO Access control and Security MP. Also refer to the Natural Resource Usage MP and Non Timber Forest products MP.
Weed infestation leading to change in habitat	Long term weed control program with monitoring of improvement over time. Prioritisation of PCA areas in planning. Refer to tending and weed control MP and the integrated pest management strategy.
Roads leading to erosion	Review of potential erosion aspects through normal monitoring. Control of impacts through improvement in road management. Refer to Road maintenance MP.
Burning rotations leading to transformation	Where possible and required, schedule of burning rotations of PCA areas to comply with prescribed conservation burning rotations as far as possible. Refer to Conservation Management plans.
Uncontrolled burning leading to damage	Fire protection and protection of areas through integrated fire protection. Refer to the Fire protection plan.
Forestry activities on critical species.	Site specific management requirements. Refer to Management plans.

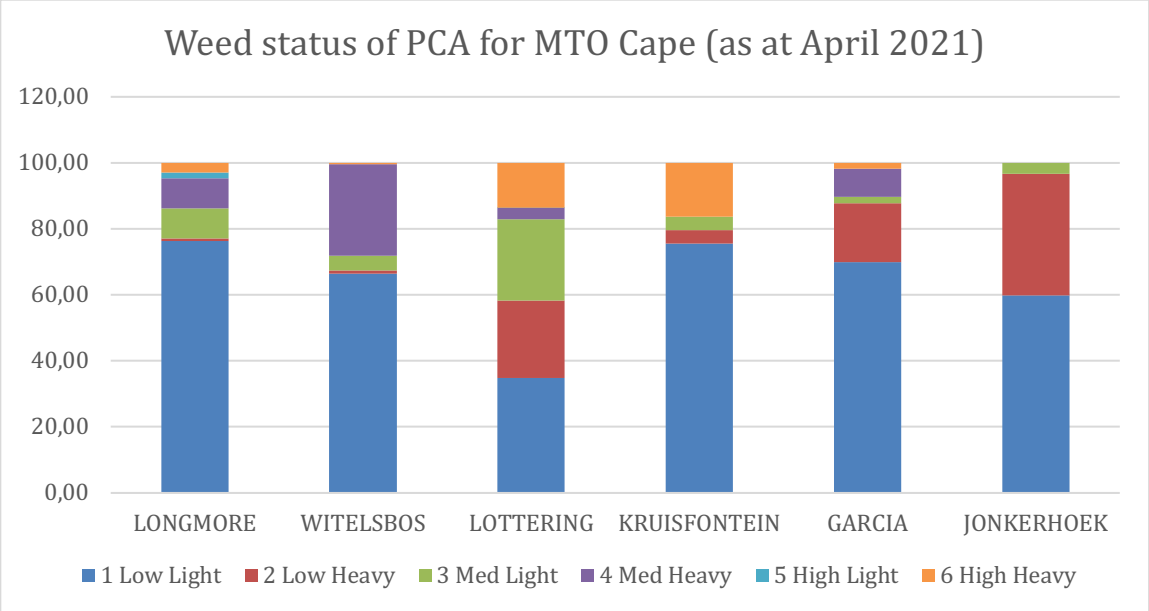
All priority conservation areas are currently scheduled for weed eradication. Fire rotations are in place where areas are managed as part of fire management or for conservation burning. Detailed information is available in the Conservation Mangement plans.

1.1.5 Monitoring Frequency

A summary of all monitoring per PCA is shown above under Summary of Results.

1.1.6 Summary of Results

Results of this monitoring program are shown under the relevant section in this report. Results of weed monitoring are included in Microforest. Detailed results are available on plantation, but for weeding are summarized here as of April 2021.



1.1.7 Monitoring Objective and Target

The objective for PCA management is to ensure that PCA areas are maintained in a stable state as close to natural as is viable and that they reach weed maintenance phase or are maintained in weed maintenance. The objective is that this goal is achieved. Achievement of this goal should be prioritised over the next 5 years.

1.2 Priority Conservation forests Monitoring

1.2.1 Requirement for monitoring

For the past 20 years, MTO Cape has monitoring forests that were identified by the company as representative High Conservation value forests (HCVF). In terms of the historical HCVF definitions no HCVF existed on MTO Cape plantations (all forests managed by MTO Cape are small patches and only parts of larger forests managed by SanParks). Nevertheless, MTO Cape decided to identify HCVF using additional local requirements, as indigenous forest is a key vegetation type, currently protected under national legislation. The criteria used to identify HCVF (Von dem Bussche, 2003) included:

- Large landscape dominating forest representing a well conserved indigenous forest ecosystem.
- Wet to very wet mountain forests bordering onto fynbos areas, which are subject to natural fires.
- Small inland forest surrounded by commercial plantations.
- Dry and very dry scrub forests
- Heavily infested forests with excessive alien vegetation.
- Forests at the ecological extremity of their natural range.

These same forests, as originally identified for monitoring are now identified as Priority Conservation Area Forests, as they represent a critical vegetation type and are therefore included in the Priority Conservation Areas monitoring program. MTO Priority Conservation Areas Forests are selected to detect trends over a long observation period, to assess management operations through monitoring and to keep records of representative small or isolated forests.

The Southern Cape indigenous forests, covering an area of 60 500 ha are the largest in South Africa and occur along the foothills of the coastal mountain range from George in the west to Humansdorp in the east. They represent the most southern extension of the Afromontane forest belt and stretch along the escarpment and the lowlands along the Indian Ocean coastal belt (Geldenhuys, 1982). The forests occur as

large landscape forest areas as well as smaller forest patches interspersing natural fynbos areas, wetlands and commercial plantations. The main forest areas are situated on stateforest land, which are managed by the South African National Parks Board (SANParks). Many indigenous forest patches of varying sizes, composition and status are also interspersed within MTO Cape plantations, and these are currently managed by MTO Cape as part of normal conservation mangement. All indigenous forests enjoy strict legal protection.

The main monitoring objective for MTO Priority Conservation forests are:

1. base-line information (status during time of first assessment),
2. to detect possible change after a predetermined period and,
3. to plan and implement adequate management activities to ensure correct management of these forests (also to be used as a guideline for other non monitored forest).

Monitoring long-term development and growth of indigenous forest is scientifically implemented at the FVC (French Volume Curve) research areas at Diepwalle (Vermeulen, 1994). In addition 966 permanent sample plots of 0,04 hectare each have been established in the indigenous forest controlled by SanParks (Vermeulen, 1994). Long-term, goal-orientated and systematic trend assessment of natural processes in the indigenous forest of the Southern Cape is therefore sufficiently attended to. A repetition of this work in the ecologically comparable indigenous forest on land controlled by MTO Cape is therefore not necessary.

The influence of commercial plantations on the indigenous forest however, needs to be monitored. The main influence of the plantation on the forest is experienced at the contact zones (forest edge or ecotone) and the influence of alien vegetation and the control thereof on the indigenous forest, forms the basis of the MTO Cape monitoring system. Fire can also significantly impact forest.

1.2.2 Monitoring protocol

Priority Conservation Forests are still selected in order to detect trends over a long observation period, to assess management operations through monitoring and to keep records of change over time. Formal monitoring was conducted every five years by a forest specialist and in the interim years by the forestry staff themselves.

The following information has been documented for each forest:

1. Name of the forest, plantation, compartment
2. General description
3. List of tree species according to the National Tree Number List
4. Regeneration
5. Ground cover
6. Past utilization
7. Present status
8. Edge (ecotone) description
9. Alien vegetation
10. Hydrology
11. Fire history
12. Fauna
13. Social functions
14. Fixed-point photo-monitoring sites
15. Other monitoring programs
16. Management proposals
17. General
18. Date of forest assessment and name of recorder.

A fixed-point photo-monitoring program, which creates a comparative, visual documentation of vegetation change, may it be due to natural causes or management induced actions, has been implemented. Photo records as well as documentation of fixed-point photo-monitoring sites are kept at a central office, while the information, relevant to each plantation, is kept at each plantation office.

1.2.3 Summary of Results

A list of all indigenous forests on MTO Cape plantations in the Eastern and Western Cape was compiled during 1996 – 1998. Twenty-one forests were historically chosen, and thirteen still form part of the monitoring (eight have been handed back to the State as part of the exit program). These forests represent a selection of different types of forests and include some unique indigenous forests on MTO Cape property.

In selecting these forests, the objective was to select a wide variety of forests, where different ecological parameters may be significant, and which could necessitate different management actions. The different reasons for selection are given for each forest on the relevant evaluation sheet. The forests were also selected in order to detect trends over a long observation period, to assess management operations through monitoring and to keep records for small and sometimes even insignificant forests.

Table 3. The current selected and assessed forests (which still occur on MTO Cape property, and under control of the company).

Plantation	Forest Code	Forest Name	Ha	Description
Garcia	Na 006 (A59)	Meulenrivierkloof	22.56	Riverine forest along the Meulenrivier with fynbos transition zones. Photo-monitoring.
Kruisfontein	Na 031 – 032 (K42)	Klein Gouna	95.02	Very dry scrub forest at steep slope towards Knysna River. Photo-monitoring. Damaged in the 2017 fire.
Kruisfontein	Na013 (G22)	Noetzie	1.49	Very small dry kloof forest surrounded by commercial plantations. Control of aliens is scheduled and will be monitored. Damaged in the 2017 fire.
Keurbooms	Na 003 – 004 (A28)	Hek se bos	128.99	Natural Heritage Site. Dry to very dry kloof forest with medium-moist riverine parts on slopes towards Keurboomsrivier. *Strelitzia alba* colony, is part of the forest and has been monitored in the past.
Keurbooms	Na 019 – 021 (D19)	Matjiesfontein	53.70	Large dry and very dry coastal scrub forest adjoining Wiskey Creek Nature Reserve and Keurboomsrivier Nature Reserve. Photo-monitoring.
Keurbooms	Na 015 (N38)	Rondebos	1.29	Very small dry inland forest patch, completely burnt during forest fire of April 1998. Photo-monitoring.
Lottering	Na 006 (B53)	Ratelbos	15.51	Wet mountain forest. Photo-monitoring to monitor burnt ecotone during fires of 1998 and 1999 and establishment of PSP's. Damaged in the 2018 fire.
Blueliliesbush	Na 003 (A24)	Klein Witelsbos	91.67	Fire-damage in 1996. Photo-monitoring. Damaged in the 2018 fire.
Witelsbos	Na 022 (C79)	Witelsbos	37.61	Dry kloof forest with riverine parts : Photo-monitoring.
Longmore	Na 001 (A38)	Longmore Forest	30.02	Dry to very dry kloof forest. Photo-monitoring.
Longmore	Na 006 (C21)	Stinkhoutkloof	3.42	Moist riverine forest with Keur fringe and a few Stinkwood (*Ocotea bullata*) trees. Previously badly damaged by fire. Photo-monitoring.
Jonkershoek	Na 012 (M75)	Heuningkloof	34.38	New sites Added 2010. Burnt in 2017. Photo-monitoring.

Jonkershoek	Na 018 (M85)	Burnt Forest	9.2	Added 2010. Burnt in 2009. Burnt in 2017. Photo-monitoring.

Detailed results of the initial monitoring are available in Von dem Bussche (2003), and the follow up photo monitoring and five yearly monitoring results are kept on plantation in the Priority Conservation Forests file.

1.2.4 General Management Recommendations

Scheduled operations are included into the conservation management plans of the plantation and include:

Potential impact	Risk Mitigation and management
Control of alien vegetation	Wattle, blackwood, eucalypt, pine and other alien vegetation notably along the edges of forests. In some cases tall mature Blackwood trees can be harvested and the timber can be utilized. The felling operations have to be acceptable according to environmental conservation principles. All other regrowth to be managed as part of long terms weed plans. Refer to tending and weed control MP and the integrated pest management strategy.
Maintenance of ecotone	It is of importance that during plantation harvesting operations no trees are felled into the forest or damage the ecotone of the forest. The officially prescribed buffer-zones between the forest and the first row of planted commercial trees must also be maintained at all times. It is essential that the buffer-zone is adequate for the establishment and maintenance of ecologically viable ecotones. Indigenous species are allowed to grow back into ecotones.
Uncontrolled burning leading to damage	Fire protection and protection of areas through integrated fire protection. Refer to the Fire protection plan.
Post fire damage recovery	Proactive weed control to ensure recovery of ecotones and forests damaged by fire. Protection of forests from fires during scheduled burning actions in adjoining compartments.
Harvesting	MTO Cape does not harvest indigenous trees.

1.2.5 Monitoring Frequency

Forest processes and dynamics are slow, and therefore responses to change can only be monitored over long time frames and were therefore scheduled every 5 years in the past, and will continue every 3 years in future to monitor the success of alien invasive plant control after impact by wildfires. Management monitoring is however carried out annually or every two years, and the weed status will be recorded on an annual basis as part of new Priority Conservation Area monitoring in future. During 2019 Jonkersberg Forest, Ratelbos and Klein Witelsbos, which were all damaged during the November 2018 fires were assessed for fire damage.

Table 5. Priority Conservation Forest monitoring schedule.

