



Environmental Guidelines for Commercial Forestry Plantations in South Africa

Revision 5 | 2024

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Cover photo: Samora Chapman

The 2024 edition (Revision 5) includes updates in information, guidelines and legal requirements

Preface to the Fifth Edition

The first edition of the Guidelines for Environmental Conservation Management in Commercial Forests in South Africa appeared in February 1995 as a printed document that could only be reproduced by photocopying. Since then, there have been a number of printed versions. It was in 2016 that the first electronic version was produced and made available on the Forestry South Africa website.

This 5th revision includes updates on applicable legislation, best practices, chemicals and pesticide uses, carbon calculations, climate change implications and the inclusion of new chapters on emergency incidents and disaster management, greenhouse gas reporting, regulations for hazardous chemical agents and integrated pest management

Sustainable forest management is the forestry component of sustainable development which was defined in 1997 by the World Commission on Environment and Development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. Early definitions of sustainable forest management focused on the continuous supply of specified wood products but more recently, the focus has included other products and services, such as broad social issues and ecosystem services and structure, water supply, soils, cultural sites and carbon sequestration. Some would say that the definition of sustainable is not possible since the word “sustain” is to “keep something going over time or continuously” and this can only be determined after the event.

While sustainable forest management focuses on people, planet and prosperity, these Guidelines deal with only one of the aspects of sustainable forest management, namely the physical/natural environment. Forest certification, such as the Forest Stewardship Council® (FSC®) (www.fsc.org), the Programme for the Endorsement of Forest Certification (www.pefc.org) and other certification programmes are systems based which promote well managed forests through compliance to a set of principles, criteria, indicators and verifiers/performance targets that cover all three components of sustainable forest management.

Readers are also encouraged to visit the Forestry South Africa website www.forestrysouthafrica.co.za and Forestry Explained website www.forestryexplained.co.za.

The Editors

The Editors welcome comments on the content of these guidelines and these should be sent to Forestry South Africa katy@forestrysouthafrica.co.za

Forestry South Africa Environmental Management Committee
Forestry South Africa
Postnet Suite 100
Private Bag X11
Birnam Park, 215
Republic of South Africa

Suite 115, 3rd Floor, The Link,
173 Oxford Road, Rosebank, 2196

Tel: +27 11 2681104

E-mail: katy@forestrysouthafrica.co.za

Website: www.forestrysouthafrica.co.za

Introduction

Objectives of the South African Forestry Environmental Guidelines for Forest Plantations

The objective of the fifth edition is to provide updated guidelines and new/amended laws that are relevant to the management of plantation forestry.

The environmental guidelines include statutory requirements as well as best management practices that are recommendations which will minimise the impact of forestry operations on the environment.

Environmental Statement of the South African Forestry Industry

The South African Forestry Industry is committed to ensure that:

- plantation forest establishment and management takes place in the most socio-economically and environmentally acceptable way;
- natural resources are managed in a manner which will ensure the sustainability of the forestry enterprise; and
- people on whom the forest industry depends may work in safety and live under conditions of acceptable quality.

Structure of this Guideline

The Guidelines generally follow a basic presentation structure throughout. With the exception of Chapter 2, each subsequent Chapter includes a general description of the subject matter to set the scene and inform the reader of the most important issues relevant to that Chapter.

Following this general description is a statement of intent (or desired outcome/objective). This statement of intent describes what the forester should aim for. As an example, the forester must ensure legal compliance with all relevant environmental laws can be demonstrated. This in turn is followed by measures to achieve the desired outcome, which describe one or more actions that can be taken to achieve the statement of intent. It is not necessary that all measures are in place.

Chapter 1

Environmental Management and Forest Certification



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1.1 What is Environmental Management?

Environmental management can mean different things to different people. However, it is usually accepted that the concept is strongly embedded in the legal sciences and, in addition, is also a governance or management strategy that is ultimately designed at shaping or changing the behaviour of people in their environment. Its primary objective is to regulate the effects or impacts of our decisions, activities, products and services on the environment.

These decisions and activities form part of everything we do in every aspect of our daily lives. The environment that is affected by an action will also “react” to it. This reaction may also result in a change in the human environment (social, political, economic and cultural) and must be seen in the broadest sense. The basic objective of environmental management is to:

- be properly informed on the reaction to an action – i.e. what will happen if I harvest a tree and it falls into a watercourse?

- assess what can be done (mitigatory measures) to minimise or negate the negative and enhance the positive impacts of such an action;
- consider alternatives in terms of the options for the action or the place where the action will take place to minimise or negate the negative and enhance the positive impacts of such an action.

1.2 Environmental Management and the Constitution of South Africa

The change in the political landscape in South Africa that followed the successful 1994 democratic elections led to the unusual (at that times) inclusion of the protection of the environment and sustainable development (section 24) in the form of a human right in the Bill of Rights contained within Constitution of the Republic of South Africa, 1996.

Section 24 Environment

Everyone has the right –

- to an environment that is not harmful to their health or well-being; and
- to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that
 - prevent pollution and ecological degradation;
 - promote conservation; and
 - secure ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development.

Importantly, section 36 of the Constitution states that the rights contained within the Bill of Rights may be limited only in terms of law of general application to the extent that the limitation is reasonable and justifiable in an open and democratic society based on human dignity, equality and freedom.

In giving effect to the environmental right, the Environment Conservation Act 73 of 1989 was overhauled through an extensive public participation consultation process and a new framework Environmental Act was adopted, the National Environmental Management Act No 107 1998 (NEMA). Since the adoption of this overarching environmental framework, numerous additional legislative interventions were drafted and published relating to, for example, protected areas, biodiversity including protected species, protected ecosystems and alien and invasive species, air quality and the associated listed activities and minimum point source emission standards, waste and the implementation of the waste management hierarchy (waste prevention, waste reduction, resource recovery, waste treatment and waste disposal, discharge or emission) and numerous revisions of the environmental impact assessment regulations.

In addition, now contained within the NEMA framework, is the National Water Act, 36 of 1998 (NWA) under which “water use” for commercial forestry is defined as a “stream flow reduction activity” (SFRA) and thus authorisation for the water use is required; the National Forests Act, 84 of 1998 (NFA) and the principles for sustainable forest management; the National Veld and Forest Fire Act, 101 of 1989 and the National Heritage Resources Act 25 of 1999 (NHRA).

In reviewing the Guidelines, the authors have tried to ensure that our understanding of what constitutes the “environment” and what is meant by “environmental management” is relevant to the forestry sector. It is not the intention of this Guideline to explore the concept much further, other than to

state that the term “environment” may be defined from either an exclusively “green” perspective or a perspective that includes social, cultural and economic issues.

A legal definition of environment is included in Section 1 of the NEMA which defines it as follows:

- i.the surroundings within which humans exist and that are made up of –
- ii. the land, water and atmosphere of the earth
- iii. micro-organisms, plant and animal life
- iv. any part or combination of i) and ii) and the interrelationships among and between them
- v. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

This is an expansive interpretation of “environment”, which will include the natural environment, anthropogenic environment, cultural processes and socio-economic considerations.

However, the brief of the editorial committee established by the Forestry South Africa Environmental Management Committee was to focus on the “green” issues that could be practically applied at the scale and intensity of a forest management unit and that could be therefore applied across all scales and intensity of plantation forest management. The Editorial Committee has however, included some basic “social” issues which are largely focused on sanitation, infrastructure (housing), rodent control and waste management.

1.3 What are Forestry Standards?

Firstly, what is a standard? A standard is a required or agreed level of quality or attainment (Concise Oxford English Dictionary, 11th edition, 2006)). Putting the word forestry in front of the word standard qualifies our understanding as being an agreed level of performance either required in terms of law or recognised as best practice.

There are a number of performance standards that have been developed and are applicable to forestry operations worldwide but each country where forest operations are present will have its own locally developed forest management performance standards developed through a combination of research findings and stakeholder consultation.

Secondly, performance standards differ from system standards such as the International Standards Organisations (ISO) 14001 Environmental Management System. The ISO system standard specifies the essential element of a structured system which allows organisations of any type and size to establish procedures to set environmental policy with stated objectives and to achieve compliance with them. There are no performance standards identified within a system standard, other than to set environmental objectives and targets that result in continuous performance as measured over time. Obviously, though, legal compliance with all performance standards is a minimum.

The FSA Environmental Guidelines for Commercial Forestry Plantations in South Africa are therefore NOT a system standard such as ISO, nor a performance standard. It is based on legislation and best management practices.

1.4 What is Forest Certification?

During the past few decades, Governments, environmental groups, Industry and the public have become increasingly aware that consumer demands and market forces have the potential to exert influence on the management and use of natural resources. As a result, there have been a number of international Government initiatives and private sector efforts to promote the concept of sustainable development. Forest certification programmes are an extension of this and are essentially comprised of:

- management certification; and
- product certification or chain of custody (CoC)
- natural forest certification.

1.4.1 Forest Management Certification

This process takes place at the level of the forest management unit (FMU) and is based on a set of forest management standards that have been developed by stakeholders and agreed upon by them to be acceptable and significant. Implementation of such standards should result in improved actions on the ground with measurable results over time.

A preliminary analysis of the results from an initial self-assessment against the certification standard will usually require the implementation of corrective actions to meet the certification standard. These can be minor modifications or major interventions, depending on the findings. Once these have been implemented or corrected, the forest owner can proceed with the formal certification process through the appointment of an external auditor that has been accredited by a certification body such as the Forest Stewardship Council (FSC®) or the Programme for the Endorsement of Forest Certification (PEFC). Both the FSC Certification Standard (www.fsc.org) and the PEFC-endorsed Sustainable African Forest Assessment Scheme (www.safas.org) are available in South Africa.

The formal certification process usually entails a pre-assessment, followed by a main assessment once any deficiencies identified in the pre-assessment report have been successfully addressed. The main assessment is a detailed evaluation of current forest management practices of the forest management unit and includes interviews with key personnel and external interested and affected parties as well as a detailed examination of relevant documentation. At the end of the main assessment, it is confirmed whether or not the FMU will be recommended for certification, or only subject to corrective action, which would need to be addressed as a condition of certification.

Following certification, regular surveillance visits will be performed by the independent body to ensure that the landowner or organisation is continuing to maintain the requirement and to address any problem areas that may have been identified during the annual audits.

Forest certification can be prohibitively expensive for a medium or small timber grower. Currently, Group Certification (where a group of landowners is certified together) remains the only feasible alternative, where the costs of the certification programme are spread over the group members. All Group members must meet the certification standard on their particular farm, as failure to meet any particular performance standard will adversely affect all other members of the scheme, which may result in suspension or even withdrawal of the certificate.

1.4.2 Forest Product Certification

Where the forest owner and/or buyers of wood from a certified forest wish to identify the wood or wood product as originating from a certified source, a chain

of custody assessment is carried out. Chain-of-custody provides the link between buyers and sellers from the forest to the point of sale and assures end-use markets that the product emanates from a certified forest. It does not, however, certify that the processing plant (e.g. sawmill) complies with any environmental standards other than the maintenance of documented procedures such as:

- all products from certified forest, or manufactured from products derived from certified forests sources, are clearly marked;
- documented procedures exist to control the marking of certified products;
- all products from certified forests, or manufactured from products derived from such sources, are kept separate from products that do not originate from a certified forest;
- all records are maintained relating to purchase, delivery, shipment, receipt, forwarding and invoicing for certified products; and
- documented procedures exist to control the record-keeping process.

Certification is essentially a market-based instrument where there is a strong willingness among consumers to purchase such products. Organisations that are certified may have many reasons to implement such a standard, amongst which would be protection or growth of market share through product differentiation, reduction of environmental risk and better access to financial markets through loans and improved image in a “green” conscious market.

1.5 Synopsis of the Guidelines

The impacts of timber plantations on the natural environment can generally be reduced to the following major impacts:

1. the reduction of stream flow in a watercourse;
2. the impact on biodiversity;
3. the impact on ecosystem structure;
4. the impact on soil (soil loss and nutrient status); and
5. the impact on carbon storage (increased carbon storage relative to the vegetation that has been replaced);
6. the potential impact of pesticide and herbicide use.

The Guidelines are designed to reduce these negative impacts through compliance with the law and the implementation of best management practices resulting in the following positive outcomes:

- the impacts on stream flow reduction are minimised through the removal of all alien and invasive species from within the wetland buffer zones and the withdrawal of timber plantations from within the wetland buffer zone (a combination of a voluntary initiative/best management practice/legal requirement);
- the impacts on biodiversity are minimised through the retention or establishment of natural vegetation corridors between the timber compartments and the management of such unplanted land for biodiversity conservation and functioning of ecosystem structures (voluntary initiatives); and
- the impacts on soil, particularly on recently harvested compartments and from roads are reduced through the retention of timber residue on the harvested compartment and the proper construction and maintenance of gravel roads.

The Chapters are presented firstly with the legal requirements pertaining to the establishment and management of timber plantations, followed by other Chapters that will refer to the law where necessary but are largely centred on best management practices.

Chapter 2

Legal Requirements



Photo: www.forestrysouthafrica.co.za

2.1 Applicable Environmental Legislation for the growing of commercial forest plantations

The environmental legislation that governs the Forest Industry in South Africa is extensive and consists, *inter alia*, of the following important Acts and associated Regulations:

- National Forests Act 84 of 1998;
- National Water Act 36 of 1998;
- National Environmental Management Act 107 of 1998, (including the EIA Regulations);
- National Environmental Management: Biodiversity Act 10 of 2004 (includes regulations on alien and invasive species, threatened and protected species and threatened and protected ecosystems);
- National Environmental Management: Protected Areas Act 57 of 2003;
- National Environmental Management: Waste Act 59 of 2008;

- National Environmental Management: Integrated Coastal Management Act 24 of 2008;
- Conservation of Agricultural Resources Act 43 of 1983 (includes the regulations on weeds and invader plant, regulations to prevent the erosion of soil caused by wind and water and regulations on stocking rates for livestock);
- National Heritage Resources Act 25 of 1999;
- Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act 36 of 1947;
- Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act 36 of 1947: Adoption of Pesticide Management Policy for South Africa, 2010; and
- Hazardous Substances Act 15 of 1973;
- National Veld and Forest Fire Act 101 of 1998;
- Occupational Health and Safety Act (No. 85 of 1993)
- Basic Conditions of Employment Act (No. 75 of 1997)

In this Chapter, the focus will largely be on those Acts and Regulations that pertain to the establishment and management of commercial plantations. The remaining legislation will be covered in the appropriate Chapters.

2.1.1 National Forests Act No. 84 of 1998 (NFA)

In the preamble to the NFA, it is recognised that natural forests and woodlands form an important part of the environment and need to be conserved and developed according to the principles of sustainable management, while plantation forests play an important role in the economy. Further, it is also recognised that plantation forests have an impact on the environment and need to be managed appropriately.

The purpose of the NFA is therefore to, *inter alia*:

- promote the sustainable management and development of forests for the benefit of all;
- provide special measures for the protection of certain forests and trees; and
- promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes.