Plantation	Forest	2008	2009	2013	2014	2015	2018	2019	2020	* 2021	2022	2023
Garcia	Meulenrivierkloof	YES		YES			YES			3 YR		
Kruisfontein	Klein Gouna	YES		YES			YES			3YR		
Kruisfontein	Noetzie	YES		YES			YES			3YR		
Lottering	Hek se Bos		YES		YES		YES			3YR		
Lottering	Maatjiesfontein		YES		YES		YES			3YR		
Lottering	Ratelsbos	YES		YES			YES	Fire mon.				3YR
Lottering	Rondebos		YES		YES		YES			3YR		
Blueliliesbush	Klein Witelsbos	YES	YES			YES	YES	Fire mon.				3YR
Witelsbos	Witelsbos	YES	YES	YES			YES			3YR		
Longmore	Longmore Forest	YES		YES			YES			3YR		
Longmore	Stinkhoutbos	YES		YES			YES			3YR		
Jonkershoek	Heuningkloof		YES			YES		5Y				3YR

Jonkershoek	Burnt forest		YES			YES		5Y				3YR

Yes = completed five yearly monitoring.

* Monitoring delayed in 2021 and 2022 due to COVID will be caught up in 2023.

1.2.6 Monitoring Objective and Target

The monitoring objective is to monitor the recovery or condition of these forests over time. The short term target is to ensure that recovery is encouraged through the removal of weeds and protection from future uncontrolled fires. Annual monitoring ensures that management can be provided (such as weeding), should it be noted during monitoring. The long term target is maintenance of these forests in as natural a state as possible.

1.3 Natural Heritage Site Monitoring

1.3.1 Requirement for Monitoring

The South African Natural Heritage Program (not to be confused by the UNESCO Natural Heritage site program) was launched in South Africa in1984 as a voluntary cooperative venture between the Government (represented by the Department of Environmental Affairs and Tourism at the time), the regional nature conservation agencies, the Worldwide Fund for Nature (WWF) and the private sector through Schneider. The program was aimed to private landowners who would dedicate a tract of land to conservation through registration. This program was discontinued in the 2000's, but still left a legacy of encouraging the protection of important natural sites, and MTO Cape still therefore honors the management of these sites that were registered while the program was still in operation.

MTO Cape, had three historical Natural Heritage sites. These are: Van Stadensberg (No. 211) on Longmore plantation which is an important fynbos mountain habitat, Kareedouwberg (No. 299), of which only the front portion of the Kareedouwberg fynbos mountain still occurs on Witelsbos plantation and Hek se Bos (No. 255), an indigenous forest occurring on the Keurbooms section of Lottering plantation and included as a Priority Conservation Forest.

1.3.2 Monitoring Protocol

To monitor changes over time a photo-monitoring program was initiated for each site from 2015. Monitoring will concentrate on the critical components of each site, which warranted their registration initially, and will be repeated every two years. The last monitoring of these sites was in 2017 (Hek se Bos, Kareedouwberg) and 2018 (Van Stadensberg).

Table 6. NHS monitoring.

NHS	Monitoring requirement
Van Standensberg	Photomonitoring of rare species habitat, and ecotone monitoring.
Kareedouwberg	General alien spread from plantation to adjoining mountain and monitoring of the recovery of the old pine compartment area below the lookout.
Hek se Bos	General overview forest monitoring and ecotone monitoring of the fynbos portion also included in the heritage site.

1.3.3 Summary of Results

Old photographs of these sites are available on file. 2015 monitoring results including photomonitoring can be found in a report by G.v.d Busche (2015). 2018 monitoring results can be found in von dem Busche and du Preez (2018) and 2020 monitoring in Kirkman (2020). Results are summarized here:

NHS	2015 Monitoring summary	2017/2018 Monitoring Summary	2020 Monitoring Summary

Van Standensberg	The whole area was subject to a hot and intensive veld fire in 2005 and has been subject to regular invader control operations, so that at present hardly any invaders along the plantation border have been observed with the only exception at one site at block Z9. In 2012 controlled block burns commenced in order to obtain different stages of fynbos development of the different management blocks over time. The present policy is to aim at a rotation of 12 – 18 years, however recent fire protection considerations have resulted in a reduction of the rotation to a minimum of 8 years for some blocks. This aspect that will need to be reviewed, with a longer period introduced to apply improved conservation planning.	An accidental veld fire burnt the total area of the NHS during June 2017. The climatic conditions before, during and after the second veld-fire had been extremely dry, so that the present monitoring was postponed to October 2018. Areas which did not burn between the two general veld fires of 2005 and 2017 have re-grown very well and the cover includes Proteaceae seedlings (serotinous species) and re-sprouters, while the area which had experienced accidental or controlled burns in between had generally a reasonable grass cover but definitely reduced Proteaceae re-sprout and no Proteaceae seedlings. This leads to the conclusion that a general rotation of 12 years is ideal for ecological reasons. Areas that burnt at intervals of 5 years and less, have probably experienced a loss of Proteaceae species, which is unfortunate but indicates that short rotations should be avoided for ecological reasons. No invader re-growth has occurred. This is probably the result of diligent weed control in the past and is an indication that intensive and correct removal of invaders, particularly *Pinus pinaster*, before fires, results in invader free fynbos areas.	Areas which did not burn between the two general veld fires of 2005 and 2017 have re-grown very well and the cover includes Proteaceae seedlings (serotinous species) as well as re-sprouters (*Leucodendron, Leucospermum*), while areas, which had experienced accidental or controlled burns in between had generally a reasonable grass cover and recovering *Leucodendron and Leucospermum*, but definitely reduced Proteaceae recovery. This confirms that longer rotations are required (to allow proteas to grow, flower and seed), and veld must be protected at least for 9 - 12 years between fires. The regrowth of proteas should determine the best ecological time to burn. Areas which burnt in intervals of 5 years and less are still not recovering their Protea component, and should still be protected going forward to allow the few plants that remain to flower and set seed to aid with recovery. Invaders have not returned and control efforts have been successful. The clean nature of the site before the fires really assisted with this, and shows that clean areas will greatly reduce costs in the long term.
Kareedouwberg	The few indigenous forests along drainage lines and rivers were badly damaged during the wild-fire of 2005, however well - developed Keur (*Virgilia oroboides)* buffers have established themselves subsequently. The southern slopes consist mainly of Mountain Fynbos. The whole area, including the adjoining commercial plantation, was burnt during 2005 by a devastating and hot wild-fire but has	Follow – up weed control at all the fynbos areas, along drainage lines and indigenous forests require urgent attention and should be scheduled. Block burn plans should be drawn up in accordance with fire-protection planning for the plantation. Most fynbos areas (except for the north-eastern areas which burnt in 2014) have last burnt during 2005 and are now 12 years old. Fynbos on the south-facing slopes should burn every 12-15 years. *NOTE: These*	This area was burnt in the October 2018 fire. A firebreak has been recently prepared, and compartment F15d is still not planted (due to be planted early 2021). The fynbos area shows good signs of recovery, with only a very few aliens (wattle) close to the road. Otherwise the area is totally clean and recovering well. Mountain Cedar regrowth was also noted at the site.

	subsequently recovered. The fynbos is now 10 years old and controlled block burns should be scheduled soon. Most of the fynbos areas above the commercial plantation are at present invaded by pine and control should be investigated. The area west of Clarkson burnt during 2014, while large areas of the northern slopes, at present under the control of DAFF also burnt during 2014, nine years after the previous wild-fire. The buffer zone between the NHS and the commercial planation is well defined. The rehabilitation area below the tower, part of FB06, consists of well - established fynbos elements, however young pine re-growth was observed at many sites and will need to be scheduled for a follow – up operation soon.	*areas subsequently burnt in the wildfire event in November 2018. Weed follow up will be scheduled.* The remaining indigenous forests along the drainage lines have a high environmental value and must not be endangered during scheduled burns or accidental fires. Proper planning and preparation to protect the forest edge (ecotone) during scheduled prescribed burning operations is required. *Note: This forest edge was affected by the November 2018 wildfire.* The Rehabilitation area (F32 Se 0028 / Tb) was until a few years ago covered with large *Pinus pinaster*. Recommendations to control pines and other invasive species and to schedule a controlled burn of the area have not been implemented. Urgent actions are suggested. *Note: This are was burnt in the November 2018 wildfire, and weed follow up will be scheldued.*	Good recovery of the fynbos was seen, with King Protea flowering (in unburnt patches), and a good regrowth of fynbos observed. No erosion noted.
Hek se Bos	The forest borders onto fynbos and rehabilitation areas (previously commercial plantations) and have now developed towards fynbos and thicket. The ecotones and buffer zones along the forest edges are well developed, however a few large wattle trees are evident along parts of the forest edge. Weed eradication has been scheduled. The mountain fynbos areas, mainly on north/western slopes at the south/western side, has recovered well after the fire of April 1997 and have developed now towards fynbos and thicket. A few pine and wattle invaders are evident however and a dense *Eucalyptus* has emerged at the N/W corner. These will	The Erosion scar has stabilised substantially and the forest edge appears in good health with good stands of Blombos (*Metalasia muricata*) and Keur (*Virgilia divaricata*) observed between the edge of the road and the forest below in the area previously affected. Control of alien invasive species has been done but a follow – up operation is urgent and needs to be scheduled. Large single pines and eucalypts inside the forest must please be ring-barked and not felled in order not to damage the surrounding vegetation. Follow-up is particularly important above the *Strelitzia alba* colony. The area which was previously commercially planted, has rehabilitated well and the Fynbos is well established and should be incorporated into controlled burning schedule	Vegetation has grown extensively since the 2017 photo monitoring, and along the road is now up to 3m high. Significant Keur regrowth was seen. A significant amount of Eucalyptus and black wattle regrowth was however also seen, and follow up weed eradication should be scheduled. For fire protection purposes, a controlled burn could be considered in the old fynbos along the forest buffer (which is now 22 years old). The *Strelitzia* colony appears to be in good condition. The site is very inaccessible and some large eucalyptus are still visible (e.g. 200m downslope) and not killed. Some young eucalyptus also noted. The site will need to be scheduled

	be addressed. The erosion scars, caused by the flooding in 2007, have stabilized and are well covered with vegetation.	done as soon as possible but no later than 2020 as the fynbos is now 19 years old. Follow-up weeding should be prioritised. The *Strelitzia alba* colony is in good condition.	for weed control again, in areas that can be reached (especially along road) to keep the invasion of weeds low.

1.3.4 General Management Recommendations

Management of the Natural heritage sites is included in the Conservation plans of the respective plantations. This includes primarily weed eradication and fynbos burning for conservation management, and potential erosion control, should it occur after fires.

1.3.5 Monitoring Frequency

Natural Heritage sites form part of the Priority Conservation areas monitoring. Monitoring of the sites to review general status is to occur every three years. Next monitoring is 2023.

1.3.6 Monitoring Objective and Target

The monitoring objective is to monitor the status of these sites over time. Monitoring ensures that management can be provided (such as weeding), should it be noted during monitoring, and that impacts can noted over time.

2. BIODIVERSITY PROCESS

2.1 Water Quality Monitoring

2.1.1 Requirement for Monitoring

The conservation and wise use of water are priorities in South Africa. For this reason the maintenance of riparian zones and wetlands is seen as a priority within the South African forestry context. Rivers and riparian zones also form critical habitat and biological corridors within forestry areas and as such should therefore be maintained to improve the overall biodiversity value of a planted area. Detailed monitoring, concentrating on benchmark monitoring and site impact monitoring, to determine change over time, are both important tools used to monitor water quality, and hence, the state of the river system. All the sites identified for water quality monitoring are also Priority Conservation areas.

Monitoring of stream flow reduction is done at National level in various catchment experiments which have been used to drive forestry policy in South Africa since 1972 towards the mitigation of this impact. Due to the complexity and scientific expertise required, plantation level monitoring is not feasible.

2.1.2 Monitoring Protocol

A water quality monitoring program was initiated for the MTO Cape in 1999. The SASS5 bio monitoring system is used. The monitoring system is essentially a bio-monitoring system of the benthic invertebrates coupled with a habitat assessment and the measurement of certain physical parameters such as temperature, pH, turbidity, dissolved oxygen and conductivity. Selected sites were sampled once a year for three years to establish baseline conditions. After the three years, sites were revisited every third year to determine whether there are any changes. In 2012, fish and dragonfly monitoring were also included in the monitoring programme, but not continued from 2019. Last monitoring occurred in 2022 for selected sites and is scheduled every three years. In 2022, new sites were added to include sites above Stormsriver village (Witteklip river), and on the Elands river following concerns regarding onsite impacts due to chemical operations. From 2022 Diatom monitoring has also been included for some selected sites as part of the MTO long term programe (Koekemoer 2022).

According to Koekemoer (2022) diatoms have been shown to be reliable indicators of specific water quality problems such as organic pollution, eutrophication, acidification, and metal pollution, as well as for general water quality. Diatom-based water quality indices for riverine ecosystems have been implemented in South Africa since 2004 as there is a measurable relationship between water quality variables such as pH, electrical conductivity, phosphorus and nitrogen, and the structure of diatom communities as reflected by diatom index scores, allowing for inferences to be drawn about water quality

Table 7. SASS5 sampling has been carried out at the following sites on MTO Cape land. Current and future diatom monitoring sites are also shown.

Site No.	Site name	River	System	Plantation	Latitude	Longitude	(m a.s.l)	Diatom site
K60F-03	Swaneberg	Bos	Noetzie	Kruisfontein	-34.03230	23.19548	250	No
K60G-04	Pumphouse	Witels	Noetzie	Kruisfontein	-34.03562	23.16029	210	Yes
K60G-05	Bracken Falls	Witels	Noetzie	Kruisfontein	-34.04607	23.16302	190	Yes
K60G-06	Noetzie	Noetzie	Noetzie	Kruisfontein	-34.05909	23.13253	50	Yes
K80A-01	Grenadier	Lottering	Lotering	Lottering	-33.93299	23.72952	267	No
K80A-02	Elandsbos	Lottering	Lottering	Lottering	-33.96415	23.74512	234	No
K80A-03	Lottering	Lottering	Lottering	Lottering	-33.97261	23.74729	204	No
K80A-06	Lower Lottering	Lottering	Lottering	Lottering	-33.99088	23.73675	1	No
K80B-01	Kleinbos	Kleinbos	Kleinbos	Lottering	-33.96386	23,81587	250	No
K80B-02	Boskor	Kleinbos	Kleinbos	Lottering	-33.96386	23.81998	208	No
K80B-06	Boskorspruit	Boskorspruit	Boskorspruit	Lottering	-33.99796	23.8017	198	No
K80B-03	Blueliliesbush	Sanddrift	Sanddrift	Witelsbos	-33.972	23.97799	260	Yes
K80B-04	Sanddrift	Sanddrift	Sanddrift	Witelsbos	-33.99041	23.97972	220	No
K80B-07	Upper Witteklip	Witteklip	Storms	Lottering	-33.956273	23.868994	254	Yes
K80B-08	Lower Witteklip	Witteklip	Storms	Lottering	-33.964056	23.873274	226	Yes
K80C-01	Upper Elands	Elands	Elands	Witelsbos	-33.975679	24.049828	219	Yes
K80C-02	Wolf sanctuary	Elands	Elands	Witelsbos	-33.980594	24.050105	211	Yes
L90B-01	Upper Klein	Klein	Klein	Longmore	-33.76822	25.0228	450	No
L90C-01	Loerie's Drift	Loeriespruit	Loerie	Longmore	-33.81489	25.08950	350	No
L90C-02	Emerald Pool	Geelhoutboom	Geelhoutboom	Longmore	-33.79663	25.06504	430	No
L90C-04	Geelhoutboom	Geelhoutboom	Geelhoutboom	Longmore	-33.80072	25.05728	410	No
L90C-05	Martins Drift	Martins	Martins	Longmore	-33.79358	25.03825	410	No
M10A-01	Upper Sand	Sand	Sand	Longmore	-33.75901	25.07253	430	Yes
M10B-02	Bulk u/s Dam	Bulk	Bulk	Longmore	-33.80827	25.15872	330	Yes
M20A-01	Van Stadens	Van Stadens	Van Stadens	Longmore	-33.84787	25.22198	310	Yes

New proposed site from 2024

Site No.	Site name	River	System	Plantation	Latitude	Longitude	(m a.s.l)	Diatom site
H90B-01	Garcia Meulen	Meul river	Meul river	Garcia				Yes

2.1.3 Summary of Results

Detailed results of the SASS5 monitoring are provided in the specific site reports provided by Diedericks on a three-to-five-year rotation (latest in Diedericks, Roux and Koekemoer 2012 and Diedericks 2015, Diedericks 2018a, 2018b, Diedericks 2019, Diedericks 2021, Diedericks 2022, Koekemoer 2022). The SASS5 method was applied to generate the appropriate biomonitoring data with ancillary measures of habitat availability generated by the Integrated Habitat Assessment System, (IHAS version 2). A Comprehensive Habitat Integrity Assessment (or Index of Habitat Integrity - IHI) was also applied at each site sampled. For many, sites were chosen to measure specific impacts at a particular site over time. From 2021 a summary of findings over time has been included in this report. The reasons for change are explained in the detailed reports for each year.

Summary of findings for Kruisfontein over time (from Diedericks 2021).

Table 3-4. Ecological categories per sampling site per sampling period. The percentage change represents the change between the November 2021 results compared to the 90th percentile of previous results. The "ns" stands for not sampled.

Site	Site Name	SAMPLING DATE											Change (%)
		Sep 1999	Oct 2000	Oct 2001	Oct 2002	Oct 2003	Nov 2004	Oct 2005	Sep 2007	Mar 2012	Oct 2018	Nov 2021	
K60F-03	Swaneberg	C	D	D	ns	ns	D	ns	C	ns	B	ns	↗
K60G-04	Pumphouse	D/E	D	E	D	C/D	D	D	D	ns	C/D	ns	↗
K60G-05	Bracken Falls	C	C	C	C	C	C	ns	C	E	C	C/D	18%↓
K60G-06	Noetzie	B	C	C	ns	ns	C	ns	C/D	C	C	C	10%↘

* Sites signicantly impacted by wildfire in June 2017.

Summary of findings for Longmore over time (from Diedericks 2021).

Table 3-3. Ecological categories per sampling site per sampling period. The percentage change represents the change between the November 2021 results compared to the 90th percentile of previous results.

Site	Stream	SAMPLING DATE											Change (%)
		Oct 2001	Sep 2002	Oct 2003	Nov 2004	Oct 2005	Oct 2006	Sep 2007	Oct 2008	Sep 2010	Oct 2015	Oct 2018	Nov 2021	
L90B-01	Klein	B	B	B	C		C	B/C	B	C	B/C	B	B	3% ↘
L90C-01	Loerie		C	B/C	C	B/C	C	C			B	B	B/C	5% ↘
L90C-02	Geelhoutboom	B	B/C	C	B/C	C		C	C	C	B/C	B	C	10% ↓
L90C-04	Geelhoutboom	C	B/C	B	B	B	C	C	B	B/C	B	B	C	11% ↓
L90C-05	Martin's	B	B	C	C	C		C	B/C	C	C	C	D	33% ↓
M10A-01	Sand							D				B/C	B	22% ↑
M10B-01	Bulk											D	B/C	16% ↑
M20A-01	Van Stadens		B/C	B	A/B	B	E	D/E				B/C	C	19% ↓

Summary of findings for Witelsbos over time (from Diedericks 2022).

Table 4-3. Stream condition based on SASS biomonitoring results for sites on the Sanddrift River on Witelsbos plantation, using MIRAI. Refer to Table 3-1 for condition scale.

Site Code	Site Name	River	Category										Change (from previous surveys)
			1998	1999	2000	2001	2004	2007	2012	2015	2019	2022	
K80B-03	Blueliliesbush	Sanddrift	B	B	B	B	B	B	C	C	B	B/C	↘
K80B-04	Sanddrift			D	B/C	B	B	C	C	C	B	B/C	↘

* = A = "natural"; B = largely natural; C = moderately modified; D = largely modified; E = seriously modified; F = critically modified

Table 4-7. Stream condition based on SASS biomonitoring results for sites on the Elands River on Lottering plantation using MIRAI.

Site Code	Site Name	River	Oct 2022
K80C-01	Upper Elands	Elands	B
K80B-08	Wolf Sanctuary	Elands	B

* = A = "natural"; B = largely natural; C = moderately modified; D = largely modified; E = seriously modified; F = critically modified

Summary of findings for Lottering over time (from Diedericks 2022).

Table 4-6. Stream condition based on SASS biomonitoring results for sites on the Lottering River on Lottering plantation, using MIRAI. Refer to Table 3-1 for condition scale.

SITE CODE	SITE NAME	RIVER	CATEGORY*								CHANGE
			2002	2003	2004	2005	2008	2015	2019	2022	(From previous surveys)
K80A-01	Grenadier	Lottering	B	B	B	B	B	C	B	B	→
K80A-02	Elandsbos		B	B	B	B/C	B	C	B	B/C	↘
K80A-03	Lottering		B	B	B	B/C	C	B/C	B/C	B	→
K80A-06	Lower Lottering					B/C			A/B	B	→

* = A = "natural"; B = largely natural; C = moderately modified; D = largely modified; E = seriously modified; F = critically modified

Table 4-10. Stream condition based on SASS biomonitoring results for sites on the Kleinbos River and Boskorspruit on Blueliliesbush (Lottering) plantation using MIRAI.

Site code	Site name	River	Category											Change (from previous surveys)
			1998	1999	2000	2001	2004	2007	2008	2010	2012	2015	2019	2022	
K80B-01	Kleinbos	Kleinbos	B	B	B	B	A/B	C	C	B	C	B	B	C	↓
K80B-02	Boskor			C	B/C	C	B	C	C	B/C	C	C	B/C	B/C	↘
K80B-06	Boskorspruit	Boskorspruit						C	C	E	D	C/D	C/D	C/D	↘

* = A = "natural"; B = largely natural; C = moderately modified; D = largely modified; E = seriously modified; F = critically modified

Table 4-14. Stream condition based on SASS biomonitoring results for sites on the Witteklip River on Lottering plantation using MIRAI.

Site Code	Site Name	River	Oct 2022
K80B-07	Upper Witteklip	Witteklip	B
K80B-08	Lower Witteklip	Witteklip	B

* = A = "natural"; B = largely natural; C = moderately modified; D = largely modified; E = seriously modified; F = critically modified

Table 3-1. Description of ecological stream conditions as guidelines for allocation of ecological categories (based on Kleynhans 1996, 1999 & Government Gazette, 30 December 2016, No. 1616, Department of Water and Sanitation).

ECOLOGICAL CATEGORY	GENERIC DESCRIPTION OF ECOLOGICAL CONDITIONS
A	Unmodified/natural, close to natural or close too predevelopment conditions within the natural variability of the system drivers, hydrology, physico-chemical and geomorphology. The habitat template and biological components can be considered close to natural or to pre-development conditions. The resilience of the system has not been compromised.
A/B	The system and its components are in a close to natural condition most of the time. Conditions may rarely and temporarily decrease below the upper boundary of a B category.
B	Largely natural with few modifications. A small change in the attributes of natural habitats and biota may have taken place in terms of frequencies of occurrence and abundance. Ecosystem functions are essentially unchanged.
B/C	Close to largely natural most of the time. Conditions may rarely and temporarily decrease below the upper boundary of a C category.
C	Moderately modified. Loss and change of natural habitat and biota have occurred in terms of frequencies of occurrence and abundance. Basic ecosystem functions are still predominantly unchanged. The resilience of the system to recover from human impacts has not been lost and it is ability to recover to a moderately modified condition following disturbance has been maintained.
C/D	The system is in a close to moderately modified condition most of the time. Conditions may rarely and temporarily decrease below the upper boundary of a D category.
D	Largely modified. A large change or loss of natural habitat, biota and basic ecosystem functions have occurred. The resilience of the system to maintain the category has not been compromised and the ability to deliver ecological goods and services have been maintained.
D/E	The system is in a close to largely modified condition most of the time. Conditions may rarely and temporarily decrease below the upper boundary of an E category. The resilience of the system is often under severe stress and may be lost permanently if adverse impacts continue.
E	Seriously modified. The change in the natural habitat template, biota and basic ecosystem functions are extensive. Only resilient biota may survive, and it is highly likely that invasive and problem (pest) species may dominate. The resilience of the system is severely compromised as is the capacity to provide ecological goods and services. However, geomorphological conditions are largely intact but extensive restoration may be required to improve the system's hydrology and physico-chemical conditions.
F	Critically / Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete change of the natural habitat template, biota, and basic ecosystem functions. Ecological goods and services have largely been lost. This is likely to include severe catchment changes as well as hydrological, physico-chemical, and geomorphological changes. In the worst instances, the basic ecosystem functions have been destroyed and the changes are irreversible. Restoration of the system to a synthetic but sustainable condition acceptable for human purposes and to limit downstream impacts is the only option.

Diatom results

Diatoms were collected in 2022 to determine whether glyphosate-based herbicide applications in commercial tree compartments are indicating changes in the stream community. Biological water quality at Site K80C-02 in the downstream reach of the Elands River obtained a SPI score of 18.1, reflecting high quality (Ecological Category A/B; Table 3-5). Based on the diatom assemblage collected, nutrient levels, salinity concentrations and organic load was low, decreasing from Site K80C-01

Table 4-8. Diatom results for the two Elands River sites, October 2022.

Site	No. of Species	SPI score	Class	Category	PTV (%)	Valve deformities (%)
K80C-01	14	17.6	High quality	A/B	5.8	0
K80C-02	10	18.1	High quality	A	0	0

Biological water quality for both sites in 2022 on the Witteklip river, control (K80B-07) and impact (K80B-08), had a low diversity dominated with very sensitive taxa, expected for these rivers. Valve deformities were observed at an abundance of 0.3% (1/400), potentially linked to leeching from an old waste landfill site used in the 1980s to 1990s by Storms River Village.

Table 4-15. Diatom results for Witteklip control (K80B-07) and impact (K80B-08) sites sampled October 2022.

Site	No species	SPI score	Class	Category	PTV (%)	Valve deformities (%)
K80B-07	11	18	High quality	A	0	0
K80B-08	9	19.7	High quality	A	3	0.3

2.1.4 General Management Requirements

General management requirements notably include weed eradication and the management of siltation through improved river crossing and road network management. All areas are part of long terms planning for improvement over time. SASS5 results include detailed management recommendations which are adopted when possible.