The South African Forestry Industry is committed to upholding the principles that are contained in section 3(3) of the NFA and which are the driving forces for Sustainable Forest Management (SFM) in South Africa:

The principles are that –

- a. natural forests must not be destroyed save in exceptional circumstances where, in the opinion of the Minister, a proposed new land use is preferable in terms of its economic, social or environmental benefits;
- b. a minimum area of each woodland type should be conserved; and
- c. forests must be developed and managed so as to:
 - i. conserve biological diversity, ecosystems and habitats;
 - ii. sustain the potential yield of their economic, social and environmental benefits;
 - iii. promote the fair distribution of their economic, social, health and environmental benefits;
 - iv. promote their health and vitality;
 - v. conserve natural resources, especially soil and water;

- vi. conserve heritage resources and promote aesthetic, cultural and spiritual values; and
- vii. advance persons or categories of persons disadvantaged by unfair discrimination.

The principles outlined above are prefaced by section 3(2) of the NFA which requires that an organ of state applying these principles must:

- a. take into account the differences between natural forests, woodlands and plantations;
- b. recognise that conservation of biological diversity within plantations should be promoted in a way which is consistent with the primary purpose for which the plantation was established;
- c. only apply those principles which it considers relevant to the decision or action which is contemplated;
- d. give such weight to each principle as it considers appropriate.

The NFA allows for the promotion and enforcement of sustainable forest management through the determination of:

- criteria on the basis of which it can be determined whether or not forests are being managed sustainably;
- indicators which may be used to measure the state of forest management;
- appropriate standards in relation to the indicators; and
- creation or promotion of certification programmes and other incentives to encourage sustainable forest management.

Once the Minister has decided to determine the criteria, indicators and standards referred to above, he/she MUST publish the criteria, indicators and standards in the form of regulations and identify clearly where the breach of a standard may be an offence. A series of criteria, indicators and standards (CI&S) for Sustainable Forest Management were subsequently developed following an intensive stakeholder consultation process, commissioned in 2001 under the guidance of the Committee for Sustainable Forest Management established in terms of the NFA. Following intensive field testing the CI&S were refined to enable stakeholders to use and adopt them in their own management practices. This was published as an internal document for use and testing by the Forestry Directorate but was never published for enforcement purposes. These CI&Ss have been reviewed and were published for stakeholder input at the end of 2015. These CI&S have been accepted by the National Forestry Advisory Committee (a committee established under the NFA as advised by the Committee for Sustainable Forest Management). In time they will be promulgated and published for use by timber growers and will be legally binding. As of May 2024, they have not been promulgated into law.

The NFA also prohibits the destruction of indigenous trees in any natural forest without a licence. No person may cut, disturb, damage or destroy any indigenous living tree, or remove or receive any such tree from a natural forest except in terms of a licence. A list of protected trees is published annually in the Government Gazette and is available from Forestry South Africa on request.

The NFA allows the Minister to declare certain forests as “protected areas”. This may apply to a State forest. Land expropriated specifically for a protected area, or, with the request or with the consent of a registered owner of land outside a State forest, may be declared as a specially protected area in one of the following categories:

- a forest nature reserve;
- a forest wilderness area; and

- any other type of protected area which is recognised in international law or practice.

The effect of setting aside protected areas is that no person may cut, damage or destroy any forest produce in the protected area; or remove any forest produce from a protected area except in terms of rules made for the management of the area, in the course of the management of the protected area, in terms of a right of servitude, in terms of the authority of a licence, in terms of an exemption and in the case of a protected area of land outside a State forest, with the consent of the registered owner.

Where the Minister has declared a forest to be a natural forest (section 7(2) of the NFA) or a particular tree or group of trees or woodland to be protected, the Minister may request the registrar of deeds for the area to make an appropriate note. The State does not acquire any rights in the land on which any natural forest or any protected tree is situated.

While the NFA regulates a wide range of uses of primarily State forests, it does not regulate uses of private forests, unless such use is voluntary (section 21).

The NFA allows communities who wish to engage in community forestry to enter into agreements with the Minister. The procedure for entering into and the minimum requirement for the content of such an agreement are set out in Chapter 4, Part 3 of the NFA. The Minister may make financial or other assistance available for community forestry and certain other forms of forestry.

2.1.2 National Environmental Management Act 107 of 1998 (NEMA)

NEMA was founded on the White Paper on Environmental Management Policy for South Africa (1998), which was developed through an extensive public participation process. Two important characteristics of the White Paper and thus NEMA were, firstly, the emphasis placed on “sustainable development” and secondly, on the transition to democracy and its socio-economic implications.

NEMA has introduced a new and comprehensive underlying legal framework to give effect to the environmental rights contained in section 24 of the Constitution. It stipulates environmental management principles and prescribes detailed procedures for co-operative governance as well as fair decision-making and conflict management. Another core objective is that of integrated environmental management based on the requirement of environmental authorisations for certain listed activities. It also aims to ensure that South Africa meets its international obligations under international environmental instruments and provides for measures to ensure effective compliance and enforcement. NEMA also introduced Specific Environmental Management Acts, or SEMAs, which regulate a specific aspect of the environment, for example, waste is dealt with in the National Environmental Management: Waste Act 59 of 2008; protected areas are dealt with in the National Environmental Management: Protected Areas Act 57 of 2003; and so on. The National Water Act 36 of 1998 is a SEMA.

In restricting the discussion in this Chapter to the impact that the NEMA has on forestry operations, it is important to emphasise the general duty of care and remediation of environmental damage found in section 28 (1), viz.

“Every person who causes has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.” – known as the “Duty of Care”.

Important to note is that this obligation is non-exhaustive in that it refers to “every person”. However, this is clarified further in the section that there are three classes of “person”; an owner of land or premises, a person in control of land or purposes (such as a lessee) and sub-lessees, contractor and subcontractors.

In addition, the section has a retrospective effect, meaning that if a person had, for example, stored hazardous material on their property for decades, they would be obliged to undertake remedial work.

The “reasonable measures” referred to above are wide-ranging and include measures to:

- a. investigate, assess and evaluate the impact on the environment;
- b. inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment;
- c. cease, modify or control any act, activity or process causing the pollution or degradation;
- d. contain or prevent the movement of pollutants or the causes of degradation;
- e. eliminate any source of pollution or degradation; and
- f. remedy the effects of pollution or degradation.

Foresters should be aware of these “Duty of Care” as a matter of principle and take all practical steps possible to avoid unnecessary impacts on the environment as a result of forestry operations. These aspects are treated in more detail in the Guideline which essentially is a guide to best practice in the forestry Industry that seeks to minimise the impacts of forestry on soil, water, biodiversity, ecosystem services, ecosystem infrastructure and heritage resources.

When is pollution or degradation “significant”?

NEMA does not define what constitutes significant pollution or degradation. In the case of *Hichange Investments (Pty) Ltd v Cape Produce Company (Pty) Ltd t/a Pelts Products* 2004 (2) SA 393 (E), the Court, in discussing the meaning of the same term used in the duty of care in section 28(1) held that the assessment of what is significant is a subjective one and the standard is not a particularly high one. Legal academic Glazewski remarked that “[t]his must be considered in the light of the constitutional right to an environment conducive to health and well-being, as well as the relevant principles in the NEMA...” Glazewski refers specifically to the precautionary and polluter pays principles and stated: “If so viewed it is suggested that the threshold level of significance is not particularly high”. (Jan Glazewski, *Environmental Law in South Africa* Butterworths, First Edition, 2000: 178. Also see the Second Edition, 2005:150.)

The area where a forester is most likely to be exposed to environmental laws and management is in the planting of new land to commercial trees. Section 24 of NEMA provides for certain listed activities that may not commence without an environmental authorisation from the relevant Provincial Environmental Affairs Department (competent authority), or in some cases, from the national Department of Environmental Affairs, Forestry and Fisheries. “The physical alteration of virgin soil to agriculture, or afforestation for the purposes of commercial tree, timber or wood production of 100 hectares or more,” is one such “listed activity”.

The application process in order to obtain such environmental authorisation requires that an environmental impact assessment must be carried out by an independent Environmental Assessment Practitioner (EAP) in accordance with the requirements contained in the Environmental Impact Assessment (EIA) Regulations. There are three lists of activities identified by the Minister that require environmental authorisation prior to being undertaken. The first list

requires a basic assessment to be undertaken due to their acknowledged lower impact, while the second list, requires a more intensive assessment; viz. a Scoping Report and a full Environmental Impact Assessment and an environmental management programme. The third list contains activities identified in specific areas in the different Provinces and require a basic assessment.

This Guideline will not provide much detail on the process to be followed since the procedure is defined in law and must be followed by the appointed independent EAP.

The current Schedules of Listed Activities which would apply to a forester and forestry activities are included in Appendix 1. The listed activities are comprehensive and the Guideline has extracted only those that are most likely to be encountered by a forester or organisation involved in the timber industry. Since all these activities require the use of an EAP, foresters are urged to discuss any development, expansion or transformation of land on their forest management units in the planning stages with an accredited EAP to ensure legal compliance.

Note also that NO “Listed Activity” should be commenced in the absence of an environmental authorisation issued by the competent authority. Note further that such an environmental authorisation contains a list of conditions and compliance with such conditions is essential to avoid possible prosecution. An environmental authorisation has a time frame within which the commencement of the authorised activity/activities must occur. Failure to do so will result in the lapsing of the environmental authorisation.

NEMA also addresses the Control of Incidents (section 30) and Emergency Situations (Section 30A) see for more details on emergency situations and requirements under the National Disaster Management Act (see Chapter 12 for more detailed information).

Measures that can be used

- ✓ Copies of environmental authorisation/s or record/s of decision for any Listed Activity must be retained by the landowner
- ✓ Compliance with any environmental authorisation should be evident, either in a written/electronic form, or on site.

2.1.3 National Water Act 36 of 1998 (NWA)

The Constitution of South Africa (section 24) states that everyone has the right to have access to (amongst other things) sufficient water, and the State must take reasonable legislative and other measures within its available resources to achieve the progressive realisation of these rights. However, it is pertinent to note that it is the “right to access” and not a “right to water” that the Constitution enshrines.

NWA is the primary legislation regulating water use in South Africa and requires amongst others, that the Minister establish a National Water Resources Strategy (NWRS) providing information about ways in which water resources will be managed. In 2000, a Department of Water Affairs and Forestry (DWAF) analysis showed that 11 of the 19 water management areas that existed in the country at that time were facing a water deficit. These 11 catchment ecosystems have either been placed under severe stress, or users cannot rely on their rights to access to sufficient water. Note that “access to sufficient water” is again different to “access to basic water supply”. The 19 water management areas have since been reduced to nine.

STATEMENT OF INTENT:

All Listed Activities should be lawfully implemented in terms of their environmental authorisation and related conditions.

In 2013, WWF South Africa conducted research with the Council for Scientific and Industrial Research (CSIR) to assess where most of the country's water originates. The research revealed that only 8% of land in South Africa produces 50% of surface run-off. This 8% of the land coined Water Source Areas (WSAs) provide a disproportionate amount of run-off to the rest of the catchment. South Africa's water source areas are generally found in the highest parts of the landscape that receive the most rainfall. Downstream users and ecosystems are dependent on the healthy functioning of these areas to sustain good quality water supplies. (see www.wwf.org.za/?9321/Defining-South-Africas-Water-Source-Areas)

The land cover in these 21 WSAs is dominated by natural vegetation cover (63%), 15% of the area is cultivated and 13% is under plantation. Three percent is degraded land, mainly in the Eastern Cape.

Only 16% of the WSAs are formally protected as nature reserves or parks. The highest protection is found in the Western Cape with the Kougaberg, Swartberg and Grootwinterhoek areas having more than 70% formal protection. Water source areas in the Eastern Cape and Maloti Drakensberg, the Enkangala Drakensberg, the Mfolozi headwaters and the Soutpansberg have very little or no protection.

Proposed amendments to the NWA published for comment in November 2023 have also included a definition of a water source area and the amendments include proposals to prohibit the establishment of plantations and agriculture in these WSAs. This has been challenged by FSA and AgriSA in their submissions and as of October 2024, these prohibitions remain proposals only.

Water use in South Africa is dominated by irrigation, which uses approximately 60% of all water. Domestic and urban use accounts for approximately 10%, while mining, power generation and industries account for 11% and commercial forestry (through reduction of run-off into rivers and streams) only 3%. Stock watering and nature conservation together account for 3%. Irrigation is thus clearly the greatest user of water and thus potentially an area for the greatest savings by the application of best management practices in the irrigation sector.

The National Water Resources Strategy 1 and 2 has been superseded by the third version, the National Water Resources Strategy, published on 1 September 2023. The National Water Resource Strategy (NWRS) is the blueprint for water resources management in South Africa and aims to ensure the protection and management of water resources to enable equitable and sustainable access to water and sanitation services in support of socio-economic growth and development and sustained ecosystem functioning for the well-being of current and future generations.

The NWRS 3 recognises that while forestry in South Africa is critical for timber and fibre production, income generation and job provision, it comes at some water cost, as the commercial forestry genera use more water than the natural vegetation they replace.

The following are the five clear priorities identified in the NWRS 3 for allocating water in South Africa and ensuring equity:

Priority 1: In line with the Constitution and the National Water Act, the highest allocation priority is afforded to water for the purposes of the Reserve. In terms of the current policy, a quantity of 25 litres per person per day has been incorporated into the Reserve determination. The ecological component of the Reserve is also in dire need of more water allocation.

Priority 2: The second-highest priority, therefore, is meeting international water requirements in terms of the agreements with neighbouring countries.

Priority 3: The third highest priority is accorded to the allocation of water for poverty eradication, the improvement of livelihoods of the poor and the marginalised and uses that will contribute to greater racial and gender equity.

Priority 4: The fourth highest priority is accorded to the allocation of water for uses that are strategically important to the national economy, as described in Section 6(1) (b) (IV) of the National Water Act.

Priority 5: The fifth priority will be water used for general economic purposes, which includes commercial irrigation and forestry.

All five priorities must give effect to allocations that promote equity

The timber industry, even at 3% of available water use, can play its part by firstly continuing with its approach to the clearing of invasive species from wetlands and water courses and secondly, putting in place appropriate best management practices (contained in this Guideline) to further limit the impacts of commercial forestry operations on both the quantity and quality of water.

Water Use

Importantly the NWA requires all water use to be authorised and such water use (section 21 of the NWA) includes:

- i. taking of water from a water resource;
- ii. storing water;
- iii. impeding or diverting the flow of water in a watercourse;
- iv. engaging in a streamflow reduction activity;
- v. engaging in a controlled activity;
- vi. discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall, or other conduit;
- vii. disposing of waste in a manner which may detrimentally impact on a water resource;
- viii. disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- ix. altering the bed, banks, course or character of a watercourse;
- x. removing, discharging, or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- xi. using water for recreational purposes.

“Stream flow reduction activity” is defined in the NWA as “the use of land for afforestation which has been or is being established for commercial purposes” or is declared as such in terms of section 36(2).

The following are NOT recognised as a stream flow reduction activity (SFRA):

- using land for afforestation established for a purpose other than for commercial purposes – this means that for example, citrus trees, nut trees etc. are not an SFRA and do not require a water use licence;
- windbreaks – they are not used for commercial purposes and are not an SFRA and thus do not require a water use licence; and
- woodlots – provided they are not used for commercial purposes but for the provision of on-farm fuel and building material, woodlots are not an SFRA.

Permissible Water Use

Permissible water use can take place as follows:

- without a licence – very low-level use as authorised automatically as a Schedule 1 use. Schedule 1 allows for reasonable domestic use, gardening, small-scale subsistence farming, animal watering (not large-scale stock

NOTE:

Proof of registration does not constitute a lawful water use but does demonstrate compliance with the National Water Act in so far as requirements to register water use have been met.

watering), firefighting and some recreation and for the use of water stored from roof run-off;

- without a licence – if that water use is permissible as a continuation of an “existing lawful use”. In this case a user who was using water during the two-year qualifying period prior to the promulgation of the NWA in 1998 is deemed to be a lawful user and may continue to use this water;
- without a licence – if that water use is permissible in terms of a General Authorisation (GA). A GA is published in the Government Gazette and authorises all or any category of persons to use water subject to conditions that may be (i) general; (ii) in relation to a specific water resource; and (iii) within an area specified in the notice;
- with a licence – if the water is authorised by a licence under the NWA; and
- if the responsible authority has dispensed with a licence requirement – section 22(3) allows for a responsible authority to dispense with the requirements for a licence for water use if it is satisfied that the purpose of the NWA will be met by the grant of a licence, permit or other authorisation under any other law.

Existing Lawful Water Use and Genus Exchange

Section 32 (1) of the NWA defines an “existing lawful water use” as a water use –

- a. which has taken place at any time during a period of two years immediately before the date of commencement of this Act and which –
 - i. was authorised by or under any law which was in force immediately before the date of commencement of this Act;
 - ii. is a streamflow reduction activity contemplated in section 36(1) or
 - iii. is a controlled activity contemplated in section 37(1).
- b. or which has been declared an existing lawful water use under section 33.

Section 32(2) goes further and clarifies that “existing lawful water use” in the case of any SFRA declared under section 36(1), means “a water use which has taken place at any time during a period of two years immediately before the date of the declaration”.

In order to qualify as an existing lawful water use, afforestation must have been established or must have been in the process of being established for commercial purposes at any time during a period of two years immediately before the NWA came into effect (referred to as the “qualifying period”).

The requirement that a SFRA must have been authorised under any other law does not apply to existing lawful water uses in respect of SFRAs. This was the subject of High Court application brought by FSA on behalf of its members for various orders declaring amongst others, that such authorisation is not required to be proven in order to claim a SFRA as an existing lawful water use. This was upheld by the Supreme Court of Appeal in November 2023 and confirmed by the Constitutional Court in August 2024. (see www.forestrysouthafrica.co.za for a detailed guideline and infographic).

Further relevant considerations are the following:

- ✓ It was not disputed that more than 70% of commercial afforestation in South Africa was established prior to 1972 when planting permits were introduced for the first time. In respect of all those plantations, there is no question of any obligations or conditions attaching to the use as contemplated in section 34(1)(a) of the NWA;
- ✓ The Statutory Authorities are not entitled to regard the mere reference to genera and species of trees in permits as conditions relevant for verifying

lawfulness under section 35 of the NWA, or to require a new application for a licence when the genus or species of trees are changed;

- ✓ Despite FSA's success in obtaining the orders as explained above in the SCA, this does not have the effect that verification in terms of section 35 of the NWA is no longer necessary;
- ✓ The purpose thereof will be to verify that land was being 'used' for afforestation during the Qualifying Period (1 October 1996 to 30 September 1998) and what the extent of the being used land was. However, this does not mean that trees needed to be physically in the ground, but the land must have been actively managed as a plantation, whether preparation, cultivating or harvesting;
- ✓ The Statutory Authorities cannot question the lawfulness in respect of a streamflow reduction activity based on reference to genus or species in old order permits (but see 10(iii) below);
- ✓ Information provided by FSA members and reflected in their water use registration certificates could be of assistance in this regard, bearing in mind that if the certificate only indicates land where trees were planted as at the date that the information was submitted to the relevant authority, additional information may be requested regarding the extent of the land used during the qualifying period (not at the time when members were requested to provide information to register their water use);
- ✓ If it appears that some of the land was not being used for plantation forestry during the qualifying period, then the existing lawful water use may be limited to the extent of the land that was managed as a plantation during the qualifying period and as such, any FSA member using more land after the qualifying period than during the qualifying period will not have such additional land verified as an existing lawful water use;
- ✓ In so far as Genus Exchange is concerned for plantations established pursuant to a water use licence issued under the NWA, it does not require the written approval of the relevant authority unless FSA members have a water use licence containing a condition that specifically requires written approval for genus exchange;
- ✓ It is important to note that while the SCA made a specific finding that authorisation is not required to be proven in order to claim a stream flow reduction activity as an existing lawful water use, the Statutory Authorities are still empowered to determine the lawfulness of the existing lawful water use that is being claimed.

The correct approach in order to verify the lawfulness of existing lawful water use in terms of section 35 of the NWA, is the following:

- i. Commercial forests established prior to 1972 (which accounts for more than 70% of commercial afforestation) are not subject to any conditions or obligations arising from law of application at the commencement of the NWA in respect of the planting of specific species or genera of trees. There are therefore no such conditions or obligations that can be taken into account by the Statutory Authorities when undertaking the verification process in terms of section 35 of the NWA. Incidentally, this may include plantations established in close proximity to water sources;
- ii. From 1972 to 1 October 1998, references in planting permits issued under the 1968 Forest Act, (as amended in 1972) and the 1984 Forest Act to species or genera of trees, without clear indications that these references establish conditions or obligations with which commercial foresters must comply, can also not be taken into consideration when undertaking verification in terms of section 35 of the NWA;

- iii. Where express conditions or obligations regulating the species or genera of trees that may be planted, have been imposed in planting permits issued under the 1984 Forest Act, commercial foresters must comply with such conditions, except if the Statutory Authorities consented in writing to the change of genera or species;
- iv. However, there are indications in the SCA judgment that the SCA supports FSA's position that the imposition of such conditions was not authorised by the old order forestry acts. Such conditions can therefore be taken on review or can be collaterally challenged by a refusal to comply therewith (see 10.v.);
- v. Collateral challenge is defined as follows: To raise a defense and refuse to comply with a coercive action taken or threatened against members of FSA by the Statutory Authorities, for example, relying on the invalidity of a condition specifying that genera may not be exchanged without written approval, even though the condition has not been set aside by a court;
- vi. There may be other legislation that was in operation at the commencement of NWA, for example, the Soil Conservation Act 16 of 1969, the Conservation of Agricultural Resources Act 43 of 1983 and the Environment Conservation Act 73 of 1989, in terms of which conditions or obligations relating to the planting of specific species or genera of trees were imposed – this, however, is unlikely;
- vii. In determining the extent of the SFRA during the qualifying period that the current use (i.e. the extent of the SFRA at the time when the verification of the existing lawful water use is being undertaken in terms of section 35 of the NWA) cannot be used to reduce the extent of the SFRA that is claimed was taking place during the qualifying period;
- viii. Trees did not need to be “in the ground” during the qualifying period – but the land must still however, have been used for commercial forestry purposes;
- ix. That the qualifying period is 1 October 1997 to 30 September 1999.

Measures that can be used to prove an existing lawful water use

Existing lawful water use should be documented through the existence of:

- aerial photographs of plantations that existed before 1972;
- aerial photographs of plantations that existed during the two-year qualifying period;
- oral evidence of witnesses, sworn affidavits or documentary proof such as planting plans, harvest schedules etc.

Other water uses

Other possible water uses that may apply to a forester include:

- storing water;
- impeding or diverting the flow of water in watercourses; and
- altering the beds, banks, course or characteristics of watercourses.

The following are recognised as storing water:

- storing water in a river before it is used;
- storing water pumped from a river into a structure constructed outside the river before it is used.

S21(c) Impeding or diverting the flow of water in a watercourse

The recent General Authorisation (GA) (GG 49833 No 4167) published on 8 December 2023 amends the General Authorisation 1 and 2 to the Schedules of Government Notice 398 published in Government Gazette 26187 dated 26 March 2004, General Authorisation 1199 published in Government Gazette 32805 dated 18 December 2009, and General Authorisation 509 published in Government Gazette 40229 dated 26 August 2016.

However, any person who registered under any of the previous Government Gazette may continue with such water use without the requirement to re-register, assuming that they previously registered such water use (between 1999 and 2000 when 19 government gazettes were published requiring the registration of sections 21 (c) and (i))

The following definitions are relevant:

- “impeding” means “to, in any manner, hinder or obstruct the instream flow of water temporarily or permanently but excludes the damming of flow so as to cause storage of water”;
- “diverting” means “in any manner, cause the instream flow of water to be rerouted temporarily or permanently”.

Both impeding and diverting should take place without altering the bed, banks and characteristics of the watercourse, except for the place where the structure is constructed for the impeding or divergence. The water use is NOT the construction or operation of a structure, carrying out an activity or drilling a borehole but the results caused by the construction, operation of a structure or drilling a borehole viz. the impeding or diversion of the water.

The following are regarded as impeding or diverting the flow of a watercourse

- low water bridge;
- footpath;
- culvert;
- flood retention weir/gauging weir;
- pillar of a bridge;
- mast of a power line (structure that may impede or divert water flow);
- structure to improve the utilisation of the water in the watercourse, for example for trout fishing, recreation; and/or
- structure for slopes stabilisation and erosion protection.

This Notice does not apply:

- a. to the use of water in terms of section 21 (c) or (i) of the Act for the rehabilitation of a wetland as contemplated in General Authorisation 1198 published in Government Gazette 32805 dated 18 December 2009, (there is a separate GA for wetland rehabilitation);
- b. to the use of water in terms of section 21 (c) or (i) of the Act within the regulated area of a watercourse where the Risk Class is Medium or High as determined by the Risk Matrix (Appendix A in the GG 49833 No 4167). This Risk Matrix must be completed by a suitably qualified SACNASP professional member; (i.e., it must be of a Low-Risk Class for this GA to apply);
- c. in instances where an application must be made for a water use license for the authorisation of any other water use as defined in section 21 of the Act that may be associated with a new activity; (i.e., can include the application for a section 2(c) and (i) in an application for a different water use such as a SFRA section 21(d));

- d. where storage of water results due to the impeding or diverting of flow or altering the bed, banks, course or characteristics of a watercourse; (i.e., does not apply to an in-stream storage facility);
- e. to any section 21 (c) or (i) water use associated with construction/installation or maintenance of main or bulk sewerage pipelines, French drains (contradicts section 21(g) where French drains are excluded if they serve 50 households or less. In effect there are two different and thus contradictory thresholds for sections 21 (g) and sections 21 (c) and (i) for conservancy tanks/soak-pits/ French drains and pipelines carrying hazardous materials).

Because of the complexity of the 2023 GA, FSA have produced a stand-alone Guideline to section 21(c) and (i) of the National Water Act, 1998 which can be accessed on the FSA website (www.forestryexplained.co.za)

S21(i) Altering the bed, banks, course or character of a watercourse

In the most recent General Authorisation 2016 (GA 2016), the following definition is relevant:

- “Characteristics of a watercourse” means the resource quality of a watercourse within the extent of a watercourse.
- “Watercourse” is defined in the NWA as “(a) a river or spring; (b) a natural channel in which water flows regularly or intermittently; (c) a wetland, lake or dam into which, or from which, water flows; and (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse and a reference to a watercourse includes, where relevant, its bed and banks”.
- “Wetland” in terms of the NWA means “land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil”.

The attributes “bed, bank, course and characteristics” are very broad. For example, the bank is not necessarily confined only to the sloping edge of the land next to the watercourse but could include some of the land alongside the river or stream.

Nevertheless, the following are regarded as altering the bed, banks, course and characteristics of a watercourse:

- widening or straightening the bed and banks of a watercourse to allow for the construction of a bridge;
- altering the banks and beds of a river while undertaking activities such as maintenance of the bridge.

The following are NOT recognised as altering the bed, bank, course or characteristics of a watercourse:

- cleaning the beds and banks of a watercourse that have silted up;
- removing sand from a watercourse that does not form part of the characteristics of the watercourse (note that the EIA Regulations limit removal of sand from a watercourse to 10 m³ – above this volume will require an environmental authorisation in terms of NEMA).

The differences between these two water uses are not always clear, so it is advised that should any activity occur within what is defined as a “watercourse”, that expert advice be sought.

Section 21 (f) and (g)

In terms of Regulation 3(b)(i) of the water use registration regulations published under Government Notice R1352 in Government Gazette 20606 of 12 November 1999 a person who uses water as contemplated in section 21 of National Water Act, 1998 (Act No 36 of 1998), must when called upon by a responsible authority to do so, register a water use. On 10 March 2023, the Minister requested all persons who uses water for section 21(f) and (g) to register their water use.

This General Authorisation replaces the need for a water user to apply for a licence in terms of section 40 of the National Water Act 36 of 1998 (NWA), provided that the water use is within the limits and conditions of this General Authorisation.

Section 21(f) means “discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit”

- ✓ This water use entails the discharge of waste or wastewater directly into a water resource;
- ✓ Common examples of this water use are waste released into a river or dam at a discharge point such as waste water from factories, or partially treated wastewater from treatment plants;
- ✓ Waste discharged into a municipal sewer is NOT included in this water use. However, the waste discharged by the municipal treatment works into a water resource IS an example of this water use, but does not affect a commercial plantation owner.

Registration process

- Completion of Registration Form DW766 is required if any wastewater (domestic or industrial) being discharged through a pipe, canal or other conduit on the property enters a water resource
- It is a requirement to register any wastewater discharge if the wastewater discharge is into a water resource up to 2 000 cubic metres (2 000 000 litres) on any given day per property.
- Form 766 must be accompanied by the completion of supplementary forms.
 - DW 901 Property where water use occurs
 - DW 902 Details of property owner
 - DW 903 Compliance management information: Actual/Monitored Waste Discharge Details applicable for sections 21 (f) and (h)

Submission of a DW766 without a DW903 form would be considered as an incomplete registration

Note: It is only the exception where a section 21 (f) water use exists on a forestry estate. This may occur on large-scale operations where staff villages are large enough to warrant the construction of a domestic waste treatment disposal system.

Section 21(g) means “disposing of waste in a manner which may detrimentally impact on a water resource;”

- ✓ This is typically disposal of water containing waste that takes place into on-site facilities such as French drains, conservancy tanks, pit latrines and soak-aways but does NOT pass through pipes, canal, sewers or other conduits directly into a water resource.
- ✓ Another example of section 21(g) water use is disposal into wastewater treatment systems, such as oxidation ponds that do not have an outlet into

a water resource. An oxidation pond is a secondary waste water treatment that uses sunlight, bacteria and algae to stabilise the waste water.

- ✓ If the oxidation pond has an outflow into a river or dam, it is defined as water use 21(f) above for discharging waste water into a water resource.
- ✓ Household on-site disposal systems for domestic wastewater into communal septic tanks serving less than 50 households is a schedule 21(g)

Registration Process

- Completion of Registration Form 767 is applicable to disposing of wastewater into land-based facilities such as evaporation dams, oxidation ponds or a wastewater pond system. It also applies to disposal of industrial ash and mine residue, which may consist primarily of solid waste materials.
- On-site disposal systems must be also registered on this form, for:
 - Industrial wastewater;
 - Domestic wastewater into communal septic tanks serving more than 50 households.
- Form 767 must be accompanied by the completion of supplementary forms.
 - DW 901 Property where water use occurs
 - DW 902 Details of property owner
 - DW 904 Compliance management information: Actual/Monitored Waste Discharge Details applicable for sections 21 (e) and (g)
 - DW 905 Supporting technical information for waste disposal facilities (21g water uses)

Submission of a DW767 without a DW905 form would be considered as an incomplete registration

Note 1: It is important to recognise that section 21 (f) is the discharge of waste or water containing waste, through a pipe, sewer, etc., while section 21(g) is the disposal of waste which may not be through a pipe, sewer, etc.