2.1.5 Monitoring Frequency

SASS5 and diatom Monitoring is scheduled every three years, with the next monitoring scheduled for LongmoreKruisfontein and Garcia in 2024.

2.1.6 Monitoring Objective and Target

Maintenance of water quality as category B. Where lower water quality, improvement in management to ensure continual improvement.

2.2 EROSION MONITORING

2.2.1 Requirement for Monitoring

As part of process monitoring, the identification, monitoring and rehabilitation of erosion sites has been initiated. This is a long-term program aimed at improving the ecological status of impacted sites. Eroded and degraded sites are caused as a result of incorrect management practices, such as road construction, firebreak erosion, burning, etc. All sites need to be identified and rehabilitated over time.

2.2.2 Monitoring Protocol

All sites are recorded as they are identified, either during routine plantation visits, or as reported by forestry staff. All sites are formally photographed and a site record established. A program to re photograph sites on a two to three yearly basis is managed by the plantation staff.

2.2.3 Summary of Results

Individual site records are available at each plantation.

2.2.4 General Management Requirements

When necessary active erosion sites will be scheduled for rehabilitation, either by improving draining impacts, seeding with indigenous seed mixed, or establishments of barriers using logs or gabions.

2.2.5 Monitoring Frequency

Two or three year monitoring will be carried out depending on the status of each site (stable or eroding). Monitoring is recorded in the Degraded sites register. Sites that are stable and rehabilitated are removed from the register.

2.2.6 Monitoring Objective and Target

The monitoring objective is to track improvement over time. All degraded sites should be in a status of stable or improvement within two years of sites being identified.

2.3 WEED ERADICTION MONITORING

2.3.1 Requirement for Monitoring

To improve weeding and develop a holistic plan for each plantation, a programme to determine weed intensity and spread was initiated in 2007. The system of identifying the current weed intensity within the conservation areas (with commercial areas later also included) was initiated, to identify the spread of weed through the plantation, and to then use this information to prioritise and schedule clearing activities on a 5 yearly basis. The intensity of spread will be reviewed every two years, and adaptations made to the clearing programme as required. Amongst other, the objective of weed ratings are to assist foresters with the prioritisation and scheduling of weed control activities over the medium term.

2.3.2 Monitoring Protocol

To quantify the amount of weed on the plantations, each conservation and commercial compartment is rated according to the amount (percentage cover) and size of weed (age), and effort needed to remove the weed (slashing, herbicide, chainsaw, cost) at least once in two years. Ratings of 1 have the lowest amount of weed and effort needed, while rating of 6 is the most infested and would cost the largest amount to remove.

Table 8. Classification used to rate the weed infestations per conservation and commercial compartment.

Rating	% weed cover	Effort needed to remove	Man day and effort required	Description Rating
0	No weed could occur (dam, graded area).			0
1	0-10 %	Young or few small patches in an area and easy to remove	Man days <3. Slashing, spraying.	Low light
2		Older or larger patches, more difficult to remove	Man days<3 or perhaps greater. Slashing, spraying, could include chainsaw	Low heavy
3	11- 50 %	Young or few small patches in an area and easy to remove	Man days 1 to 3. Normally not chainsaw.	Medium light
4		Older or larger patches, more difficult to remove	Man days 1 to 3. Chainsaw could be required.	Medium heavy
5	51 – 100 %	Young or few small patches in an area and easier to remove.	Man days 1 to 3. Normally not chainsaw.	High light
6		Older or larger parches, more difficult to remove	Man days > 3. Chainsaw required.	High heavy

Because it is difficult to include a quantification of the weeds species into a rating system, the actual species found within the compartment was merely added as a comment and did not influence the rating system.

2.3.3 Summary of Results

Individual site records are available at each plantation and on Microforest and GIS. A summary of the changes in total weed ratings for the company from 2008 is however shown below.

Figure 1. Summary of percentage weed for conservation areas 2008 – 2022.

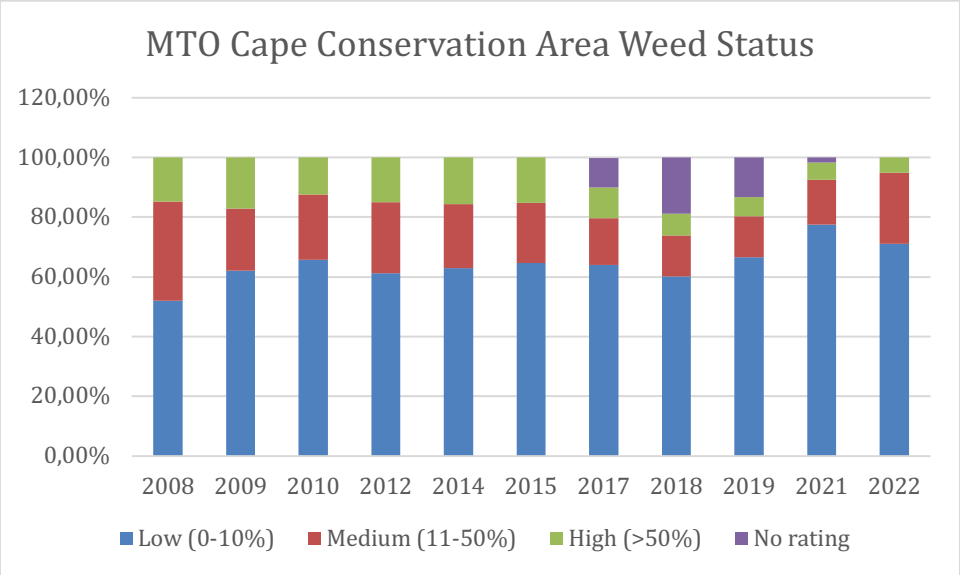


Table 9. MTO Cape Plantations: Total weed rating progress in hectares 2015-2022.

Weed Rating	Low (0-10%)	Medium (11-50%)	High (>50%)
2008	52,03%	33,25%	14,72%
2009	61,99%	20,90%	17,11%
2010	65,67%	21,86%	12,45%
2012	61,23%	23,81%	14,96%
2014	62,87%	21,53%	15,60%
2015	64,66%	20,21%	15,13%
2017	64,13%	15,50%	10,22%
2018	60,24%	13,75%	7,23%
2019	66,60%	13,80%	6,38%
2021	77,48%	15,02%	5,78%
2022	71,04%	23,09%	5,06%

1.3.4 General Management Recommendations

A conservation action plan has been developed for each plantation, which shows the requirements for weeding for all conservation areas. These plans are edited annually as changes are needed. All actions scheduled and completed work is recorded on Microforest. Weed eradication will continue annually in order to decrease the weed density over time. The aim is to decrease all weeds to a maintenance phase on the plantations. MTO Cape is also committed to the reduction in the use of chemicals as and is reviewing the intergrated approach

to herbicide use in 2022. Various methods to achieve chemical use reduction whilst at the same time ensuring that weeds are reduced are being reviewed and included in the company procedures.

2.3.5 Monitoring Frequency

Weed Monitoring is carried out every two years. From 2012 conservation as well as commercial areas were included in the monitoring. From 2019 the specific weed ratings of all priority conservation areas will also be reported annually to track improvement in weed ratings in these priority sites. Chemical is monitored annually.

2.5.6 Monitoring Objective and Target

The objective is to actively control weed infestations with the ultimate goal of achieving maintenance phase for all areas. The Target for the next 5 years is to achieve 75% maintenance for all conservation areas, 80% for PCA areas and maintain commercial areas above 75%.

3. SPECIES MONITORING

3.1 General fauna monitoring and the identification of Red data species

3.1.1 Requirement for Monitoring

Vertebrates have been relatively well documented in South Africa (www.sanbi.org). In total 243 mammals are found in South Africa, of which 17 are threatened species. Of the more than 800 bird species, 26 are threatened and 5 are declared as endangered. 370 reptiles and amphibians are known to occur in the region, of which 21 are threatened and 6 are endangered. 220 freshwater fishes occur, of which 21 are threatened.

A baseline database has been developed for all vertebrates (birds, mammals, reptiles, amphibians and fish) known to occur on MTO Cape plantations. This information was obtained by reviewing the South African National Biodiversity Institute (SANBI) databases and various species lists (see references in the tables below).

Baseline data is important when management decisions are taken, and when changes to the planted area are contemplated. General fauna monitoring should be seen as a long-term record keeping action, and the database will be expanded as more information becomes available.

Red Data species are those species that are known to be rare or threatened with extinction according to IUCN criteria. Species listed in the Red Data List are placed in categories that reflect the scarcity of the species. Species may be classified as Critically Endangered (CE), Endangered (E), Vulnerable (VU) and Near Threatened (NT). The identification of red data species is a priority, as where located, these species might require additional management and protection to ensure their survival, if their survival could be impacted by forestry. Using known literature for South Africa (www.sanbi.org) and the IUCN Red list (www.iucnredlist.org) a list of potential Red Data Species has been compiled.

3.1.2 Monitoring Protocol

From the 2021 IUCN Red List (www.iucnredlist.org) (downloaded August 2021) and South African red lists (www.sanbi.org) (2016 update) (South African Biodiversity Institute (SANBI) websites), the following Species of Special Interest, possibly occur on MTO Cape plantation, and are also shown in terms of their threatened or protected species status (TOPS) or CITES status. All known and existing sight record data are linked to this. The Threatened or Protected species regulations (Notice 388 of 2013, GG 16 April 2013, No. 36375) governs the protection or red data species in South Africa, while CITES (Convention on International Trade in Endangered Species), protects species internationally.

CITES I include all species threatened with extinction, which are or may be affected by trade. Trade in specimens of these species must be subject to particularly strict regulation in order not to endanger further their survival and must only be authorized in exceptional circumstances. Cites II include all species which although not necessarily now threatened with extinction may become so unless trade in specimens of these species is subject to strict regulation to avoid utilization incompatible with their survival.

From this list, all Red Data Species either positively identified, or potentially known to occur on MTO Cape plantations has been drawn up. Eight fish species (3 positively identified), fourteen frog species (1 positively identified), sixteen mammal species (4 positively identified), eight reptile species (1 positively identified) and twenty five bird species (14 positively identified) and 1 butterfly species (positively identified) were identified during this review. A formal review of databases will occur every two years.

Table 10. Red Data listed mammal species that could occur on MTO Cape property.

Common name	Scientific name	2021 IUCN status	2016 Red listing	TOPS 2013	CITES 2018	Jponkershoek	Garcia	Kruisfontein	Tsitsikamma	Longmore
Fynbos Golden mole	*Amblysomus corriae*	*NT*	*NT*	*None*	*None*	*X*	*X*	*X*	*X*	
Duthie's Golden mole	*Chlorotalpa duthiae*	*VU*	*VU*	*None*	*None*			*X*	*X*	*X*
Grey rhebok	*Pelea capreolus*	*NT*	*NT*	*None*	*None*	*X*	*X*	*X*	*X*	*X*
Blue duiker	*Philantomba monticola*	LC	VU					*YES*	*YES*	*YES*
Mountain reedbuck	*Redunca fulvorufula*	*EN*	*EN*					*X*	*X*	*X*
Cape clawless otter	*Aonyx capensis*	NT	NT	*Protected*	*Type II listed*	*X*	*X*	*X*	*X*	*YES*
Black footed cat	*Felis nigripes*	*VU*	*VU*	*Protected*	*Type I listed*	*X*				*X*
Serval	*Leptailurus serval*	*LC*	*NT*	*Protected*	*Type II listed*				*X*	*X*
Leopard	*Panthera pardus*	*VU*	*VU*	*Protected*	*Type I listed*	*X*	*YES*	*X*	*YES*	*YES*
African striped weasel	*Poecilogale alibinucha*	LC	NT	None	None	X	*X*	*X*		*X*
Southern African hedgehog	Atelerix frontalis	LC	NT	None	None					*X*
Long tailed forest shrew	*Myosorex longicaudatus*	*EN*	*EN*	*None*	*None*		*X*	*X*	*X*	
African marsh rat	*Dasmys incomtus*	LC	VU	*None*	*None*	*X*	*X*	*X*	*X*	*X*
Spectacled dormouse	*Graphiurus ocularis*	LC	NT	*None*	*None*			*X*	*X*	*X*
White tailed rat	*Mystromys albicaudatus*	VU	VU	*None*	*None*	*X*		*X*		
Elephant	*Loxodonta africana*	EN	LC	Protected	Type II listed			*YES*		

Positively identified species are shown as YES, species not yet identified, but which could potentially occur is shown as X.
Mammal references:

- Smithers, H.N. 2009. Stuart, C. & Stuart, T
- Friedman, Y & Yolan, B. 2006.
- IUCN red list: www.iucnredlist.org. Verified 10 August 2021.
- SA Red list: 2016 Red list of mammals of South Africa, Lesotho and Swaziland.
- TOPS 2007: Threatetened or Protected species regulations: Notice 388 of 2013, GG 16 April 2013, No. 36375.

Table 11. Red Data listed bird species that could occur on MTO Cape property.