Procedure for registration of water use

All water users, of whatever form of water use as identified in Section 21 of the NWA (see above), must register their water use with the DWS, even if they are unsure as to the legality of that water use. The water use registration form (DW 764) can be found on the DWS website www.dws.gov.za/WAR/licenceprocess.aspx.

All SFRA water users must have already registered their water use. If not, late registrations are permitted in terms of the NWA. Non-registration is regarded as an offence under the NWA.

Procedure for Water Use Licence Application (individual)

An application for a water use licence needs to be made on the appropriate form which is obtainable from the provincial Regional Office or can be downloaded from the DWS website (www.dws.gov.za Water Use Registration and Licensing page). A recent Government Gazette (GG No. 40713 No. R. 267 of 24 March 2017) has published regulations regarding the procedural requirements for water use licences and appeals.

The DWS has a Stream Flow Reduction Activity Licence Assessment Advisory Committees (LAAC) in provinces where plantation forestry is prevalent and all licence applications are considered by the regional LAAC. The LAAC is made up of

the DWS, Department of Environment, Forestry and Fisheries, the Department of Agriculture, Land Reform and Rural Development, provincial environment affairs, provincial agricultural affairs, provincial heritage resources agency, provincial conservation agency, environmental non-government organisations (ENGOS) and representatives of Forestry South Africa (FSA). All water use licence applications are reviewed by the LAAC and recommendations made to the DWS on whether or not to approve the application. Depending on the area of commercial forestry proposed, the authority to approve the SFRA water use licence application may rest with the Regional Office, or the National Office.

The application form should be accompanied by appropriate approvals from the provincial environmental, agricultural and heritage resources agencies. The conservation agencies, ENGOS and FSA can only make recommendations and play no part in the formal approval process.

SFRA licences are issued with conditions, the most important being that planting must proceed within a specified period, normally five years. If planting does not occur within the specified period the licence may be amended to reflect the extent of the water use that is being utilised, or the licence may be cancelled.

2.1.3 Conservation of Agricultural Resources Act 43 of 1983 (CARA)

The CARA essentially deals with soil health through the reduction in man-induced soil erosion but also regulates weeds and invader plants that pose a threat to the natural resources on the land. CARA came into effect on 1 June 1984 and cannot be applied retrospectively (unless it can be demonstrated that the continuation of a certain activity is compromising soil loss and others).

Combating and Prevention of Erosion and Weakening or Destruction of Soil

The emphasis of CARA is to ensure that soil health is maintained or improved through appropriate agricultural practices. The following regulations specifically address soil erosion and apply to forestry operations:

- except with written authority, no virgin land shall be cultivated (land which in the opinion of the executive officer has at no time during the preceding ten years been cultivated). Note that this restriction is carried through to the NEMA and constitutes a “listed activity” in terms of the Environmental Impact Assessment (EIA) Regulations requiring an environmental authorisation.
- except with written authority, no land shall be cultivated if it:
 - has a slope of more than 20%;
 - has a slope of more than 12% and is situated in certain magisterial areas with specified erodible soils and physical properties. NB This prohibition does not apply to land which was under cultivation on the date of the commencement of the regulations (i.e. 1 June 1984), provided such land is protected against excessive soil loss due to erosion through the action of water.
- cultivated land shall be protected against excessive soil loss as a result of erosion through the action of water; and
- cultivated land shall be protected against excessive soil loss as a result of the actions of wind.

Measures that can be used

- ✓ virgin land has not been planted to trees;
- ✓ slopes more than 20% have not been cultivated (after June 1984); and
- ✓ there should be no obvious signs of man-induced soil erosion on the farm (eroded roads, bare soil, erosion gullies, accelerated soil erosion from harvested compartments, etc.).

Protection of Vegetation and the Combating of Weeds and Invader Plants

CARA prohibits the spreading of weeds and invader plants. Amendments to the regulations published under the CARA in March 2001 declared certain plants as weeds and invader plants and grouped them into various categories that reflected their threat to the conservation of natural agricultural resources and vegetation. Note that the regulations are to be replaced by the National Environmental Management: Biodiversity Act (NEMBA) Alien and Invasive Species (AIS) Regulations that are dealt with further below, this has not happened as of May 2024.

It is recommended that the provisions of NEMA and the AIS Regulations be prioritised as the relevant government departments are focusing on compliance with the NEMBA AIS Regulations. Invader plants recognised under CARA are indigenous species (e.g. sekelbos) and will not be considered further in these guidelines. The focus is on weeds as in CARA or, as recognised in the NEMBA Biodiversity Act, Alien and Invasive Species (see below).

Category 1 plants may not occur on any land or inland water surface and a land user is lawfully required to control any category 1 plant by means specified in the Regulations. Effectively, no person may establish, plant, maintain multiply, propagate, import, sell, or acquire any propagating material of any Category 1 plant. No commercial forestry species are included in Category 1.

Category 2 plants may not occur on any land or inland water surface other than a demarcated area. The Act allows for an area in respect of which a water use licence for stream flow reduction activities has been issued in terms of the NWA, to be deemed to be a demarcated area. By implication, this includes all existing SFRA lawful water uses. Further, CARA allows for the demarcation of an area for the occurrence, establishment and maintenance of a Category 2 plant if:

- a. The Category 2 plants in the area are cultivated under controlled circumstances;
- b. The land user has been authorised to use water in terms of the NWA;
- c. The Category 2 plants or products of Category 2 plants in the area are demonstrated to primarily serve a commercial purpose, use as a woodlot, shelter belt, building material, animal fodder, soil stabilisation, medicinal or other beneficial function; and
- d. All reasonable steps are taken to curtail the spreading of propagating material of the Category 2 plants outside the demarcated areas.

In addition and unless authorised in terms of the NWA, no land user shall allow Category 2 plants to occur within 30 m of the 1:50 year flood line of a river, spring, natural channel in which water flows regularly, or intermittently, lake, dam or wetland. However, this restriction only came into effect in March 2001 and so cannot be lawfully applied retrospectively.

Commercial forestry species are included as Category 2 species in the regulations and therefore need to be controlled when outside the demarcated area. Control is only lawfully required on the landowner's property, although

STATEMENT OF INTENT:

There has been no cultivation of virgin land or land greater than the specified slope as required under the Conservation of Agricultural Resources Act since the date of proclamation (1984).

foresters are encouraged to control plants on adjoining properties through a mutual agreement with the affected landowner.

Note that should a forester wish to establish a woodlot for on-farm use but not for commercial use, this is permitted in terms of the Regulations but must be applied for through the local provincial agricultural affairs office. If authorised, the woodlot will be regarded as a demarcated area.

Category 3 plants shall not occur on any land or inland water surface other than in a biological reserve. No commercial forestry species are included in Category 3 plants.

The regulations specify the methods of control, which include:

- a. Uprooting, felling, cutting or burning;
- b. Treatment with a weed killer that is registered for use in connection with such plants in accordance with the directions for the use of such weed killer;
- c. Biological control carried out in accordance with the stipulations of the Agricultural Pests Act No. 36 of 1983, and any other applicable legislation;
- d. Any other method of treatment recognised by the Executive officer that has as its object the control of plants concerned; and
- e. A combination of one or more of the methods prescribed in paragraphs a), c) and d), save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.

From a practical perspective, it is clear that only chemicals that are registered for control of the weeds can be used lawfully. Use of chemicals NOT registered for control of a specific species or category of plants may NOT be used. (See also Chapter 5.2.5 TIPWG Approved Pesticide List (APL)).

Measures that can be used

- ✓ A weed control plan should be developed and included in or on the Land Use Plan (see Chapter 2 and Chapter 5.2); and
- ✓ Progress in weed control should be documented or photographed (See Chapter 2 and Chapter 5.2).

STATEMENT OF INTENT:

Weeds are controlled in terms of the regulations published under the Conservation of Agricultural Resources Act.

2.1.4 National Environmental Management: Biodiversity Act. Regulations published for the control of Alien and Invasive Species

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) regulates the conservation of South Africa's biodiversity through, among other things, regulating the growth and spread of Alien and Invasive Species (AIS).

In terms of section 97(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), the Minister is required to publish Regulations for the control of Alien and Invasive Species (AIS), as well as a list of Alien and Invasive Species. The Minister was required to publish by notice in the Gazette, the national list of alien and invasive species within 24 months of the Act coming into effect i.e. by June 2006 (section 70(1)). It was only in August 2014 that the list was finalised and came into effect on 1 October 2014, amended in July 2016 and again in 1 March 2021.

The Main Contents of the Regulations and the List

- the Alien and Invasive Species Regulations, 2014, published on 1 August 2014 in GG No. 37885 R 598 and the Alien and Invasive Species Lists published on

1 August 2014 in GG No. 37886 R 599 came into effect on 1 October 2014. The Alien and Invasive Species Lists were amended in July 2016 in GG No. 40166 R 864 and again in GG No. 43726 No 1003 and came into effect on 1 March 2021.

- the Regulations have four categories of Alien and Invasive Species and the list of commercial forestry species are included in all Categories, depending on the species and the geographic location.
- NEMBA, the AIS Regulations and the AIS Lists specify “restricted activities” in relation to AIS, which are prohibited or may only be undertaken with a permit. Some exemptions from the requirement to obtain a permit are provided. This is discussed below.

Restricted Activity

The Regulations have four categories of Listed Invasive Species and no person may carry out a restricted activity involving a specimen of a Listed Invasive Species without a permit, except where exempted from doing so. In relation to some AIS, restricted activities are prohibited outright. In order to fully understand the implications of the Listing of Alien and Invasive Species it is important to clarify the definition of a restricted activity in relation to a specimen of an alien or listed invasive species. In terms of the Act this means:

- importing into the Republic, including introducing from the sea, any specimen of an alien or listed invasive species;
- having in possession or exercising physical control over any specimen of an alien or listed invasive species;
- growing, breeding or in any way propagating any specimen of an alien or listed invasive species, or causing it to multiply;
- conveying, moving or otherwise translocating any specimen of an alien or listed invasive species;
- selling, or otherwise trading in, buying, receiving, giving, donating, or accepting or disposing of any specimen of an alien or listed invasive species; and
- any other prescribed activity which involves a specimen of an alien or listed invasive species.

In addition to what is defined in the Act, the AIS Regulations define further restricted activities –

- spreading or allowing the spread of, any specimen of a listed invasive species; and
- releasing any specimen of a listed invasive species.

General obligations

Any landowner, occupier of land, person in control of land or any person in control of a listed category 1a, 1b and 3 invasive species must prevent the escape and spread of the species, including its growth or spread of propagules and must control any specimen that escapes or spreads.

A person entering the Republic, must declare any alien or listed invasive species on their person or in their luggage at ports of entry.

Categories of Listed Alien and Invasive Species

Category 1a Listed Invasive Species (LIS)

- Category 1a LIS must be combatted or eradicated and any person in control of a Category 1a LIS must immediately take steps to combat or eradicate the species by means of methods appropriate for the species and the

NOTE:

That (1) a “specimen” means any living or dead animal, plant or other organism; a seed, egg, gamete or propagule or part of any animal, plant or other organism capable of propagation or reproduction or in any way transferring genetic traits; any derivative of any animal, plant or other organism; or any goods which contain a derivative of an animal, plant or organism; or from an accompanying document, from the packaging or mark or label, or from any other indications, appear to be or contain a derivative of an animal, plant or other organism.

(2) A “derivative” in relation to an animal, plant or other organism, means any part, tissue or extract, of an animal, plant or other organism whether fresh, preserved, or processed and includes any chemical compound derived from such part, tissue or extract.

(3) As a general exemption “all dead specimens of any listed species are exempted from requiring a Permit for any restricted activity” (this is important as far as transporting of harvested timber).

environment in which it occurs, with due consideration for the environment (see sections 75 (1), (2) and (3) of the Act));

- such person must also allow an official from the Department to enter onto land to monitor, assist with or implement the combatting or eradication of the LIS;
- if an Invasive Species Management Programme has been developed in terms of the Act (by the regulatory authority), a person must combat or control the LIS in accordance with the programme.

Category 1b Listed Invasive Species

- Category 1b LIS are those species that must be controlled and any person in control of a Category 1b LIS must control that species by means of methods appropriate for the species and the environment in which it occurs, with due consideration for the environment (see sections 75(1), (2) and (3) of the Act);
- such person must also allow an official from the Department to enter onto land to monitor, assist with or implement the combatting or eradication of the LIS;
- if an Invasive Species Management Programme has been developed in terms of the Act (by the regulatory authority), a person must combat or control the LIS in accordance with the programme.

Category 2 Listed Invasive Species

- Category 2 LIS requires a permit to carry out a restricted activity within an area specified under the Act or AIS Regulations or an area specified in the permit, as the case may be;
- no person may carry out a restricted activity in respect of a Category 2 LIS without a permit;
- a landowner on whose land a Category 2 LIS occurs or person in possession of a permit must ensure that the specimens of the species do not spread outside of the land or area specified in the notice or permit;
- if an Invasive Species Management Programme has been developed (by the regulatory authority), a person must control the LIS in accordance with such a programme;
- unless otherwise specified in the Notice, any species listed as a Category 2 LIS that occurs outside the specified area (see (1) above), must be considered to be a Category 1b LIS and must be controlled as such; and
- notwithstanding the specific exemptions relating to existing plantations in respect of LIS published in July 2016, any person or organ of state must ensure that the specimen of such LIS do not spread outside of the land over which they have control.

Category 3 Listed Invasive Species

- Category 3 LIS are species which are subject to exemptions (section 71(3) of the Act) and prohibitions (section 71A of the Act), as specified in the Notice;
- any Category 3 LIS that occurs in riparian areas must be considered a Category 1b LIS and managed as such; and
- if an Invasive Species Management Programme has been developed (by the regulatory authority), a person must control the LIS in accordance with such a programme.

NOTE:

More details on the Alien and Invasive Species Regulations are included in Appendix 2. For a full list of all Listed Alien and Invasive Species, check out the Department of Environmental Affairs website www.environment.gov.za

Categories of Plantations

Note: Sections 22(1) and (b) below relate to Permissible Water Use under the NWA. Under section 22(1), a person may only use water without a licence if the water use is a continuation of an existing lawful water use; or, (section 22 (b) with a licence if the water use is authorised by a licence issued under the NWA

The 2020 revised Regulations have included categories of plantations as follows:

- “dormant plantation” means a plantation that has not been operational, functioning as a plantation or does not have a valid authorisation in terms of section 22(1)(a) or (b) of NWA for a period of 10 years and where no reasonable attempt has been made to clear any listed invasive species;
- “exempted from an existing plantation” means an existing plantation is exempted from requiring a permit for that specific species for any restricted activity in terms of NEMBA or the Alien and Invasive Species Regulation, 2014;
- “existing plantation” means a plantation that was operational, functioning and authorised to grow a specific listed invasive species in terms of section 22(1)(a) or (b) of NWA as at 18 October 2020 and does not include:
 - a. any extension to a plantation;
 - b. any new plantations; or
 - c. any dormant plantation;
- which is established or recommissioned after 18 October 2020;
- “extension to a plantation” means the increase of the area of the plantation beyond the limits, area or location specified in:
 - a. a permit issued in terms of NEMBA or the Alien and Invasive Species Regulations, 2014; or
 - b. an authorisation in terms of section 22(1)(a) or (b) of NWA; and
 - c. the size of such extension will trigger the requirement to obtain and environmental authorisation in terms of the NEMA.
 - d. In effect, any plantations established up to 18 October 2020 do not require a permit under the AIS Regulations (but see *Pinus pinaster* and *P. radiata* below).

Note: There are no definitions under the NEMBA or the Regulations for:

- **Woodlots:** usually regarded as restricted area that is normally privately managed or managed by communities, for growing trees for building material and fuel;
- **Bee-forage areas:** While no definition of a bee-forage area is to be found in any South African legislation, a search for bee-forage area identified a radius of approximately 5km from a hive, but is dependent on the existence of natural vegetation within that 5km radius (see www.beepods.com/honey-bee-forage-map-diameter-hive-coverage-plants-range.html);
- **Windrows:** a row of hay raked up to dry in the wind before being baled or stored. It is assumed that the term as used in the AIS Regulations means a single row of identical trees planted very close together, tall and narrow – can be multiples rows of up to four rows of different species and established as windbreaks (and not windrows). Windrows must not be for commercial purpose or they qualify as SFRA and require a water use license;
- **Tree-lined Avenue:** a tree lined approach to a farm house or any other building;

These descriptions have therefore been defined using various sources of literature and dictionary definitions.

NEMBA definitions:

- “cultivation”, in relation to land, means any act by which the topsoil is disturbed mechanically.
- “untransformed land” means land that has not been altered from its natural state, or land that has been used for natural grazing, and including land that has been used for natural grazing, and including land in its natural state that has been degraded by factors such as soil erosion, over-grazing, over-burning, flood, invasive species and bush encroachment.

In effect, any plantations established up to 18 October 2020 do not require a permit under the AIS Regulations

Regulations for Acacia species (Category 2)

A. decurrens De Willd. *A. mearnsii* De Willd. and *A. melanoxylon* R.Br. species and hybrids, varieties and selections are categorised as Category 2 species and are exempted from the requirement to obtain a permit for restricted activities in relation to an existing plantation. If, however, they fall outside an existing plantation they must be managed as if it were a Category 1b species.

Acacia dealbata is categorised as a Category 2 species but is not exempted for an existing plantation – in other words if established as a plantation – will require a permit to carry out a restricted activity within an area specified under the Act or AIS Regulations or an area specified in the permit, as the case may be. If outside a plantation they must be managed as a Category 1b species. No person may carry out a restricted activity in respect of a Category 2 LIS without a permit

All other Acacia species are categorised Category 1a, 1b, or 3 species and are subject to certain prohibitions and conditions such as:

- prevent the escape and spread of the species, including its growth or spread of propagules;
- must control any specimen that escapes or spreads; and
- any person or organ of state must ensure that the specimen of such LIS do not spread outside of the land over which they have control.

Regulations for Existing Plantations Eucalyptus species. (Category 2)

E. camaldulensis species and hybrids, varieties and selections are a Category 2 species and are exempted from the requirement to obtain a permit for restricted activities in relation to an existing plantation

- Note: *E. camaldulensis* is Category 1 b within;
 - Riparian areas;
 - A Protected Area declared in terms of the Protected Areas Act; or
 - Within and Listed Ecosystem or an ecosystem identified for conservation in terms of a Bioregional Plan or Biodiversity Management Plans published under the Act.
- Not listed within Nama-Karoo, Succulent Karoo and Desert Biomes, excluding within any area in (a) above;
- Category 1 b in Fynbos, Grassland, Savanna, Albany Thicket, Forest and Indian Ocean Coastal Belt Biomes but;
 - Category 2 for plantations, woodlots, bee-forage areas, windrows and lining of avenues;
 - Not listed within cultivated land that is at least 50m away from untransformed land but excluding within any area in (a) above;

- iii. Not listed within 50m of the main house on a farm but excluding within (a) above; and
- iv. Not listed in urban areas for trees with a diameter of 400 mm at 1 000 mm height at the time of the publishing of these regulations i.e. 18 September 2020.

E. cladocalyx, hybrids, varieties and selections of these species are exempted from the requirement to obtain a permit for restricted activities in relation to an existing plantation.

- a. Note: *E. cladocalyx* is Category 1 b within;
 - i. Riparian areas;
 - ii. A Protected Area declared in terms of the Protected Areas Act; or
 - iii. Within and Listed Ecosystem or an ecosystem identified for conservation in terms of a Bioregional Plan or Biodiversity Management Plans published under the Act.
- b. Not listed within Nama-Karoo, Succulent Karoo and Desert Biomes, excluding within any area in (a) above;
- c. Category 1 b in Fynbos, Grassland, Savanna, Albany Thicket, Forest and Indian Ocean Coastal Belt Biomes but;
 - i. Category 2 for plantations, woodlots, bee-forage areas, windrows and lining of avenues;
 - ii. Not listed within cultivated land that is at least 50 m away from untransformed land but excluding within any area in (a) above;
 - iii. Not listed within 50m of the main house on a farm but excluding within (a) above;
 - iv. Not listed in urban areas for trees with a diameter of 400 mm at 1 000 mm height at the time of the publishing of these regulations.

E. conferruminata (*E. lehmanni*) hybrids, varieties and selections of these species are exempted from the requirement to obtain a permit for restricted activities in relation to an existing plantation:

- a. Note: *E. conferruminata* (*E. lehmanni*) is Category 1 b within;
 - i. Riparian areas;
 - ii. A Protected Area declared in terms of the Protected Areas Act; or
 - iii. Within and Listed Ecosystem or an ecosystem identified for conservation in terms of a Bioregional Plan or Biodiversity Management Plans published under the Act.
- b. Not listed within Nama-Karoo, Succulent Karoo and Desert Biomes, excluding within any area in (a) above;
- c. Category 1 b in Fynbos, Grassland, Savanna, Albany Thicket, Forest and Indian Ocean Coastal Belt Biomes but;
 - i. Category 2 for plantations, woodlots, bee-forage areas, windrows and lining of avenues;
 - ii. Not listed within cultivated land that is at least 50 m away from untransformed land but excluding within any area in (a) above;
 - iii. Not listed within 50m of the main house on a farm but excluding within (a) above;
 - iv. Not listed in urban areas for trees with a diameter of 400 mm at 1 000 mm height at the time of the publishing of these regulations.

E. diversicolor hybrids, varieties and selections of these species are exempted from the requirement to obtain a permit for restricted activities in relation to an existing plantation:

- a. Note: *E. diversicolor* is Category 1 b within;
 - i. Riparian areas;
 - ii. A Protected Area declared in terms of the Protected Areas Act; or
 - iii. Within and Listed Ecosystem or an ecosystem identified for conservation in terms of a Bioregional Plan or Biodiversity Management Plans published under the Act.
- b. Not listed within Nama-Karoo, Succulent Karoo and Desert Biomes, excluding within any area in (a) above;
- c. Category 1 b in Fynbos, Grassland, Savanna, Albany Thicket, Forest and Indian Ocean Coastal Belt Biomes but;
 - i. Category 2 for plantations, woodlots, bee-forage areas, windrows and lining of avenues;
 - ii. Not listed within cultivated land that is at least 50m away from untransformed land but excluding within any area in (a) above;
 - iii. Not listed within 50m of the main house on a farm but excluding within (a) above;
 - iv. Not listed in urban areas for trees with a diameter of 400 mm at 1 000 mm height at the time of the publishing of these regulations.

E. grandis hybrids, varieties and selections of these species are exempted from the requirement to obtain a permit for restricted activities in relation to an existing plantation.

- a. Note: *E. grandis* is Category 1 b within;
 - i. Riparian areas;
 - ii. A Protected Area declared in terms of the Protected Areas Act; or
 - iii. Within a Listed Ecosystem or an ecosystem identified for conservation in terms of a Bioregional Plan or Biodiversity Management Plans published under the Act.
- b. Not listed within Nama-Karoo, Succulent Karoo and Desert Biomes, excluding within any area in (a) above;
- c. Category 1 b in Fynbos, Grassland, Savanna, Albany Thicket, Forest and Indian Ocean Coastal Belt Biomes but;
 - i. Category 2 for plantations, woodlots, bee-forage areas, windrows and lining of avenues;
 - ii. Not listed within cultivated land that is at least 50m away from untransformed land but excluding within any area in (a) above;
 - iii. Not listed within 50m of the main house on a farm but excluding within (a) above;
 - iv. Not listed in urban areas for trees with a diameter of 400 mm at 1 000 mm height at the time of the publishing of these regulations.

E. tereticornis and hybrids, varieties and selections of these species are exempted from the requirement to obtain a permit for restricted activities in relation to an existing plantation.

Note: *E. tereticornis* is a Category 1b within;

- a. Category 1 b within;
 - i. Riparian areas;
 - ii. A Protected Area declared in terms of the Protected Areas Act; or

- iii. Within and Listed Ecosystem or an ecosystem identified for conservation in terms of a Bioregional Plan or Biodiversity Management Plans published under the Act.
- b. Not listed within Nama-Karoo, Succulent Karoo and Desert Biomes, excluding within any area in (a) above;
- c. Category 1b in Fynbos, Grassland, Savanna, Albany Thicket, Forest and Indian Ocean Coastal Belt Biomes but;
 - i. Category 2 for plantations, woodlots, bee-forage areas, windrows and lining of avenues;
 - ii. Not listed within cultivated land that is at least 50 m away from untransformed land but excluding within any area in (a) above;
 - iii. Not listed within 50m of the main house on a farm but excluding within (a) above;
 - iv. Not listed in urban areas for trees with a diameter of 400 mm at 1 000 mm height at the time of the publishing of these regulations.

Regulations for *Pinus* species

Pinus elliotti, *P. patula*, *P. roxburghii* and *P. taeda* and hybrids, varieties and selections are exempted for existing plantations from the requirement to obtain a permit for restricted activities in relation to an existing plantation.

However, all plantations in the Western Cape using *Pinus pinaster* and *P. radiata* and hybrids, varieties and selections as of 1 October 2016, would have had to apply for a permit to carry out a restricted activity. The requirement for a risk assessment in support of a permit application for existing plantations for these two species and any hybrids, varieties and selections was amended in July 2016 and has been removed from the regulations. Thus, no risk assessment is required for existing plantations.

P. canariensis is a Category 3 species is neither exempted nor prohibited but if in a riparian area is a Category 1b species and must be managed as if it is a Category 1(b) species.

P. elliotti and hybrids, varieties and selections are a Category 2 species throughout the country and exempted from the requirement to obtain a permit for restricted activities under the regulations but only for existing plantations of sterile specimens. The implication is that fertile specimens will require a permit for existing plantations, new plantations exceeding 100ha and extension to existing plantations but no risk assessment will be required for new plantations and extension to existing plantations if a risk assessment was undertaken as part of the environmental authorisation process under NEMA.

P. halepensis is listed as a Category 3 species in the Eastern Cape, Free State and Western Cape and must be removed from riparian areas. It is not listed anywhere else in the country. It is not recognised as a plantation species.

P. patula and hybrids, varieties and selections are a Category 2 species throughout the country and is exempted for an existing plantation from the requirements to obtain a permit for restricted activities.

P. pinaster and hybrids, varieties and selections are Category 2 species and are exempted for an existing plantation from the requirements to obtain a permit for restricted activities outside of the Western Cape. Existing plantations in the Western Cape require a permit but are exempted from undertaking a risk assessment in terms of section 71(2) of the Act prior to applying for a permit (for an existing plantation).

Note: *P. pinaster* is categorised in the following areas as:

- a. Category 2 for plantations and windrows (wind rows are not defined under NEMBA but the DWS “accepts” four rows of trees as a windrow. (See description for windrow above);
- b. Category 1b elsewhere (outside of plantations);
- c. National Heritage Trees or National Monument Trees in terms of the National Heritage Resources Act, 1999, (Act No. 25 of 1999) are not listed;
- d. Except for “a.” above (i.e. plantations and wind rows), specimens with a circumference greater than 1.256 m at a height of 1 000 mm at the date of the first publication of this notice (August 2014) are not listed for urban areas in Cape Town, the Overberg District Council and Winelands District Council, except;
 - i. When in a riparian area, or
 - ii. When in a protected area or any property abutting a protected area, or
 - iii. Where they are ruled to pose a wildfire risk, where they remain a category 1b.
- e. All specimens with a smaller circumference are Category 1b.

P. radiata and hybrids, varieties and selections are Category 2 species and are exempted for an existing plantation from the requirements to obtain a permit for restricted activities outside of the Western Cape. Existing plantations in the Western Cape require a permit but are exempted from undertaking a risk assessment in terms of section 71(2) of the Act prior to applying for a permit (for an existing plantation).

Note: *P. radiata* is categorised in the following areas as:

- a. Category 2 for plantations and windrows (windrows are not defined under NEMBA but the DWS “accepts” four rows of trees as a windrow);
- b. Category 1b elsewhere (outside of plantations);
- c. National Heritage Trees or National Monument Trees in terms of the National Heritage Resources Act, 1999, (Act No. 25 of 1999) are not listed;
- d. Except for “a.” above (i.e. plantations and wind rows), specimens with a circumference greater than 1.256 m at a height of 1 000 mm at the date of the first publication of this notice (August 2014) are not listed for urban areas in Cape Town, the Overberg District Council and Winelands District Council, except;
 - i. When in a riparian area, or;
 - ii. When in a protected area or any property abutting a protected area, or;
 - iii. Where they are ruled to pose a wildfire risk, where they remain a category 1b.
- e. All specimens with a smaller circumference are Category 1b.

P. roxburghii and hybrids, varieties and selections are Category 2 species and are exempted for an existing plantation from the requirements to obtain a permit for restricted activities.

P. taeda and hybrids, varieties and selections are Category 2 species and are exempted for an existing plantation from the requirements to obtain a permit for restricted activities.

General Exemptions of Listed Invasive Species

1. All dead specimens of listed alien and invasive species are exempted from requiring a permit for any restricted activity. This is important when it comes to the transport and movement of harvested timber.

2. Subject to paragraph 1. above, any person in possession of a listed invasive plant species which is being utilised as biomass (no definition of biomass is provided in the AIS Regulations but is generally regarded as thinnings from commercial forests, listed alien and invasive plant species that have been removed from areas outside plantations, by-products of plantations that would otherwise not be used for higher end products, wood residues, harvested wood products) is exempted from requiring a permit for and may undertake the restricted activities of:
 - a. Conveying, moving or otherwise translocation of any specimen of a listed invasive plant species; and
 - b. Selling or otherwise trading in, buying, receiving, giving or accepting as a gift, or in any way acquiring or disposing of any specimen of a listed invasive plant species.

On the condition that the person complies with any norms and standards relating to biomass, published in terms of NEMBA (no norms and standards currently exist under NEMBA).

3. Any person conveying, moving or otherwise translocating any specimen of a listed invasive plant species for disposal or treatment as waste, is exempted from requiring a permit for and may undertake such restricted activity, provided such person complies with any norms and standard relating to the disposal of listed invasive species, published in terms of NEMBA (no norms and standards currently exist under NEMBA).
4. Any authorised official is exempted from requiring a permit for and may undertake any restricted activity necessary to perform their functions in terms of NEMBA or NEMA.
5. An extension to a plantation is exempted from undertaking a risk assessment in terms of section 71(2) of NEMBA prior to applying for a permit in terms of NEMBA and the Alien and Invasive Species Regulations, 2020, provided the application for an environmental authorisation in terms of NEMA included an invasive species risk assessment. (Note: a risk assessment would not be required if one was already undertaken for an environmental authorisation to extend a plantation by 100 hectares or more). Extensions of less than 100ha to an existing plantation does not require an environmental authorisation or a permit under the AIS Regulations.