Common name	Scientific name	SA Regional status	2021 IUCN status	TOPS 2013	CITES 2018	Jonkershoek	Garcia	Kruisfontein	Tsitsikamma	Longmore
Cape Cormorant	Phalacrocorax capensis	*EN*	*EN*	*VU*	*No*			*X*	*X*	
Whitebacked night heron	*Gorsachius leuconotus*	VU	LC	No	No			*X*	*X*	*X*
Black Stork	Ciconia nigra	*VU*	*LC*	*No*	*Type II*	*X*	*X*	*X*	*X*	*X*
African finfoot	*Podica senegalensis*	VU	LC	No	No		X	X	X	X
Yellow-billed Stork	Mycteria ibis	*EN*	*LC*	*No*	*No*			*X*	*X*	*X*
Cape Vulture	Gyps coprotheres	*EN*	*EN*	*VU*	*Type II*	*X*	*YES*			
Black Harrier	Circus maurus	*EN*	*EN*	*No*	*No*	*X*	*YES*	*X*	*X*	*X*
African marsh harrier	*Circus ranivorus*	EN	LC	No	No	X	YES	X	X	YES
African Crowned Eagle	Stephanoaetus coronatus	*VU*	*NT*	*No*	*Type II*	*X*	*X*	*X*	*YES*	*YES*
Martial Eagle	Polemaetus bellicosus	*EN*	*EN*	*No*	*No*	*X*	*X*	*X*	*X*	*YES*
Verreaxs' Eagle	Aquila verreauxii	*VU*	*LC*	*No*	*No*	*X*	*YES*	*X*	*YES*	*X*
Lanner Falcon	Falco biarmicus	*VU*	*LC*	*No*	*No*	*X*	*YES*	*X*	*X*	*YES*
Striped Flufftail	Sarothrura affinis	*VU*	*LC*	*No*	*No*	*X*		*X*	*X*	*X*
Blue Crane	Anthropoides paradiseus	*NT*	*VU*	*VU*	*Type II*	*X*	*YES*	*X*	*YES*	*YES*
Ludwig's Bustard	Neotis ludwigii	*EN*	*EN*	*No*	*Type II*		*YES*			
Denham's Bustard	Neotis denhami	VU	NT	VU	No		*YES*	*X*	*YES*	*YES*
Kori bustard	*Ardeotis kori*	NT	NT	Protected	Type II		*X*	*X*	*X*	*X*
Karoo korhaan	*Eupodotis vigorsii*	NT	LC	No	No		*X*			
Black rumped button quail	*Turnix nanus*	VU	LC	No	No		*X*	*X*	*X*	*X*
Hottentot buttonquail	Turnix hottentottus	EN	EN	No	No	X	*X*	*X*	*X*	*X*
Half-collared Kingfisher	Alcedo semitorquata	*NT*	*LC*	*No*	*No*	*X*	*X*	*X*	*YES*	*X*
Secretarybird	Sagittarius serpentarius	*VU*	*EN*	*No*	*Type II*	*X*	*YES*	*X*	*YES*	*YES*
Cape rockjumper	Chaetops frenatus	*NT*	*NT*	*No*	*No*		*X*			
Knysna Warbler	Bradypterus sylvaticus	*VU*	*VU*	*No*	*No*	*X*	*YES*	*X*	*X*	*X*
Knysna woodpecker	*Campethera notata*	NT	NT	No	No		YES	X	YES	X

Positively identified species are shown as YES, species not yet identified, but which could potentially occur is shown as X.
Bird references:

1. Sinclair, I. & Ryan, P. 2010 SA Red data book birds (www.sanbi.org)
2. 2015 Checklist. The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Birdlife South Africa
3. IUCN red list: www.iucnredlist.org
4. TOPS 2007: Threatetened or Protected species regulations: Notice 388 of 2013, GG 16 April 2013, No. 36375.

Table 12. Red Data listed reptile species that could occur on MTO Cape property.

Common name	Scientific name	2021 IUCN status	SA status	TOPS 2013	CITES 2018	Jonkershoek	Garcia	Kruisfontein	Tsitsikannma	Longmore
Albany Sandveld lizard	*Nucrus taeniolata*	*LC*		No	No					X
Oelofsen's girdled lizard	*Cordylus oelofseni*	*LC*		No	Type II listing	X				
Fitzsimon's long tailed seps	*Tetradactylus fitzomonsii*	*VU*		No	No			X	X	X
Cape Dwarf chameleon	*Bradypodion pumilum*	*NT*		No	Type II listing	X				
Elandsberg dwarf chameleon	*Bradypodion taeniabronchum*	LC		No	Type II listing				YES	YES

Positively identified species are shown as YES, species not yet identified, but which could potentially occur is shown as X.
Reptile references:

- Branch, B. 1990, 1998.
- IUCN red list: www.iucnredlist.org. Verified 10 August 2021.
- Bates et al. 2014: Atlas and Red list of the Reptiles of SA, Lesotho and Swaziland.

Table 13. Red Data listed amphibian species that could occur on MTO Cape property.

Common name	Scientific name	2021 IUCN status	SA status	Jonkershoek	Garcia	Kruisfontein	Tsitsikamma	Longmore
Cape rain frog	*Breviceps gibbosus*	*NT*	*NT*	*X*				
Hewitt's Ghost frog	Heleophryne hewitti	*EN*	EN					YES
Knysna leaf folding frog	*Afrixalus knysnae*	EN	EN			X	X	
Montane marsh frog	*Poyntonia paludicola*	NT	NT	X				
Landdroskop Moss frog	*Arthroleptella landdrosia*	*NT*	NT	X				

Positively identified species are shown as YES, species not yet identified, but which could potentially occur are shown as X.
Amphibian references:

- Du Preez, L. & Carruthers, V. 2009.
- Minter et. al. 2004
- IUCN red list: www.iucnredlist.org. Verified **10 August 2021**.
- Measey, G.J. 2011. Ensuring a future for South African frogs: a strategy for conservation research. SANBI biodiversity Series 11.

Table 14. Red Data listed fish species that could occur on MTO Cape property.

Common name	Scientific name	2021 IUCN status	SA status	Jonkershoek	Garcia	Kruisfontein	Tsitsikamma	Longmore
Whitefish	*Pseudobarbus capensis*	*EN*	*EN*	*X*				
Eastern Cape redfin	*Pseudobarbus afer*	EN	EN		X	X	X	YES
Gamtoos River ridefin	*Pseudobarbus swartzi*	*EN*	*VU*					YES
Small scale redfin	*Pseudobarbus asper*	*VU*	*VU*		X	X	X	X
Barrydale redfin	*Pseudobarbus burchelli*	*CR*	*CR*		YES			
Berg River redfin	*Pseudobarbus burgi*	*EN*	*EN*	*X*				
Slender redfin	*Pseudobarbus cf. tenuis 'Keurbooms'*	*Not listed*	*EN*				X	X

Positively identified species are shown as YES, species not yet identified, but which could potentially occur are shown as X.
Fish references:

- Skelton, P.H. 1987.
- IUCN red list: www.iucnredlist.org. verified 10 August 2021.
- SANBI: http://speciesstatus.sanbi.org/. verified January 2023.

Table 15. Red Data listed butterfly species that could occur on MTO Cape property.

Common name	Scientific name	IUCN status	SA SANBI status*	Tsits
Tsitsikamma Copper	*Aloeides pallida juno*	Not listed	EN	Yes Witelsbos

- SANBI: http://speciesstatus.sanbi.org/. verified January 2023.

3.1.3 Management Requirements

Most of the red data species identified are difficult to monitor and detect, and therefore only presence and sightings are recorded for most of these species on the plantation. One frog (Hewitt's Ghost Frog) and two fish species (*Pseudobarbus afer* in 2019 and *P. tenuis* in 2015) were chosen for monitoring, because they could potentially be impacted by forestry activies. The monitoring of these species is discussed below.

To protect fauna, the following general mitigation measures have been identified and where needed incorporated into procedures and planning:

1. Priority Conservation Areas, Natural Heritage sites, indigenous forests, natural fynbos and rocky outcrops will be conserved to create corridors for the movement of animals.
2. Wetland areas will be maintained and protected.
3. Roads and river crossings will be correctly managed, to prevent soil erosion.
4. Procedures will be implemented to minimize impacts on conservation areas by forestry activities such as harvesting, silviculture and road maintenance.
5. Planning will priorities the provision of interconnection of bio-corridors along rivers that will permit fauna to connect to breeding sites and allow flora dispersal, and will provide set aside conservation areas managed for protection of natural fauna and flora.

3.1.4 Monitoring Frequency

A photographic identification key of red data species was developed for staff and contractors in 2013 and updated again in 2018. This is used to identify the location and presence of red data species on the property, where their location is not already known. Maintenance of the General Fauna Monitoring database and red data species list will be continuous. An initial fish monitoring programme was initiated in 2019 for *Pseudobarbus afer* at Longmore and is discussed in more detail below. The monitoring of the priority fauna species, Hewitt's Ghost frog, is also discussed below.

3.1.5 Monitoring Objective and Target

The monitoring objective is to update the species databases over time, with the added objective of identifying new and unknown species and species of interest. As this is an ongoing program, there is no end target.

3.2 Hewitts Ghost Frog monitoring

3.2.1 Requirement for Monitoring

The Hewitt's Ghost Frog (*Heleophryne hewitti*), discovered in 1988, is regarded as endangered. Except for one other locality, the entire distribution of this species falls within the Longmore plantation. The species occurs in four river systems on the plantation, the Geelhoutboom, Martins, Klein and Diepkloof rivers. In order to ensure the survival of this species, a herpetologist, M. Burger, completed a year study on the distribution and requirements of this species in 2000, and since then ongoing research and management actions have occurred over time.

3.2.2 Monitoring Protocol

A management plan has been developed for Hewitts Ghost frog (Kirkman 2017), and details of the monitoring protocol can be found in this document. The first study occurred from 1999 – 2000, and involved a specialist survey (Burger 2000), to determine the exact locality of the species on the plantation, as well as to provide initial management and monitoring information for the species. This work resulted in a finding that the frog occurred in only four rivers on Longmore, and that only portions of the river were of importance (Klein river 57.38km; Martins river 23.44km; Geelhoutboom 23.457km, Diepkloof 33.85km) which resulted in a length of 138.14km of river which is of importance to this species.

Resulting from the first study, a second study, to continue to monitor the water quality in the priority rivers was also initiated, and water quality monitoring has taken place from 2001 on a two to three yearly basis.

After a one-year period of testing various methods to monitor Hewitt's Ghost frog, a tadpole monitoring programme was initiated during 2003, which continued until 2009. This programme concentrated on monitoring tadpoles within notably the Geelhoutboom, Martin and Klein systems. A MSc study was produced (De Beer, 2009) which describes the habitat preferences of the species and recommends rehabilitation actions

for the river. Since 2010 periodic specialist surveys continued. To update the current status of the species, a repeat tadpole monitoring programme was again initiated in 2015 – 2018 and repeated in the 2021/2022 breeding season.

3.2.3 Monitoring Results

The Burger (2000) and De Beer (2009) reports made valuable recommendations on the management of the rivers for the protection of the species. The report recommended that harvesting along these rivers should follow a stratified harvesting and clearing program and that the thinning process of ring-barking along the rivers should be spread over three years, to allow light to penetrate the riparian zone slowly.

During the last few years the survival of the species has been challenged severely, as a result of major fires and floods. The 2005 fire devastated all the identified habitat of the species. This was followed by flooding at the end of 2005, and again in 2006 and 2007, severely affecting rehabilitation of the frogs' habitat and effecting tadpole survival. Detailed monitoring results are available in Kirkman (2017) and in summary reports of Opperman (2018, 2021). The 2022/2023 report is due soon.

3.2.4 Management Requirements

Detailed mangement requirements are available in Kirkman (2017). Management concentrates on improving the in-stream habitat, removal of trees from the riparian buffers, and improvement of the river crossings and roads adjoining Hewitts habitat. During 2013 two river crossings on the Geelhoutboom river were closed and continued clearing of weeds in the riparian zones is occurring. Because clearing must be staggered over a long time period to prevent impacts on the species, it is will take some time to complete all the actions necessary. A formal survey of river crossings was also initiated in 2016, and the results of this monitoring will assist with prioritizing upgrading work going forward. Harvesting along adjoining rivers has been scheduled to minimize impacts over time, and only occurs after proper planning to minimize impacts.

3.2.5 Monitoring Frequency

SASS5 monitoring is scheduled every three years. Formal tadpole monitoring will continue from November until March from 2021 - 2023 to monitor the ongoing status of the species. The potential to repeat this monitoring at the end of 2023 will be discussed after results of the current monitoring is available. The herpetologist of the PE Museum and other specialists conduct periodic surveys and access is granted when requested.

1.2.6 Monitoring Objective and Target

The monitoring objective is to monitoring population numbers over the long term to inform management decision making. As this is an ongoing program, there is no end target.

3.3 Fish monitoring

3.3.1 Requirement for Monitoring

Fish are good indicators of long-term effects and broad habitat conditions, and changes in the available habitat conditions (Karr et al. 1986). This is because fish are "top of the food chain", relatively long-lived and mostly highly mobile. Assemblages include a range of species that represent a variety of trophic levels (omnivores, herbivores, insectivores, planktivores, piscivores). They tend to integrate effects of lower trophic levels; thus fish assemblage structure is reflective of integrated environmental health. In 2018 an unknown population of *P. afer* was discovered in the Bulk river at Longmore plantation during SASS5 monitoring. If was suspected that this was a new or unknown population, and therefore a specialist survey was completed for this site in January 2019.