Sale or transfer of alien and listed invasive species

If a permit-holder sells a specimen of an alien or listed invasive species, the new owner of such specimen must apply for a permit in terms of Chapter 7 of NEMBA prior to acquiring such specimen. Note that this would not apply to dead specimens of listed invasive species (i.e. harvested material).

However, a landowner or occupier of land may transfer a permit issued in terms of the AIS regulations, to the new landowner or occupier of the same land specified in the permit. A new owner or occupier of the land must notify the issuing authority within 30 days of such transfer, after which the issuing authority must issue an amended permit in the name of the new landowner or occupier, subject to any other conditions or amendments which may be required. Note: This does not apply to existing plantations, only to extensions to an existing plantation or a new plantation established after 1 March 2021.

Permits (sections 88 to 93B of NEMBA)

Before issuing a permit, the issuing authority may in writing require the applicant to furnish it, at the applicant's expense, with such independent risk assessment or expert evidence as the issuing authority may determine but only for new

STATEMENT OF INTENT:

The control of Alien and Invasive Species is regulated primarily under the Alien and Invasive Species Regulations and the Alien and Invasive Species Lists.

afforestation over 100ha. NEMBA also requires a risk assessment for listed commercial forestry using AIS but only for new afforestation in excess of 100ha.

An issuing authority may issue a permit under NEMBA for a restricted activity involving a specimen of an alien species or of a listed invasive species only if:

- a. adequate procedures have been followed by the applicant to assess the risks and potential impacts associated with the restricted activity;
- b. the relevant species has been found to have negligible or not invasive potential;
- c. the benefits of allowing the activity are significantly greater than the costs associated with preventing or remedying any resultant damage to the environment or biodiversity; and
- d. it is satisfied that adequate measures have been taken by the applicant to prevent the escape and spread of the species.

A person may apply for a permit by lodging an application on the prescribed form to the the issuing authority (www.dffe.gov.za/sites/default/files/docs/forms/permitapplication_invasivespeciesregulations.pdf).

The responsible authority:

- i. May require additional information;
- ii. May require compliance with reasonable conditions as it may impose before it grants the application;
- iii. May Issue a permit unconditionally or issue it subject to conditions;
- iv. Refuse a permit but must give reasons;
- v. Defer a decision to issue a permit if the applicant is under investigation for the contravention or failure to comply with any provision of NEMBA;
- vi. Must specify the period on the permit for which it will remain valid;
- vii. Cancel a permit and claim any reasonable costs incurred by the relevant authority necessitated by the cancellation of the permit from the permit holder; and
- viii. Suspend a permit.

A permit holder may before the expiry date of the permit apply to the issuing authority for the renewal and amendment of the permit. It is likely that permits will be issued for 40 years to align with the duration of a water use licence issued under the NWA.

Measures that can be used

- ✓ An Alien and Invasive Species Management Plan should be developed and included in or on the Land Use Plan (see Chapter 2 and Chapter 5.2);
- ✓ Progress in Alien and Invasive Species control should be documented or photographed (see Chapter 2 and Chapter 5.2).

2.1.5 National Environmental Management: Waste Act 59 of 2008 (NEMWA)

With regards to the “Duty of Care” contained in section 28 of NEMA (refer 2.1.2) and in terms of S16 of NEMWA this applies to generators, holders and treaters of waste.

NEMWA was promulgated on 10 March 2009 and came into effect on 1 July 2009 and has been amended a few times, in part due to practical difficulties with some of the definitions in particular the definition of waste. NEMWA has as the main objectives, to:

STATEMENT OF INTENT:

The management of waste must be to avoid, minimise, reduce, re-use, recycling and recovery of waste and the safe disposal of any such waste.

- protect health, well-being and the environment by providing reasonable measures for:
 - avoiding and minimising the generation of waste;
 - reducing, re-using, recycling and recovering waste; and
 - treating and safely disposing of waste.

The definition of waste is contained in the National Environmental Management Laws Amendment Act 25 of 2014 – Government Notice 448 in Government Gazette 37713 dated 2 June 2014 which commenced on 2 September 2014.

This definition has been amended many times due to the complexity of describing precisely what is, and what is not waste.

- a. “any substance, material or object that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 of this Act, or;
- b. any other substance material or object that is not included in Schedule 3, that may be defined as waste by the Minister by notice in the *Gazette* but any waste or portion of waste, referred to in paragraphs (a) and (b), ceases to be a waste:
 - i. once an application for its re-use, recycling or recovery has been approved of, or, after such approval, once it is, or has been, re-used, recycled or recovered;
 - ii. where approval is not required, once a waste is, or has been re-used, recycled or recovered;
 - iii. where the Minister has, in terms of section 74, exempted any waste or portion of waste generated by a particular process from the definition of waste or;
 - iv. where the Minister has, in the prescribed manner, excluded any waste stream or a portion of a waste stream from the definition of waste”.

Foresters should practice the general duty in respect of waste management contained in section 16 of the Act which is based on:

- waste avoidance or minimisation;
- waste reduction, re-use, recycling and recovery;
- waste disposal;
- waste management so that it does not endanger health or the environment or cause a nuisance through odour or visual impacts;
- preventing any employee from contravening NEMWA;
- prevention of waste from being used for an unwanted purpose.

Waste Classification and Management Regulations were published in the in GG No 36784 R634 of 23 August 2013 Chapter 7 Annexure to Regulations Appendix 1: Wastes that do not require classification or Assessment and read as follows:

General Waste:

- i. Domestic waste
- ii. Business waste not containing hazardous waste or hazardous chemicals
- iii. Non-infectious animal carcasses
- iv. Garden waste
- v. Waste packing
- vi. Waste tyres

- vii. Building and demolition waste not containing hazardous waste or hazardous chemicals
- viii. Excavated earth material not containing hazardous waste or hazardous chemicals

Hazardous Waste

- i. Waste products
 - Asbestos waste
 - PCB and PCB containing waste
 - Expired, spoilt or unusable hazardous products
- ii. Mixed Waste
 - General waste, excluding domestic waste, which contains hazardous waste or hazardous chemicals
 - Mixed, hazardous chemical wastes from analytical laboratories and from academic institutions less than 100 litres
- iii. Other
 - Health Care Risk Waste

NEMWA requires that any person who stores waste (such as a waste pit) must ensure that adequate measures are taken to prevent leaking; that waste cannot be blown away and nuisances such as odour, visual impacts and breeding of vectors do not arise (Section 21). No person may dispose of waste at an unauthorised site but this does not apply to waste generated as a result of normal household activities and where the municipality does not render a waste collection service. This would apply to many foresters who will have a waste disposal site (pit) on their land. Despite this, foresters should adopt the most environmentally feasible option for the management of waste (Section 26). Littering is also prohibited in terms of section 27 of NEMWA.

Measures that can be used

- ✓ waste should be avoided or recycled or disposed of in accordance with the relevant legislation;
- ✓ recycling of glass, tins, paper, organic kitchen waste, fluorescent/LED lights and oil should be promoted and adequately identified containers should be provided by landowners to manage the programme;
- ✓ empty agrochemical containers, tyres, used batteries, oil filters should be sent for recycling;
- ✓ cognisance should be taken of any provincial or local by-laws on waste management;
- ✓ seedling containers should be removed from in-field and returned to the nursery. Broken seedling containers should be disposed of at a registered waste disposal site or sent for recycling;
- ✓ organic fertiliser stockpiles:
 - should not be placed near natural water sources or near groundwater where water can be contaminated;
 - should be protected from wind dispersal and the breeding of insects and pests (there should be no standing water at the stockpile).
- ✓ workshops:
 - wash-bay facilities should be provided for cleaning tractors and equipment;
 - all run-off should be directed into a protected sump to minimise contamination of ground water or water courses;

- old engine oil should be emptied into containers and recycled;
 - all equipment and power supply points should comply with relevant health and safety requirements.
- ✓ servicing in-field:
- servicing or washing of vehicles in-field should not occur anywhere near a waterway or watercourse;
 - oil and diesel should be drained into containers and removed, together with discarded spares.

It should also be noted that the Minister has listed various waste management activities in terms of the NEMWA. No person may commence, undertake or conduct a waste management activity, except in accordance with –

- a. the requirements or standards determined in terms of section 19(3) of NEMWA for that activity; or
- b. a waste management licence is issued in respect of that activity, if a licence is required.

2.1.6 National Environmental Management: Integrated Coastal Management Act 24 of 2008 (NEMICMA)

Section 11 of NEMICMA, which is not yet in operation, declares that “[t]he ownership of coastal public property vests in the citizens of the Republic and... must be held in trust by the State on behalf of the citizens of the Republic”. The preamble gives a good idea of the approach and objective of this Act by referring to the coastal zone as a unique part of the environment in which the biophysical, economic, social and institutional considerations interconnect in a manner that requires a dedicated and integrated management approach. The State, in its capacity as the public trustee of all coastal public property, must ensure that coastal public property is used, managed, protected, conserved and enhanced in the interests of the whole community; and take whatever reasonable legislative and other measures it considers necessary to conserve and protect coastal public property for the benefit of present and future generations. Section 13 guarantees the right of reasonable and free access to coastal public property for natural persons, subject to some limitations.

The “coastal zone” is defined in section 1 to mean “the area comprising coastal public property, the coastal protection zone, coastal access land and coastal protected areas, as well as the seashore, coastal waters and the exclusive economic zone”.

The definition of “coastal public property” includes any Admiralty reserve owned by the State and any natural resources found on, in, under and above such area. The definition of Admiralty reserve refers to strips of land inland of the high-water mark which still occur on some title deeds and of which the original purpose was to serve as access for performing rescue or salvage operations on stranded ships.

The coastal protection zone consists of:

- sensitive coastal areas declared in terms of the Environment Conservation Act 73 of 1989, (“the ECA”). (See R879 in GG 17213 of 31 May 1996 and R1526 in RG 6353 No. 19493 of 27 November 1998 on the Outeniqua Sensitive Coastal Area and the Outeniqua Sensitive Coastal Area Extension, as well as the Pennington Sensitive Coastal Area and Umtamvuna Sensitive Coastal Area contained in R1529 in GG 19493 of 27 November 1998, as amended by R477 in GG 19950 of 23 April 1999.);

- any part of the littoral active zone that is not coastal public property;
- any coastal protected area or part of such area, which is not coastal public property;
- any land situated wholly or partially within one kilometre from the high-water mark which, at the time the Act came into force, was zoned agricultural or undetermined, or where the land was not zoned and was not part of a lawfully established township, urban area or other human settlement;
- any other land not referred to directly above, situated wholly or partially within 100 meters from the high-water mark;
- any coastal wetland, lake, lagoon or dam or the part of a river that is situated wholly or partially within the following land units:
 - any land situated wholly or partially within one kilometre from the high-water mark which, at the time the Act came into force, was zoned for agricultural or undetermined use; and
 - any other land situated wholly or partially within 100 meters from the high-water mark (excluding land within one kilometre from the high water mark which, at the time the Act came into force, was not zoned and was not part of a lawfully established township, urban area or other human settlement);
- any part of the seashore that is not coastal public property, including all privately owned land below the high-water mark;
- any Admiralty reserve which is not coastal public property; and
- any land adjacent to an area referred to above that would be inundated by a 1:100-year flood or storm event.

The purpose of the coastal protection zone is set out in section 17 of NEMICMA is to enable the use of land that is adjacent to coastal public property or that plays a significant role in a coastal ecosystem, to be managed in such a way as to *inter alia* protect the ecological integrity of coastal public property and to provide protection against natural hazards and the risk of sea-level rise. In effect, it mainly serves as a kind of buffer zone to protect the integrity of the coastal ecosystem.

Coastal access land refers to strips of land to be declared and managed by municipalities in terms of section 18 of NEMICMA, to secure public access to coastal public property.

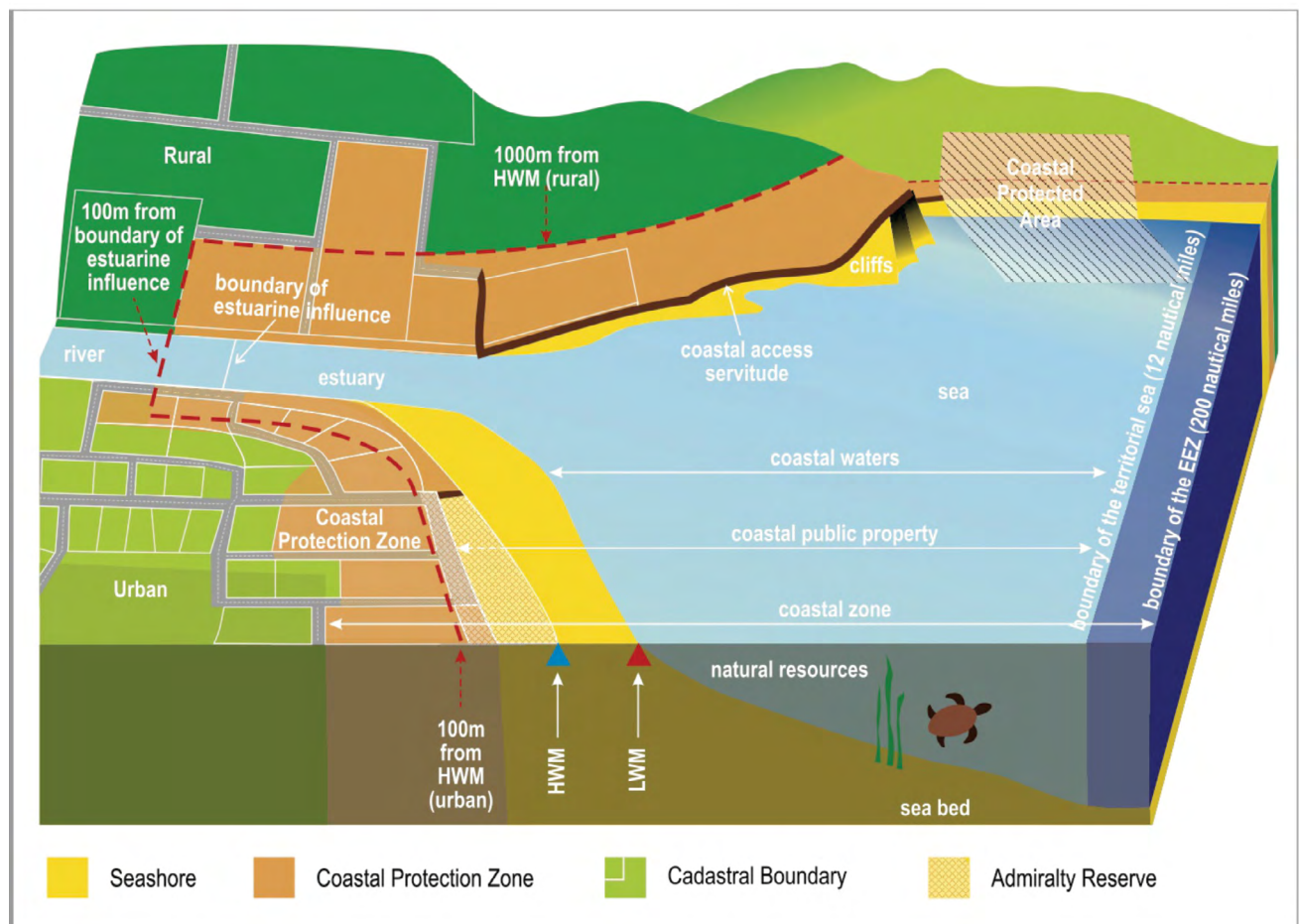
A coastal protected area means a protected area that is situated wholly or partially within the coastal zone and that is managed by, or on behalf of, an organ of state. A part of such an area may be excised from the coastal zone in terms of section 22. A protected area, in this case, refers to the definition of such areas in section 9 of the National Environmental Management: Protected Areas Act 57 of 2003, and therefore includes special nature reserves, national parks, nature reserves (including wilderness areas), protected environments (which includes lake areas in terms of the Lake Areas Development Act 39 of 1975), world heritage sites and marine protected areas (as declared in terms of section 43 of the Marine Living Resources Act 18 of 1998). It also includes specially protected forest areas, forest nature reserves and forest wilderness areas (as declared in terms of the NFA) and mountain catchment areas declared in terms of the Mountain Catchment Areas Act 63 of 1970. Two lake areas with development boards have been established, the Knysna Area Lakes Development Board, and the Wilderness Areas Lake Development Board. Proclamation 48 of 1983 in GG No. 8633 has transferred the administration of both of these areas to SANParks. Also, see Proclamation R.224 of 13 December 1985 declaring the Knysna Lake Area.