3.3.2 Monitoring Protocol

In 2018 the new population of redfin minnow (Pseudobarbus sp.) was recorded by Diedericks (2018a) in the Bulk river system during SASS5 monitoring (site M10B-02). Redfin minnow are not known from this system, and for this reason a survey to determine the presence and location of the various Redfin minnow *Pseudobarbus* species (or sub-species) within selected sites within the three major river systems draining the Longmore Plantation occurred in January 2019. Fish species present at chosen sites in the selected rivers were reviewed and in addition to visual observations of fish in the shallow, clear- water streams, fish were captured by means of a 3m long minnow seine net with 3mm mesh size. Tissue samples for later DNA analyses were taken from a representative sample of the fish captured.

3.3.3 Monitoring Results

For Longmore results from the snap-shot survey indicated that the Berg, Klein and the Bulk rivers represent important sanctuaries for the narrow range endemic redfins, *P. swartzi* and *P. afer*, which are listed in the IUCN list of threatened species as Endangered (Bok and Chakona 2019). Further surveys will be required to determine the need to construct instream barriers to prevent the upstream movement of alien fish species present in the mainstem of the Gamtoos and Swartkops river systems in order to protect the indigenous fish in the upper reaches of streams within the MTO Plantations. The authors suggested that as the isolated populations of redfins within the MTO streams could be vulnerable to genetic problems such as inbreeding depression, on-going monitoring of the genetic fitness of these populations may be necessary to ensure their long-term survival. They also concluded that although no fish were captured at five of the ten sites sampled, it is possible that further surveys in other reaches of these streams may be more successful.

3.3.4 Management Requirements

The 2019 survey of the *P. afer* and P. swartzi at Longmore suggested further monitoring of the genetic fitness of the species and a review to determine if sufficicient barriers exist to keep out alien fish species. Continued weeding and correct conservation management of the river systems is of importance and will continue.

3.3.5 Monitoring Frequency

Monitoring of the habitat of redfin minnow *P. afer* and P. swartzi and mapping of localities was suggested for 2020, but was delayed due Covid-19 constraints. It is recommended that monitoring could be scheduled again in 2023.

3.3.6 Monitoring Objective and Target

The monitoring objective is to update the species databases over time, with the added objective of identifying new and unknown species and species of interest. As this is an ongoing program, there is no end target.

3.4 GENERAL FLORA MONITORING AND IDENTIFICATION OF RED DATA SPECIES

3.4.1 Requirement for Monitoring

More than 20 300 species of flowering plants occur in South Africa. One of the six most significant concentrations of plants in the world is the Cape Floral Kingdom, with its distinctive fynbos vegetation, in the south-west Cape. Most of South Africa's 2 000 threatened plants are found in fynbos (www.sanbi.org).

Due to the large extent of MTO Cape plantations, and the huge number of species, a systematic program to identify and record all flora found on MTO Cape plantations will be almost impossible. Species lists can however be built up through the knowledge of specialists, field surveys and ad hoc records. General flora monitoring should be seen as a long-term action, with databases updated over time to obtain more information on the floral diversity of conservation areas as it becomes available. The identification of rare, threatened and

endangered or Red Data species is however a priority, as where located, these species will need additional management and protection to ensure their survival. For MTO Cape, specialist surveys over time have already identified a number of red data flora species, and these will be managed when their location is known. As new species are identified, they will be added to the management list for rare species.

3.4.2 Monitoring Protocol

The concept of Red Data books was introduced in the mid 1960s by Sir Peter Scott and adopted by the South African Ecosystems Programmes of the CSIR in the 1970s. A preliminary Red Data Book on Plants was published in 1980 (Hall *et al* 1980). In 1996, the Red Data list of Southern African Plants (Hilton Taylor 1996) was published. The most recent accounts of Red Data plants is the *Southern African Plant Red Data Lists* (Golding 2002) and the *Red List of South African Plans* by Raimondo et. al. 2009. The South African National Botanical Institute (SANBI) (www.sanbi.org) maintains a detailed list of plants of South Africa, and their status.

Known species from species lists have been compared, and a list of rare species drawn up. A database, listing all known general flora species has also been developed for the company as a baseline document.

3.4.3 Monitoring Results

Identified Red Data species are listed below. The Raimondo *et al* (2009) and IUCN categories were used and status is therefore also shown according to these categories. Four critically endangered, five endangered species, two vulnerable species, three rare and three near threatened species have been identified.

Table 16. The Red list categories used to describe a species' conservation status.

Conservation Category	Abbrev.	Description
Critically endangered (IUCN)	CR	A species facing an extremely high risk of extinction in the wild, in the immediate future.
Endangered (IUCN)	EN	A species in danger of extinction and whose survival is unlikely if the threats to the species' survival remain. Numbers of individuals may be reduced to a critical level or habitats may be reduced or altered drastically.
Vulnerable (IUCN)	VU	Species that are close to endangered, but whose numbers are declining through over exploitation and loss or alteration of habitat in the medium-term future.
Conservation dependent (IUCN)	LRcd	Lower Risk – conservation dependent. Species not belonging to the categories of Critically endangered, endangered, or vulnerable, but that are the focus of a specific conservation programme, without which the species would qualify for one lf the threatened categories within five years.
Near threatened (IUCN)	LRnt	Lower Risk –near threatened. Species which do not qualify as conservation dependent, but which are close to qualifying as Vulnerable.
Least Concern (IUCN)	LRlc	Lower risk – least concern. Species that do not qualify as conservation threatened or near threatened.
Near Threatened (IUCN)	NT	Do not qualify for categories of threat, but are sufficiently close enough to qualify that they may become in danger of extinction in future.
Critically Rare (SA)	CR	Known to occur at a single sute, but not exposed to any known direct or plausible potential threat (does not qualify for IUCN criteria)
Rare (SA)	R	Not exposed to any known direct or plausible potential threat and does not qualify for IUCN criteria, but is still very localized according to Raimondo et al. 2009 criteria.

Table 17. Identified potential Rare, threatened and endangered flora species on MTO Cape (from Raimondo *et al*. 2009).

Species	Status	Location	Formal monitoring
Erica ixanthera	VU	Garcia	3 yearly
Gladiolus sempervirens	R	Witelsbos (Kromme River NHS area now managed by SanParks)	Locality only. Difficult to monitor bulb in exit area.

Gladiolus geardii	R	Longmore	3 yearly
Cyclopia longifolia	CR	Longmore	3 yearly
Encephalartos longifolius	NT	Longmore	3 yearly
Leucodendron orientale	EN	Longmore (Van Stadensberg NHS)	3 yearly
Paranomus reflexus	EN	Longmore (Van Stadensberg NHS)	3 yearly
Cyrtanthus staadensis	NT	Longmore (Van Stadensberg NHS)	Locality unknown.
Crassula rupestris	R	Longmore (Van Stadensberg NHS)	Locality unknown.
Euryops ursinoides	VU	Longmore (Van Stadensberg NHS)	Locality unknown.

* monitoring impacted due to the Covid-19 lockdown will be caught up in 2023 and 2024.

3.4.4 Management Requirements

Where the locality of identified red data species is known, the habitat of the species is protected. This includes weed eradication and where possible, burning for conservation management. Many of the identified species occur in areas where exit is occurring.

3.4.5 Monitoring Frequency

Management of General Flora Monitoring database: ongoing. Monitoring of red data species is scheduled on a 3 yearly basis where monitoring is possible.

4. LANDSCAPE SCALE MONITORING

4.1 FIRE IMPACTS

4.1.1 Requirement for Monitoring

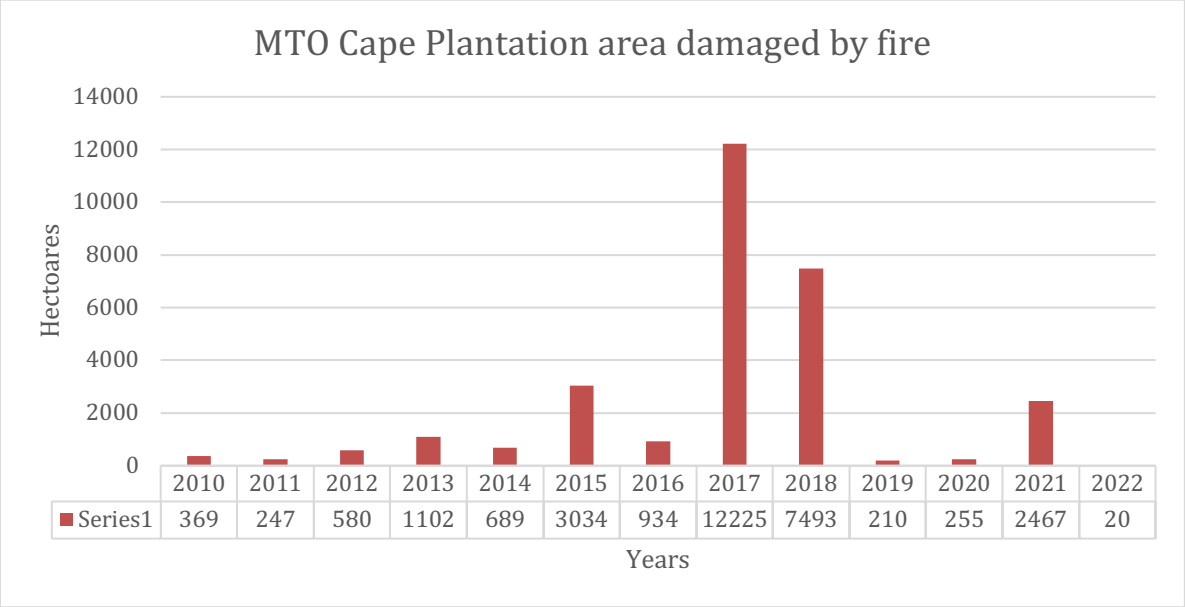
Fire is the biggest threat faced by forestry, and the company has a significant program to poactively prevent and combat fire, especially excellerated after the 2017 and 2018 fires. Fire events are tracked in detail, with lessons learnt and monitoring of causes of fire and proactive protection measures forming an important part of continual improvement.

4.1.2 Monitoring Protocol

A summary of fire impacts, which includes number of fires, extent of damage, and examination of causes and analysis of trends therefore forms part of the monitoring protocol from 2020.

4.1.3 Summary of Results

Year	Number of fires	Plantation area damaged (Ha)	(%)of Total planted area	MTO Cape commercial area (ha)
2015	145	3035	5%	62968.70
2016	152	934	2%	57785.49
2017	198	12225	23%	52608.59
2018	91	7493	16%	47766.08
2019	43	210	0.50%	42243.48
2020	94	255	0.75%	34185.40
2021	97	2467	7.22%	34130.58
2022	80	19.71	0.058%	34077.0



The above figure depicts the annual number of reported fires and the planted area affected by the fires for MTO Cape. Significant fire damage was reported in 2017 and 2018, when the region was efffected by severe fire events, impacting neighbouring property and towns as well. Most of these fires did not originate on MTO property. Since 2017 the company has worked on increasing fire protection measures, and the lowest amount of fires and areas impacted was reported in 2019 and 2020 since 2015, with an unfortunate increase again in 2021. In 2022 through intergrated fire management, only 20 hectares was damaged.

4.1.4 General Management Recommendations

Management of fire protection is included in the Fire protection plans of MTO Cape. The company has adopted a rigourous intergrated fire management approach since 2020 to minimize fire impacts.

4.1.5 Monitoring Frequency

Reporting will occur on an annual basis.

4.1.6 Monitoring Objective and Target

The monitoring objective is to track areas damaged by fire over time. The target of the company is to have no plantation areas destroyed by fire over time.

4.2 SOIL TREND/GROWTH MONITORING

4.2.1 Requirement for Monitoring

The monitoring of soil viability is difficult, and can be impacted by a number of variables, making accurate monitoring complex. This monitoring reporting is a new initiative from 2020 and will attempt to track average Site Index values over time as a proxy for soil monitoring, with comparison every five years.

4.2.2 Monitoring Protocol

Determining site quality on a compartment by compartment basis, or on small units is considered as too complex and costly. There are many variables that affect the final growth and production of a comparment, if long term change is to be determined. Tracking per species was therefore completed for *P. elliotti, P. ellioti carridea* and *P. radiata*, the predominantly grown species.

At MTO Cape, there is a focus on site-species matching and as part of this process the determining of Site Index values are an important measurable to guide the forest silviculture strategy.

Table 21. Site Index Values MTO Cape, as changes have occurred from 2015 to 2020.

Species and Year	Sum of Area (ha)		Weighted SI (Site Index)	
Year	**2015**	**2020**	**2015**	**2020**
Pell	20946.1	21786.06	22.22	22.30
Pexc	1967	3034.09	22.47	23.98
Prad	8117.57	6963.22	25.32	25.78
Grand Total	**31030.67**	**31783.37**	**23.05**	**23.22**

4.2.3 Summary of Results

When comparing Site Index Values over the past five years, the Site Index for all species increased. It is important to not the signficant inclureas in areas of *P. elliotti carribea*, which has shown the largest increase, and is replaceing undesirable species such as *P. pinaster*. *P. radiata* areas are also being decreased, in favour of other species.

4.2.4 General Management Recommendations

Silviculture management will continue to look at Site Index values as an indication of risk to forest yield over the longer term.

4.2.5 Monitoring Frequency

Analysis will occur every three years.

4.2.6 Monitoring Objective and Target

The monitoring objective is to track improvement over time. The target is to show continued improvement as a result of improved silviculture.

4.3 IMPACT OF HERBICIDE APPLICATION

4.2.1 Requirement for Monitoring

A new program to monitor the impact of herbicides, on water runoff and underground water sources will be implemented from 2023 to objectively monitor restricted herbicides, notably glyphosate, after stakeholder concerns regarding off site impacts in the Tsitsikamma. This monitoring will compliment monitoring of volumes of herbicide used and SASS5 monitoring on water quality which have been in place for a number of years.

4.2.2 Monitoring Protocol

<u>Trends in herbicide use</u>

MTO has tracked the use of herbicides since 1997. Detailed records of volume of chemicals use are kept per compartment for each plantation.

<u>Types of herbicides used</u>

MTO will record the list of active ingredients of herbicides used annually and include detail on the volume per active ingredient used as part of this monitoring going forward.

<u>Diatom Monitoring</u>

From 2022 MTO has expanded the SASS5 water quality monitoring program to include diatom monitoring of specific sites where either stakeholders have reported a concern regarding the impacts of chemicals or where downstream users could occur. This monitoring is described under 2.1 (Water Quality monitoring).

Glyphosate/Herbicide monitoring

To obtain objective information on the potential impacts of glyphosate on groundwater, a scientific based monitoring program, to review the impact of chemicals on groundwater and water runoff, will be initiated in 2023. One site in the Tsitsikamma at Witelsbos and one site at Kruisfontein near Knysan will be included in 2023, with additional sites added each year. Water quality will be determined before and after spraying using groundwater monitoring protocols, which take slope angle, geology, streams, rivers and plant growth, as well as the herbicide used and downstream receptors into consideration.

4.2.3 Summary of Results

Trends in herbicide use

MTO maintains a monitoring system on the use of chemicals. Below is a summary of chemical use per hectare and a breakdown of number of hectares treated and litres of total chemicals used over time.

Figure 3. Chemical used (litres per hectare) for MTO Cape sustainable (commercial and conservation areas).

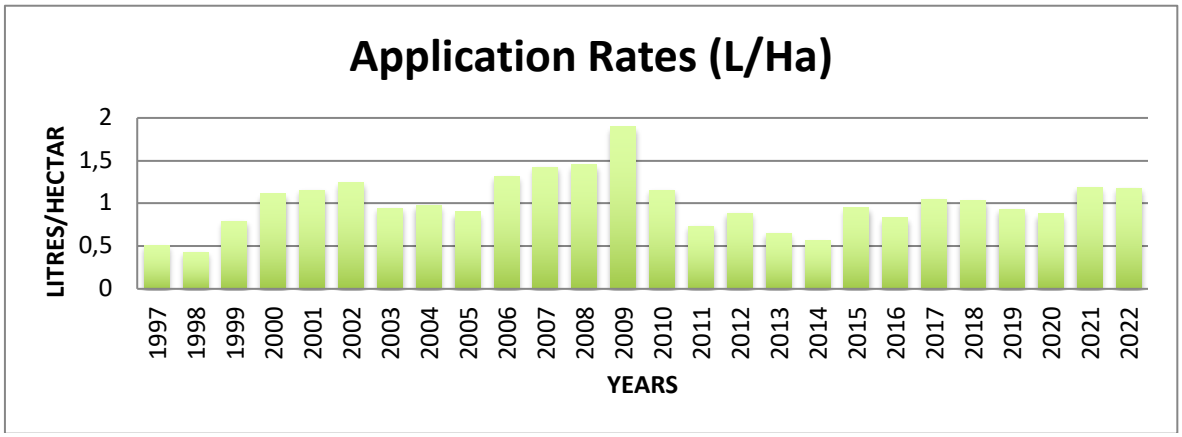


Figure 4. Litres of chemicals used for MTO Cape sustainable (commercial and conservation areas).

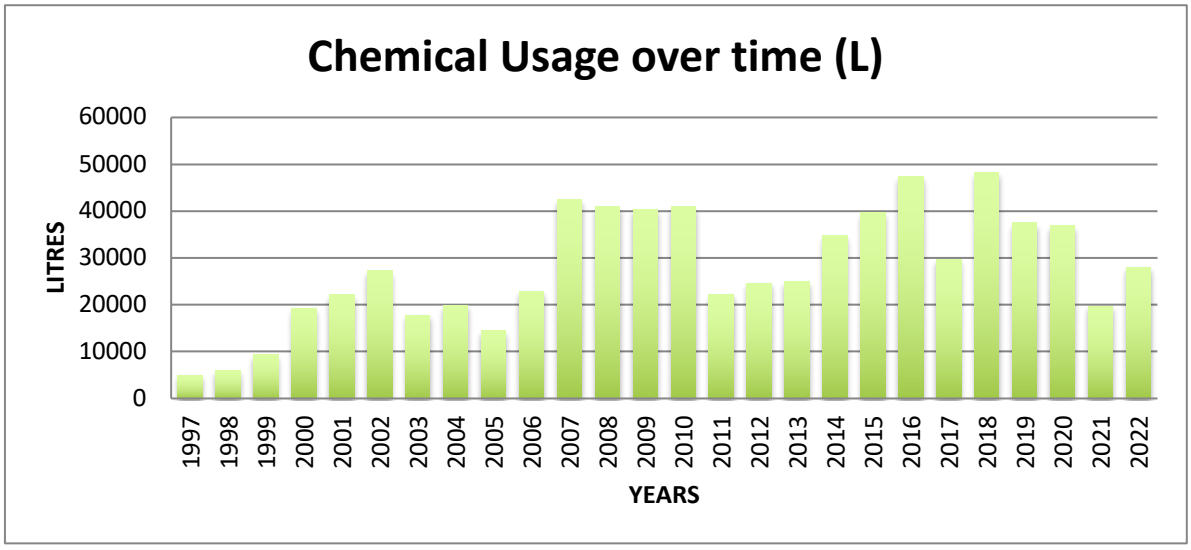
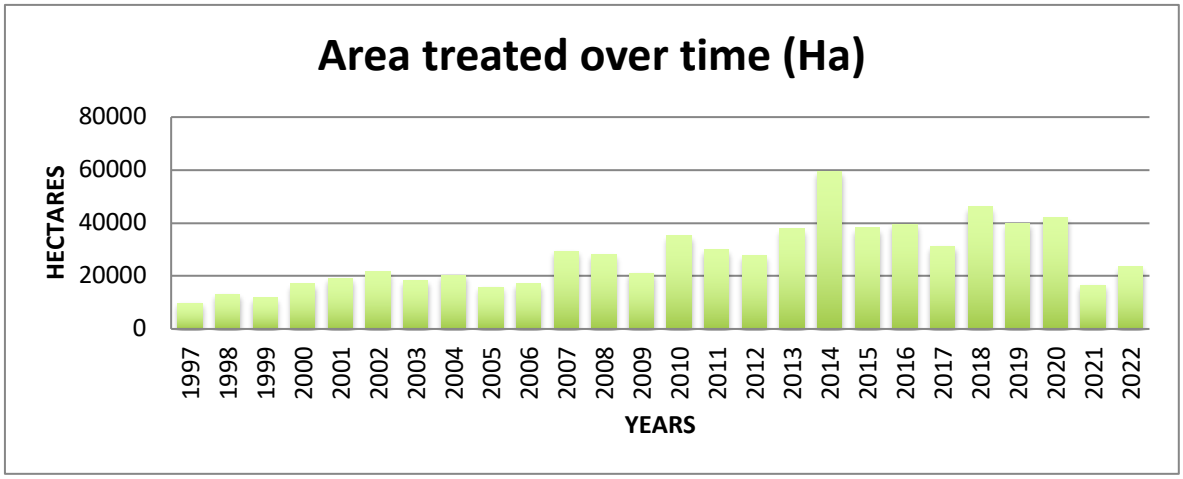


Figure 5. Hectares treated sustainable (commercial and conservation areas).



Types of herbicides used

Year	Active ingredient	Application (ha)	Litres used	Average L/ha
2019	Triclopyr butoxyethyl ester	9979	6830	1,46
	Triclopyr triethylammonium salt	1685	210	8,02
	Glyphosate	15968	31910	0,50
	Fluroxypry methylheptyl ester	6794	907	7,49
	Metsulfurone	3036	150	20,24
	Clopyralid	72	20	3,60
2020	Triclopyr butoxyethyl ester	8692	9437	0,92
	Triclopyr triethylammonium salt	1794	195	9,20
	Glyphosate	16942	31037	0,55
2021	Fluroxypry methylheptyl ester	6772	1220	5,55
	Metsulfurone	2771	252	11,00
	Triclopyr triethylammonium salt	3735	2046	1,83
	Glyphosate	8213	13682	0,60
	Fluroxypry methylheptyl ester	7001	620	11,29
	Metsulfurone	880	56	15,71
	Imazapyr isoproylammonium salt	1151	185	6,22
2022	Triclopyr butoxyethyl ester	6411	4348	1,47
	Triclopyr triethylammonium salt	1980	320	6,19
	Glyphosate	13384	18206	0,74
	Fluroxypyr methylheptyl ester	3702	576	6,43
	Metsulfurone	2588	224	11,55

Diatom Monitoring
This monitoring is described under 2.1 (Water Quality monitoring).

Glyphosate/Herbicide monitoring
To be included in the next update of this report when results are available.

4.2.4 General Management Recommendations

MTO is a member of the Timber Industry Pestide Working group (TIPWG). TIPWG has rated the risks of each herbicide and has developed an Allowed Produt list to which MTO prescribes (www.tipwg.co.za).

MTO currently reviews the impact of herbicides using a risk-based approach per compartment.

1. No Highly Restricted (HR) chemical are used by MTO
2. Restricted (R) chemicals are only be used where they are used responsibly and taking health and safety, social and environmental risks into consideration. Where possible the company will strive to find alternatives or minimize use.
3. No new Restricted chemical will be purchased without prior identification of risks and approval by the Planning Manager after review.
4.

Additional mitigation measures are implemented through compartment specific review. The outcomes of the glyphosate/herbicide monitoring program will also be fed into decision making.

4.2.5 Monitoring Frequency

Trends in herbicide use: Annual collection of data.
Types of herbicides used: Annual collection of data.
Diatom monitoring: Incorporated into the SASS5 water quality monitoring as per schedule shown.
Glyphosate/Herbicide monitoring: Initiatiated with 2 sites in 2023 (1 Kruisfontein, 1 Tsitsikamma). Review need to increase no. of sites in 2024.

4.2.6 Monitoring objectives and targets

The objectives of the Integrated Pest Management program for MTO Cape are:

- List all identified alien and invasive or damaging pests currently known and identify new or emerging species.
- Provide plantation management with various strategies that combine different pest control measures, applicable at varying frequencies and degrees depending on the stage of an actual or potential infestation. As conditions change, control measures can be applied to meet the increased or decreased pest hazard, while always maintaining an appropriate level of base protection.
- Encourage and promote the development and adoption of environmentally friendly non-chemical methods of pest control management and strive to reduce the use of chemical pesticides where possible.
- Understand the economic, environmental, and social costs associated with the pest, disease or weeds, and understand the economic, environmental and social costs of control.
- Continuously strive to improve IPM to be an essential part of the management planning, with primary reliance on prevention through best silvicultural practices and biological control methods rather than chemical pesticides and monitor results to adapt as necessary.
- If chemicals are used, proper equipment and training shall be provided to minimize health and environmental risks.
- As a long-term objective, find alternatives to the use of glyphosate for control where possible, or minimize its use through strict control and minimization of impacts on workers and develop a process to notify stakeholders where relevant.

The objective of this monitoring is to track the volume, active ingredient and impact of herbicides used. The objective of glyphosate monitoring is to determine if there is any residual impact on water quality because of herbicide application.

The target is that glyphosate monitoring shows no impact on water quality downstream which could be harmful to human health. Targets will be revised further after results are available in 2023.

5. SOCIO-ECONOMIC MONITORING

5.1 AREAS OF SPECIAL INTEREST MONITORING

5.1.1 Requirement for Monitoring

MTO Cape's commitment to people and communities includes a commitment to the management of the artefacts of the cultural and historical past and areas of outstanding natural importance. For this reason MTO Cape recognizes certain places and objects as Areas of Special Interest (ASI). These include specific sites of cultural, historical or archaeological significance such as graves and rock painting sites and sites of natural importance, such as waterfalls. These ASI require specific and sensitive management and this is prescribed in the management records for each site. Monitoring of these sites is important to detect changes over time, and to assist with monitoring the impacts on these sites, such as weed infestation. Management includes general maintenance and the establishment of buffers around sites to prevent potential impacts that may damage the site, and the removal of alien vegetation. Where required and relevant, management is planned in consultation with local communities.

4.1.2 Monitoring Protocol

To ensure that management is effective, all sites are monitored on a two to three year rotation and photographed. A standardised database with site information and monitoring photographic has been developed and is available on the plantation.

4.1.3 Summary of Results

Thirty eight sites are recorded as ASI, and they are listed below. All sites are scheduled for monitoring on a two to three yearly rotation and for site specific management.

Table 18. ASI sites on MTO Cape.