Wherever such a protected area, for example, such as a forest wilderness area, is situated wholly or partially within the coastal zone and is managed by, or on behalf of, an organ of state, it will fall into this category of coastal protected areas and is considered to be part of the coastal zone.

The seashore means the area between the low-water and high-water mark.

Coastal waters are defined as marine waters that form part of internal waters or territorial waters and estuaries.

Below is a schematic diagram of the coastal zone, taken from A User-friendly Guide to the Integrated Coastal Management Act of South Africa, The Department of Environmental Affairs and SSI Engineers and Environmental Consultants, Cape Town, South Africa, 2009:



The rest of Chapter 3 of NEMICMA deals with the declaration and management of special management areas and the establishment of coastal set-back lines. The management of estuaries is dealt with in Chapter 4, which provides for a national estuarine management protocol and estuarine management plans. NEMICMA further contains provisions on institutional arrangements such as the establishment of national, provincial and municipal coastal committees. Coastal management is to be implemented by national, provincial and municipal coastal management programmes.

Extensive provision is made for the protection of coastal resources in sections 58 – 60 in Chapter 7. Section 58, in the Act, makes it clear that the Section 28 duty of care in NEMA also applies to any impact, caused by a person, that has an adverse effect on the coastal environment.

Sections 59 and 60 provide for administrative enforcement tools. Section 59 grants the Minister the power to issue coastal protection notices prohibiting an activity or instructing a person to take certain steps or stop or postpone an activity if the Minister has reason to believe that a person is carrying out, or intends to carry out such an activity which has, or is likely to have, an adverse effect on the coastal environment.

A similar provision in section 59 authorises the Minister to issue a coastal access notice if the Minister has reason to believe that a person is carrying out, or intends to carry out, an activity that is having, or is likely to have, an adverse effect on the rights of natural persons to gain access to, use and enjoy coastal public property.

Section 60 provides for the Minister or MEC to issue a repair or removal notice to any person responsible for a structure on or within the coastal zone which is having, or is likely to have, an adverse effect on the coastal environment, or which has been erected, constructed or upgraded in contravention of NEMICMA or any other law. Also note the provision in section 65(1), which prohibits the illegal occupation of, or construction on or in, coastal public property.

In addition, section 92 under Chapter 11 provides for urgent action by the Minister, who may issue a verbal directive to any responsible person to stay an activity if such activity poses an immediate risk of serious danger to the public or property, or an immediate risk of serious damage, or potentially significant detriment, to the environment.

Section 63 requires additional factors to be taken into consideration by competent authorities in the decision on the granting of environmental authorisations under NEMA.

Additional regulations promulgated in terms of NEMICMA, that may be relevant are the Control of Vehicles in the Coastal Area of 27 June 2014.

2.1.7 National Heritage Resources Act 25 of 1999 (NHRA)

The environment, as defined in section 1 of NEMA, explicitly includes aesthetic and cultural properties of the surroundings in which humans exist. A heritage resource is defined in Section 1 to mean any place or object of cultural significance. The NHRA also creates the South African Heritage Resources Agency (“SAHRA”) to coordinate and promote the management of heritage resources.

Section 38 of the Act requires that any person who intends to undertake a development (this includes afforestation) categorised as:

- construction of a road, wall, power line, pipeline, canal or barrier exceeding 300 m in length;
- construction of a bridge exceeding 50 m in length;
- development or other activity which will change the character of the site exceeding 5 000 m² in extent;
- rezoning of a site exceeding 10 000 m² in extent.

must at the earliest stages of initiating the development, notify the responsible Heritage Resources authority and furnish it with details relating to the location, nature and extent of the proposed development (afforestation, dam construction, roads etc.).

“Development” is defined as meaning “any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of a heritage authority in any way result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well-being, including—

- a. construction, alteration, demolition, removal or change of use of a place or a structure at a place;

STATEMENT OF INTENT:

To comply with any existing or proposed development in accordance with the limitations of the Act.

- b. carrying out any works on or over or under a place;
- c. subdivision or consolidation of land comprising, a place, including the structures or airspace of a place;
- d. constructing or putting up for display signs or hoardings;
- e. any change to the natural or existing condition or topography of land; and
- f. any removal or destruction of trees, or removal of vegetation or topsoil.”

Offences under the NHRA include the following:

- Section 27(18) determines that no person may destroy, deface, excavate, alter or remove any heritage site without a permit the heritage resources authority;
- Section 29(10) has a provision similar to the above with regard to provisionally protected places or objects;
- Section 32(13) provides that no person may destroy, damage, disfigure or alter any heritage object or disperse any collection listed in Part II of the register without a permit issued by SAHRA. SAHRA may declare certain objects as heritage objects in terms of section 32. Part I contains heritage objects listed by type. Part IIA contains specific heritage objects listed in the inventory of a public museum or otherwise displayed or kept in secure conditions. Part IIB contains other specific heritage objects. This can include objects in private ownership;
- Section 32(19) determines that no person may export or attempt to export from South Africa any heritage object without a permit by SAHRA.

2.1.8 Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 36 of 1947

Purpose of the Act and relevance to alien and invasive species management

The purpose of the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 36 of 1947 (“the Farm Feeds Act”) is to regulate the labelling, marketing and administration of fertilisers, farm feeds, agricultural remedies and stock remedies. The chemicals and other substances used for alien and invasive species management are regarded as agricultural remedies. “Agricultural remedy” is defined in the Farm Feeds Act as “any chemical substance or biological remedy... to be used for the destruction, control, repelling, attraction or prevention of any undesired... plant”. The Minister has declared certain substances and remedies to be agricultural remedies and promulgated various regulations relating to agricultural remedies.

The Farm Feeds Act is therefore relevant to persons or businesses engaged in alien and invasive species management who make use of agricultural remedies.

The following obligations in the Farm Feeds Act are relevant:

- Agricultural remedies must be registered with the Registrar of Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies (i.e. unless a supplier has duly registered the agricultural remedy with the Registrar, it may not legally be sold).
- No person may use agricultural remedies unless they are registered as a “pest control operator” with the Registrar of Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies.
- No person may use or recommend the use of agricultural remedies for a purpose or in a manner that is contrary to what is specified on the label on a container thereof.
- All handling, storage and disposal requirements of the South African National Standards must be complied with.

STATEMENT OF INTENT:

The use of agricultural remedies (a chemical substance) must only be done by a registered pest control officer.

Offences and penalties

It is an offence to:

- Sell agricultural remedies that are not registered.
- Use agricultural remedies without being registered as a pest control officer.
- Use or recommend the use of agricultural remedies for a purpose or in a manner that is contrary to what is specified on the label on a container thereof.
- Not comply with the handling, storage and disposal requirements of the South African National Standards.

A person convicted of an offence under the Farm Feeds Act is liable to a fine not exceeding R1 000 or imprisonment for a period not exceeding two years or to both.

Any person who refuses or fails to comply with handling, storage and disposal requirements of the South African National Standards shall be guilty of an offence and liable on conviction to a fine or imprisonment or to both a fine and imprisonment.

In addition, the prosecutor may apply to the court convicting a person who is the owner of or has in his or her possession such agricultural remedy, to declare such agricultural remedy forfeited to the State.

2.1.9 Occupational Health and Safety Act (No. 95 of 1993)

To provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety; and to provide for matters connected therewith.

2.1.10 Basic Conditions of Employments Act (BCEA)

In the realm of South African employment law, the Basic Conditions of Employment Act ("BCEA") plays a pivotal role. This fundamental piece of legislation establishes the minimum acceptable standards for employment conditions within the country. Understanding the BCEA is crucial for both employers and employees, as it governs critical aspects of the work environment and employee rights.

The BCEA is a key piece of legislation in South Africa designed to ensure fair labour practices and to set the standard for employment conditions.

Key Provisions of the BCEA

The Act covers several fundamental aspects of employment, including:

- **Working Hours:** It stipulates maximum working hours per week, provisions for meal and rest intervals, and overtime regulations.
- **Leave Entitlements:** This includes annual leave, sick leave, maternity leave, family responsibility leave and others.
- **Termination of Employment:** The BCEA outlines the lawful process for contract terminations, notice periods and severance pay.
- **Prohibition of Child and Forced Labour:** It sets the minimum age for employment and prohibits forced labour.
- **Remuneration and Payslips:** The Act specifies the payment of wages, deductions and the provision of detailed payslips to employees.

The Role of the BCEA in Protecting Employee Rights

The BCEA plays a crucial role in safeguarding employee rights by:

- Providing a legal framework that guarantees minimum employment standards.
- Ensuring fair treatment and non-exploitation of workers.
- Offering recourse for employees in cases where basic conditions of employment are not met.

2.1.11 Hazardous Substances Act (No. 15 of 1973)

Hazardous Substances Act is probably the most important chemical regulation in South Africa. It controls the production, import, use, handling and disposal of hazardous substances. Under the Act, hazardous substances are defined as substances that are toxic, corrosive, irritant, strongly sensitizing, flammable and pressure generating under certain circumstances and may injure, cause ill-health or even death in humans.

Hazardous substances are classified into 4 groups) see below). Anyone who intends to sell or distribute group 1 hazardous substances must apply for a license from health authority first:

- Group I: industrial chemicals (IA) and pesticides (IB)
- Group II: nine classes of wastes excluding Class 1: explosives and Class 7: radioactive substances
- Group III: electronic products and group
- Group IV: radioactive substances

Chapter 3

Land Use Map and Visual Impacts of Plantations



Photo: www.forestrysouthafrica.co.za

3.1 Land Use Map

A land-use map or plan is an elementary planning tool for all landowners and assists him/her in identifying management priorities based on the inherent characteristics of the land. Different parts of the land usually require different types of management and these must be integrated into a working plan that, while striving for economic returns and which protects the environment.

A land use map should be developed and maintained for all existing timber farms, as well as for any new afforestation. A Forest Management Unit (FMU) (see definition) map should form the basis of any land use plan and should be used to plan all forestry activities. A map is the first step to minimising the impact of forestry activities on the environment. The map should include the proposed forest management units, the delineation of natural vegetation, the identification of water courses and wetlands, soils map, inclusion of existing roads and any new roads planned, including stream crossings.

For the development of a land use plan relevant biodiversity screening tools, provincial conservation plans, threatened species distribution maps, and proclaimed threatened ecosystems should be consulted. As a first step, the National Web Based Environmental Screening Tool can be accessed. This is a geographically based web-enabled application which allows a person to screen their proposed site for any environmental sensitivity. While this would normally be carried out by an environmental assessment practitioner, it may give you some sense of the sensitivity, or not, of the proposed planting area. (See www.environment.gov.za/ScreeningToolHelp/index.html).

New afforestation will require the submission of a planting plan to the relevant provincial Stream Flow Reduction Activity Licence Assessment Advisory Committee (LAAC), plus other relevant features as noted above.

For large operations, a detailed management plan may also be developed. The plan should be in a written form that allows the development of annual plans of operation, revision and monitoring.

To ensure an economic and sustained timber crop production and to minimise impacts on the environment, it is advisable to consider and integrate the characteristics of the selected commercial forestry species (for example, frost tolerance, wind resistance, drought tolerance, etc.) with the climate, soil types and topography. It is important to develop maps at an appropriate scale (e.g. 1:10 000), which can then indicate various important features of the area.

The maps will assist a forester to make an informed decision on:

- areas that are suitable for afforestation;
- commercial forest species that are suitable for the farm;
- site-specific management requirements;
- slope restrictions (to determine the site preparation method to be used);
- the conservation of protected environments;
- the protection of water sources;
- the choice of appropriate harvesting systems; and
- the suitability of locations for new infrastructure.

The level of detail will be dependent on the scale of the operation and the intensity of plantation forestry practiced as well as whether the management unit is comprised of other farming activities.

Measures that can be used

- ✓ existing plantations should be mapped with each management unit identified as to size, species planted and date of planting;
- ✓ other land crops (existing or old lands) should be mapped and where possible, each crop type should be identified in terms of area and species planted;
- ✓ location of existing infrastructure, such as roads, firebreaks, quarries, causeways, houses, villages, workshops and power and telecommunication lines should be identified on a map or can be visually identified or described by the landowner;
- ✓ where appropriate, rainfall and temperature should be recorded daily, weekly or at a minimum, monthly and recorded electronically or in a book/chart;
- ✓ altitude (contour lines if possible) should be recorded or mapped - if not documented, the landowner should be aware of the range in altitude on the farm, which is important for species selection;
- ✓ soil types, series, depth, organic content, and erodibility should be mapped or described;
- ✓ natural vegetation which can be classified further in terms of its structural features (e.g. forest, grassland, fynbos, woodland etc.) or status (threatened/

STATEMENT OF INTENT:

A land use map or plan should be developed that is sufficiently detailed (illustrated or written) to allow for informed on-farm decision making.

protected in terms of the National Environmental Management Biodiversity Act) should be identified or mapped, or can be described;

- ✓ location of water sources such as wetlands, dams, rivers, streams and boreholes should be mapped or their location can be described; and
- ✓ location of waste disposal sites/rubbish dumps should be known and/or mapped.

3.2 Visual Impacts

Forestry activities in South Africa alter the visual quality and character of the natural landscape. These alterations may reduce the variety within and visual penetration into the landscape. Forestry also creates features with strong visual dominance. Careful and sensitive planning can reduce any negative visual effects of the plantations and the alteration of significant visual attractions.

The basic concepts of planning for the visual landscape include the character of the landscape, the location of an observer in the landscape, scale and spatial arrangement, visual penetration, the presence of man-made structures and unique landscapes. However, the practical application is very limited since plantation forests have been established progressively over the last 100 years and with the limitations of available land for commercial plantations, any modification of existing boundaries purely for aesthetic reasons may not be achievable. Nevertheless, the concept has been retained in the fifth version of the Guidelines, as it is still applicable where new afforestation is planned and where significant changes to the forestry boundaries are possible.