Code	Plant	Site Name
279005	Jonkershoek	Jonkershoek Farmhouse
279006	Jonkershoek	Spookhuis
279007	Jonkershoek	Jonkershoek Muslim grave
242001	Garcia	Cave of hands - Rock Painting A57
312002	Garcia	Cave of Hands
312003	Garcia	Earth Crust Fault
322001	Kruisfontein	Brakenhill Falls
322002	Kruisfontein	Big Tree
322003	Kruisfontein	Bell
333001	Lottering	Blaaukranz Pass
333002	Lottering	Oakhurst
333003	Lottering	Whitcher Graveyard
333004	Lottering	Puntjiesbos Graveyard
333005	Lottering	Die Rye Graveyard
331004	Lottering	Goesa Graveyard
334006	Lottering	Dynamite store – Q15
331001	Witelsbos	Foresters Time book
331002	Witelsbos	Foresters Diary
334001	Witelsbos	Graves Block D10b
334002	Witelsbos	Damant se Kamp
334003	Witelsbos	Graves Block H51
334004	Witelsbos	Spoorbek se Pad
334005	Witelsbos	Old Forestry Office
334007	Witelsbos	Grave – Compartment D5
334008	Witelsbos	Graves H45 and H47
334009	Witelsbos	Stormsriver Pass
334010	Witelsbos	Graves – L52a
334011	Witelsbos	Graveyard –L11a
334012	Witelsbos	Anker memorial plaque
334013	Witelsbos	Dynamite store – L89
334014	Witelsbos	Khoisan midden

332001	Longmore	Upper Van Stadens Fort and Dam
332003	Longmore	Cemetry Loeriecamp
332004	Longmore	Cemetry Longmore Houses
332005	Longmore	Cemetry Ottorford
332006	Longmore	Cemetry Longmore Village
332007	Longmore	Shepard's Hut
332008	Longmore	Cemetry – Otterford East

4.1.4 Management Requirements

All ASI's are scheduled for weeding where required. Buildings receive maintenance as required, while archaeological site are protected and closed to the public. All ASI's are shown on maps and protected from impacts during harvesting or other activities that may impact on them.

4.1.5 Monitoring Frequency

Each site to be photographed and monitored every two to three years.

4.1.6 Monitoring Objective and Target

The objective of monitoring is to formally visit each site and record site status notably the need for any management intervention, such as weed control. Regular monitoring will ensure that the target of keeping sites clean and well maintained will be achieved.

6.1 EMPLOYMENT, TRAINING AND CONTRACTOR

6.1.1 Requirement for Monitoring

MTO Cape employs 628 people directly and at least 603 people indirectly, through forestry contracting positions. All staff receive employment contracts, while contracts are signed with all service providers employed to assist with harvesting and silvicultural operations. Staff is notably employed from the local area, and the company strives to provide jobs in the local economy, either directly or indirectly through contractors and downstream processing.

6.1.2 Monitoring Protocol

A summary of employment, training and contractor employment will monitor the impact of employment over time. This is a new monitoring initiative from 2019.

6.1.3 Summary of Results

Current number of employees, and contractor employees is shown below. Number have decreased from 2019 due to completion of the Exit process. A summary of the type of ongoing training provided by MTO is also shown below.

Table 19. Employment numbers and traing provided by MTO Cape.

MTO Cape employment summary			
	2019	**2021**	**2022**
No. of Employees	781	628	667
Men	625	515	532
Women	156	113	135
No. of Contractors (forestry)	27	19	19
No. of Contractor teams (forestry)	34	22	21
No. of Contractor workers (forestry)	780	603	650
No. own employees trained	1431 (Learners) or 2632	1153 (Learners) or 1808	1990 (Learners) or 3309

	(Mandays)	(Mandays)	(Mandays)
No. of contractor employees trained	1172 (Learners) or 1910 (Mandays)	1690 (Learners) or 2418 (Mandays)	1277 (Learners) or 1711 (Mandays)
List of courses provided			
Agricultural Tractor handling : Basics; Alcotest 6820 Training; Basic Fire Suppression: Buildings; Basic Safety For Workers; Board Edger Operator; BOP - Moulder Training; Brushcutter : Re-Certification; Brushcutter Operator :Basics; Chainsaw Mechanic : Basics; Chainsaw Mechanic Evaluation; Chainsaw Operator : Basics; Chainsaw Operator : Re-Certification; Chairing of a disciplinary hearing; Chemical Store Handling (unit standard 116065); Chipper / Shredder Operator: Basic; Chokerman : Basic; Chokerman : Refresher; Communicate at work; Communicate using a two-way radio system; Competency : Tractor Agriculture; Competency - L.D.V. (4 X 4); Competency : Backactor and loader; Competency : F1 C/Balanced lift truck (3000kg); Competency : Fire tanker Hino 5000 lt; Competency : Fire tanker 10 ton 6X4 Mercedes; Competency : Fire tanker 10 ton Nissan' Competency : Fire tanker 5 ton 4X4 Mercedes; Competency : Fire tanker Unimog; Competency : Front End Loader (Bucket); Competency : Grader; Competency : LDV (4x4); Competency : Light vehicle Code B; Competency : Overhead crane Sawmill; Competency : Samag 20; Competency : Samel 50; Competency : Skidder – Cable; Competency : Tipper -10 Ton; Competency : Tipper 5 Ton; Competency : Tipper Truck up to 7000kg; Competency : Truck req C1 license; Competency: Fortk Lift F2 Counterbalanced lift truck (7000kg); Competency: Almoniet Finger Jointer; Competency: Bakkie Sakkie; Competency: Bobcat Loader; Competency: Code B Mini Bus; Competency: Isuzu (New) 4000 LT; Competency: Isuzu 4000LT; Competency: Tipper 7 Ton; Competency: UD Bulk Tanker; Contract law for business and non-lawyers; Counterbalanced Lift Truck Code F2; Counter-Balanced lift Truck Forklift F2(5 Ton); Crew Boss: Appreciation; Crosscut Saw Operator Training; Defensive Driving Techniques; Demonstrate understanding of HIV/AIDs and its implications; Driver Evaluation; Environmental Awareness; F1 - Counterbalanced lift truck 3000kg; Fire Fighting in Buildings; Fire Lookout : Basics; Fire Tanker Hino 5000 lt; Fire tanker operating 10 ton 6x4 Mercedes; Fire tanker operating 5 ton 4x4 Mercedes; Fire tanker operating Unimog; First Aid - Level 1; First Aid -Level 1 & 2; Front End Loader Handling :Refresher; Health And Safety Representative; Herbicide Applicator Course; Herbicide Applicator Refresher; Interpret and use information texts; ISO 45001 Internal Auditor; Job Observation Workshop; Log Recorder: Basic; Logrecorder :Re-Certification; Logscaling in poles/saw logs: Basics; Logscaling in Sawlogs & Poles: Re-Certification; Manage individual and team performace; Manage Personal Finance; Management of Herbicide Store; Managing Employment Relations; Map Reading; Marking for Thinning : Basic; Marking For Thinnings :Refresher; Moderation; NKV Multi Rip Saw Operato; Operate in a team; Opticut Operator Training; Overhead Crane C30; Planer & Moulder Maintenance and Operation; Pole Pruning; Prescribed Burning Course; Recovery saw operator training; Safe Working Procedures; Safety Induction Course; Safety Program Store Personnel; SAMTRAC; Side Loader Lift Truck 5000kgs; Silviculture Planning Phase 1; Site Preparation; Specialised Tree Felling Techniques; Stacker Operator; Storeman : Evaluation; Storeman :Basics; Three Wheel Loader : F11/FZ; Three wheeler loader : Basics; Three Wheeler loader Refresher; Three Wheeler Loader with Forks; Time Management; Truck, bus requiring C1 license; Twin Band Saw Operator; Two Way Radio Communication; Understand the nature and importance of conservation; Unimog : Basics; Wild Fire Suppression : Basic; Wild Fire Suppression : Refresher; Wild Fire Suppression: Crew boss; Wild Fire Suppression: Proto team; Wild Fire Suppression: Prototeam Refresher; Working at Heights		

6.1.4 General Management Recommendations

Personnel management is addressed via the systematic analysis of all critical aspects to provide the necessary procedures and control systems. Orderly and well-managed personnel administration systems provide a basis for sound relations.

6.1.5 Monitoring Frequency

Reporting will occur on an annual basis.

6.1.6 Monitoring Objective and Target

The monitoring objective is to report on employment and training over time. The employment targets of the company are relevant.

6.2 SOCIAL AND ECONOMIC DEVELOPMENT

6.2.1 Requirement for Monitoring

The MTO Group social and economic development programme currently aims at uplifting and improving the relationship with local communities living in and around forest operations. MTO Cape has a good relationship with most of the communities on its borders and gives aid to communities regularly when it is requested. Community Liaison forums have been established in order to facilitate good neighbour relations and encourage ongoing dialogue.

Social and economic development intends to provide effective social development engagement to ensure that social development projects are sustainable. Social investment should build capacity and derive mutual and/or symbiotic benefit to MTO and to stakeholders. Measuring assistance and reach over time is the start of a improved monitoring program for the company.

6.2.2 Monitoring Protocol

A list of social and economic donations and spend is maintained to monitor donations over time.

6.2.3 Summary of Results

Table 20. Assistance rendered during 2021 and 2022.

GROUP	ASSISTANCE PROVIDED	2021 NO. OF PEOPLE REACHED	2022 NO. OF PEOPLE REACHED
Education	ICT Skills training to school management teams and all Grade 4 -7 learners.	All Eight Tsistikamma primary schools	120 teachers; 640 learners directly impacted; 2952 learners indirectly impacted; 53 unemployed youth impacting 265 families; 43 SMT's.
Food security	Food gardens in schools, creches, clinics and backyards.	2500 people benefitted	3250 beneficiaries (650 gardens)
Donations	Homeless shelter support Soccer kit donation Transporting leaners to an educational camp	Native Roots Shelter, Plettenberg bay. Longmore soccer club Tsitsikamma ward 5 leaners	Aftercare centre cleanup, impacting 45 learners;
Enterprise & Supplier Development	Assisted a young entrepreneur in starting a charcoal manufacturing business Business development support to a young entrepreneur – Agri business Business development support to a women owned sewing business Ferns picking permit Supply and integrate Quickbooks payroll system software into the existing financial management system and providing relevant training.	1 SMME, 5 employees 1 SMME, 3 employees 5 people 1 Cooperative of 8 individuals 15 contractors	3 x Supplier Development SMME's (Silviculture, Harvesting, Transport) - 30 people. 2 x Enterprise development - entrepreneurs supported with infrastructure development.
Skills Development	Skills development programme for unemployed youth.	15 people	None

Community	Non-timber forest products (firewood, droppers, poles, mushrooms) Servicing DAFF villages (Water supply & sewage)	All communities bordering the plantations. Longmore, Die Blaar and Koomansbos communities.	All communities bordering the plantations. Longmore, Die Blaar and Koomansbos communities.

6.2.4 General Management Recommendations
An improved system to prioritize projects and monitor the sustainability of donations was initiated in 2020.

6.2.5 Monitoring Frequency
Reporting will occur on an annual basis.

6.2.6 Monitoring Objective and Target
The objective of MTO's socio-economic development program is to utilize available resources to facilitate the improvement of the lives of identified stakeholders.

The stakeholder relations department manages the expenditure on socio-economic initiatives with the purpose of promoting the achievement of this objective.

6.3 COMMUNITY ENGAGEMENT
6.3.1 Requirement for Monitoring
MTO Group has a dedicated Stakeholder Relations team, managing all aspects related to social development. Stakeholder registers are maintained, and regular meetings held with interested and affected communities. Formal community engagements are held with key communities adjoining plantations. An up-to-date record of all grievances is maintained.

6.3.2 Monitoring Protocol
A summary of community engaments will be maintained by the company for comparison over time. This is a new monitoring requirement from 2019, from 2020 a summary of grievances will be included in monitoring.

6.3.3 Summary of Results
MTO Cape has established liaison forums where continuous and structured engagement process on issues material both to MTO and its stakeholders take place quarterly.

2022 COMMUNITY ENGAGEMENTS	
FORUM	No. OF ENGAGEMENTS
Tsitsikamma	3
Longmore	1
No. Formal grievances received: 1 (Tsitsikamma Witelsbos)	

6.3.4 General Management Recommendations
Continuous response to stakeholder engagement aspects.

6.3.5 Monitoring Frequency
Reporting will occur on an annual basis.

6.3.6 Monitoring Objective and Target

MTO's objectives for monitoring community engagement is to:

- observe and track dialog between the company and its stakeholders with the aim of developing mutually respectful relationships through the company's actions and attention to stakeholder matters;
- measure the effectiveness of the community engagement;
- promote the consideration of the views and interests of participating stakeholders during decision making, with the goal of reducing unnecessary and/or potentially negative stakeholder impacts;
- promoting transparency; and
- building a relationship of trust between the company and its stakeholders.

MTO's target is to effectively engage with community members on matters in a manner that results in expedient resolution thereof and without any formal grievances arising from these matters being raised against the company.

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Contact details

MTO | cape

Phone: +27 044 8711016

Jaco Oosthuizen
General Manager
Jaco@mto.co.za

MTO | group

Phone: +27 21 866 1512

Private Bag X5024
Stellenbosch, 7599

www.mto.co.za