Measures that can be used

- ✓ harvesting operations should be scheduled from the farthest to the nearest point to viewpoint which reduces the visual impact of extensively harvested areas being visible all the time;
- ✓ in visually sensitive landscapes, screening can be used to reduce the impact of slash left behind after a harvesting operation;
- ✓ permanent screens can include belts of indigenous vegetation which would hide forestry operations;
- ✓ temporary screens can be made by leaving a strip of trees standing until the compartments have been re-established;
- ✓ variety can be provided by using species that are texturally different, e.g. different species or different genera;
- ✓ variation and interest can be improved by introducing species with attractive autumn colours in selected areas of the landscape;
- ✓ in a flat landscape, elements or planes with varying heights can be used to break monotony and increase variety particularly next to public roads;
- ✓ the visual dominance of ridge-tops should be treated with special care;
- ✓ the spatial arrangement of removals should prevent what is referred to as a “moth-eaten” landscape;
- ✓ natural features such as watercourses should be used to define boundaries, as these are generally more pleasing to the eye than straight lines;
- ✓ where practical, the natural pattern of the land should be complemented when placing horizontal plantation boundaries that follow the contour instead of using straight lines;
- ✓ horizontal and vertical boundaries can be softened by using a gradual change in texture from one element to the next;
- ✓ the visual dominance of a feature crossing a ridge can be reduced by establishing this feature at the lowest contour with a diagonal approach to the ridge;

STATEMENT OF INTENT:

Scenic and/or unique landscapes of significant visual attraction should be protected through the sensitive establishment of plantation forests that enables the landscape to remain visible, either partly or wholly.

- ✓ the tunnel effect of continuous edges with little diversity and/or relative spatial change, such as plantations on road edges, can be broken up by alternating vertical edges or by creating openings in the “tunnel” to provide for the viewing of special landscape features and penetration to adjacent landscapes;
- ✓ diversity can be brought onto the road edge by planting trees (pockets of alien or indigenous trees) in groups to provide variation in colour, texture and form;
- ✓ espacement of 300 mature tree stems per hectare could be considered in specific areas situated close to recreation sites, viewing sites and hiking trails to provide good visual penetration and a “comfortable” spatial experience;
- ✓ the use of professional assistance for the construction of buildings using natural materials (e.g. timber, stone and grass) can be considered to create a building that is aesthetically acceptable;
- ✓ the visual impacts of service areas and villages should be considered as well as the level of comfort they will provide to the inhabitants;
- ✓ towers, radio transmission masts and lookouts often have to be placed in visually prominent locations, so their designs should attempt to complement the surrounding landscape;
- ✓ signage should be informative and clearly visible but should not dominate the landscape;
- ✓ signage that provides a lot of information should be carefully designed to prevent “visual pollution”;
- ✓ aspects that contribute to the uniqueness of the landscape should be identified, conserved and not obscured;
- ✓ any activity that could visually intrude on such a landscape or feature should be carefully planned and executed to minimise physical and/or visual negative impacts; and
- ✓ kranz edges and rocky outcrops are often more bio-diverse than the immediate surroundings and generate interest in the landscape and should preferably not be obscured by commercial tree planting or weed encroachment.

Chapter 4

Conservation Areas



Photo: ICFR

4.1 Conservation Areas: Freshwater Ecosystems

Freshwater ecosystems refer to all inland water bodies whether fresh or saline, including rivers, lakes, wetlands, sub-surface waters and estuaries. South Africa has a diverse set of freshwater ecosystems, matching the diverse range of biomes in the country, each showing significant freshwater biodiversity values. Research has shown that freshwater ecosystems, such as wetlands, riparian zones and lakes, play a critical role in ensuring the delivery of water related ecosystem services to informal rural communities and urbanised formal communities alike. These include important regulating ecosystem services, such as flood attenuation (reducing the loss of life and property to floods), water provision during droughts, removal of excess nutrients, sediments and toxic substances from water and maintaining water supply. Freshwater flows are critical for the ecological integrity of estuaries (which provide nursery areas for marine and estuarine animals) and for marine ecosystems (which provide fisheries).

South Africa is a water stressed country, with an average rainfall of 450 mm, whereas the global average is 850 mm. In times of drought, this water stress becomes a water crisis. As a result, water is one of South Africa's most limited resources for present and future economic and social development. Water is important for human well-being and is critical for food and energy security.

This situation is complicated further by the fact that water resources are under significant pressure, where demand often outstrips supply and where a significant number of freshwater ecosystems are transformed (both water quality and quantity) by poor water and land management practices. As a result, the country's freshwater biodiversity – wetland and river ecosystem types and fauna – is under significant threat.

This alteration of freshwater ecosystems compromises many of the ecosystem services on which the country depends and results in high costs to address these issues or to replace this natural infrastructure with built infrastructure. The situation will be exacerbated in future years as the demand for water increases. Climate change will result in further strains on the limited water supplies and freshwater ecosystems.

It is therefore important that a catchment approach is taken to water resource management, ensuring optimum land use configurations and sound management practices. Many of the main rivers are “hard-worked systems” and important to the economic hubs of the country. It is therefore important that the tributaries for these main rivers are kept intact, as they can play a key role in mitigating some of the impacts on these rivers.

In summary:

- freshwater inputs are important to estuarine and marine environments;
- free-flowing rivers should be regarded as part of our natural heritage;
- healthy tributaries and wetlands support the sustainability of “hard-working” rivers;
- healthy buffers of natural vegetation mitigate the impact of land-based activities;
- groundwater sustains river flows particularly in dry seasons;
- mountain catchment areas play an important role in securing water supplies; and
- healthy freshwater ecosystems support adaptation to climate change.

4.2 Conservation Areas: Wetlands and Riparian Habitat

DWS has published a document “Wetland/Riparian Habitats: Practical field procedure for identification and delineation of wetlands and riparian areas.” The full document can be accessed from the DWS website (www.dws.gov.za) or from www.forestrysouthafrica.co.za. DWS will often require the use of this document when delineating wetlands for new plantings. It is also a useful voluntary tool to delineate wetlands and riparian areas in existing plantations as a best management practice.

4.2.1 Roles of Wetlands

The word “wetland” is a common name for many different types of wetlands. Traditionally, these were referred to as springs, seeps, mires and bogs in the upper catchment, to midland marshes and floodplains, to coastal lakes, mangrove swamps and estuaries at the bottom of the catchment. All these are connected by rivers, streams and the associated stream and riverbanks which make up the wetland system.

The primary values of wetlands reside in the fact that they regulate streamflow and assist with the purification of fresh water:

- wetlands protect and regulate the water resource. Acting like sponges, they hold back water during floods and release it during dry periods;
- by regulating water flows during floods, wetlands reduce flood damage and help prevent soil erosion;
- wetlands recharge ground water sources and remove pollutants from the water. Being natural filters, they help to purify water by trapping these pollutants, which include sediment, heavy metals, disease-causing bacteria and viruses;
- some wetlands, such as estuaries, serve as important breeding grounds for oceanic fish and bird species; and
- the very diverse nature of a wetland provides a land type that is relatively biologically diverse and this further supports their conservation significance.

Wetlands are defined in the NWA as “land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil”.

Because of the accumulation of water and nutrients in wetlands they have the potential to be one of the most productive lands available to man. The NWA is a landmark piece of legislation internationally as the water requirements of aquatic ecosystems have been given priority, together with basic human needs, over any other competing forms of water use. The importance of the protection of wetlands, or their rehabilitation, cannot be overemphasized and commercial timber farmers are encouraged to ensure that they place priorities on the identification, protection and rehabilitation of this nationally important and threatened resource.

Measures that can be used

- ✓ the DWS Wetland Delineation Procedure should be used to delineate buffer zones;
- ✓ all wetlands, water resources and buffer zones should be included on the Land Use Map and/or management plan;
- ✓ any commercial plantations that have been planted unlawfully in wetlands or watercourses or in the delineated buffer zone should be removed;
- ✓ any commercial plantations that were planted in wetlands, watercourses or within delineated buffer zones prior to 1972 when there were no legal impediments to planting should be considered for removal. Legally, the relevant authority cannot require that they be removed, as this would constitute the expropriation of land;
- ✓ justification to retain plantings in these circumstances should be based on socio-economic considerations and the potential impacts on downstream water users;
- ✓ any old agricultural drains (structures for the draining of wetlands or the diversion of rivers) should be rehabilitated to approximate the natural ecosystem functions that existed prior to the establishment of the drains; and
- ✓ such an intervention may require expert advice and a formal environmental impact assessment, as well as a water use licence.

STATEMENT OF INTENT:

Water resources should be protected, conserved or managed in a manner that minimises the impacts of commercial timber plantations on the water availability on the forest management unit, adjoining landowners and in the catchment.

4.3 Conservation Areas: Grasslands

Grasslands cover almost one third of South Africa’s land surface and extend across the boundaries of seven of the nine provinces. Grasslands are second

only to the Fynbos (see 4.4 below) in plant diversity and include 52 of South Africa's 122 important bird areas, almost a third of the country's 107 threatened butterflies, 15 of its endemic mammals and nearly 3 500 plant species. They are an important water production landscape, containing 42 river ecosystems and most of the country's threatened wetland types. Five of South Africa's major river systems have their headwaters in the grasslands, which also receive the majority of the country's rainfall and half of the country's strategic water source areas.

Grasslands are an important economic hub in that they support 60% of the country's commercial crops, 44% of the cattle and 32% of the sheep and, importantly for forestry, 92% of timber lands occur in the Grassland Biome. Six percent of the grasslands have been converted to timber plantations.

These Guidelines have adopted the "landscape approach" to conserving the remaining grasslands on the forestry estate. This approach recognises the need to include grassland conservation with the management of timber plantations across the entire landscape. Conservation actions should focus on maintaining the functional ecosystems, the animal and plant assemblages and ecological structures. This means that the grasslands on the estate can be managed and maintained, allowing for connectivity between the grasslands across the landscape through neighbour agreements. This allows the maintenance of an ecological structure that operates at a larger scale than just the farm level. Even grasslands that have a reduced number of grass species as a result of overgrazing can still allow for the maintenance of the ecological structure.

The landscape approach recognises that plantation forestry and the associated unplanted land is an integral part of the landscape, that not all land-uses are compatible with grassland conservation (timber replaces the grassland) and that management actions should be carried out at a scale suited to the issue being addressed.

Grasslands are generally long-lived (the individual tufts themselves can be a few thousand years old in the mid-to high altitude grasslands) and can withstand the effects of repeated grazing, fire and frost. Impacts are negative under high grazing pressure which can lead to changes in species composition, basal cover and accelerated soil erosion. Fire applied during the dormant season (after the first frosts) has little, if any negative impacts on grasslands, as the fire simply removes the old grass which is of limited nutritional value to herbivores. However, heavy grazing post fire can have deleterious impacts, as noted above, so post-burn grazing pressure should be minimal to moderate to reduce the chances of any negative impacts.

Disturbed grasslands, as a result of overgrazing, become susceptible to the colonisation by alien and invasive species such as bramble, bugweed, various wattle species (especially alongside water courses) and some pine species. They also increase the intensity of fires which can have deleterious effects on the soil if very hot. Alien species control is thus important to reduce this risk. The indigenous "ouhout" can also become invasive at mid to high altitude especially as a result of historical overgrazing. It is a fire tolerant species and will coppice readily if it is burnt. However, it is a useful browsing species and should not be removed.

High rainfall grasslands are usually classified as sourveld and do not retain much nutrition during winter. They do however produce a significant amount of biomass, which accumulates over time. Within a month of being burnt, the above ground biomass is less than 100 kilogrammes per hectare, peaking at between 1 300 – 1 600 kilogrammes per hectare at the end of autumn after the first year. The longer the grassland remains unburnt, the greater the above ground biomass, which peaks at around 2 500 kilogrammes per hectare after three years.

At this stage, the nutritional content is low and the grassland runs the risk of reduced basal cover and species composition change if not burnt. Further, the high biomass restricts the flowering of many plant species (lack of light to initiate flowering) and also restricts the movement of various invertebrates and rodents, resulting in their localised decline in numbers. This in turn has a knock-on effect whereby the predators of such species (birds, reptiles, mammals such as jackal, caracal and civet) also decline in the absence of sufficient prey species. Grazing herbivores which rely on fresh green grass and forbs after the burn are likewise affected and in the absence of sufficient nutritional food, their number decline as they move off in search of better food conditions.

Areas next to rivers should be alternated in a burning plan. This means burning one side of the river in one year and the other side the next year. This may not always be practicable, especially in high fire risk areas.

Ideally, all grasslands should have a specific objective when it comes to burning and this should be reflected in the burning plan. For example, the objective of burning a specific block may be a reduction in fuel load resulting in an annual burn, maintaining the plant and animal assemblages and ecosystem structure (biennial burns), or even directed at the conservation of a specific species, such as the oribi, where an autumn burn may be prescribed, provided that the autumn burnt grassland is also not available for domestic livestock. The autumn burn results in a late flush of nutritional green grass which helps this selective grazer through the winter months. An early winter burn, such as a firebreak, can achieve the same result for oribi and other small selective grazers.

Measures that can be used (see also Chapter 4.10)

- ✓ grassland conservation is best achieved through the implementation of a controlled burning programme and low to medium stocking densities of domestic livestock, if at all;
- ✓ burning programmes should be prepared annually with the provision of firebreaks being the first priority to minimise the risk of run-away fires later in the winter season;
- ✓ foresters should ensure that there is a mosaic of burnt and unburnt grassland on the estate which encourages the regrowth of palatable grass species post-burn and cover for wildlife in the unburnt areas especially during the winter months;
- ✓ specific objectives for any particular grassland should be developed, such as an early winter burn for oribi, or protection of wattled crane nests (in June);
- ✓ extensive annual burning should be avoided where possible, although it may be necessary for the same areas to be burnt annually such as for the protection of timber from fires in high-risk areas (adjoining known high fire danger hot spots), or for firebreaks;
- ✓ grasslands should be planned to be burnt at a frequency of between two to three years in the sourveld areas; and
- ✓ records of the fire plan should be kept and notes made on the success or otherwise of the plan in terms of achieving its objectives.

STATEMENT OF INTENT:

Grasslands should be protected by firstly avoiding or preventing significant impacts on the species composition and associated ecosystem services; secondly, if the impacts cannot be avoided, by minimising impacts on species composition and ecosystem services; and thirdly, by rehabilitating grasslands that have been negatively impacted as a result of plantation forestry operations.

4.4 Conservation Areas: Fynbos

The Fynbos Biome contains three major vegetation formations and occupies just 2.7% of southern Africa. It has the richest flora of all the biomes in southern Africa with over 9 000 indigenous plant species. The Fynbos Biome includes the Cape Floral Kingdom, which has high levels of endemism (species not occurring anywhere else in the country or the world). The floral composition can change

significantly over very small distances due to what is known as environmental and geographical gradients, which results in the presence of many rare species. In fact, the Fynbos Biome has the highest number of rare and endangered plants and animals for any biome in southern Africa.

Fire is the major management tool that can be used to maintain the diversity in the fynbos communities and should be applied judiciously and following expert advice. Fire should be applied at various frequencies, ranging from 8-20 years. Unfortunately, wildfires often interfere with this frequency.

The Fynbos Biome, particularly the more mountainous regions, is susceptible to invasions by certain Pine species whose presence increases the fuel load in proportion to the density of invasive species in the plant community. Invasive species control is thus an important management action for foresters, whose responsibility for control may extend beyond the boundaries of the forest estate onto adjoining land that has not been afforested.

In most cases in the Fynbos Biome, there will be no further expansion of plantations into the native vegetation, so forester's efforts will mostly be directed at conserving any existing fynbos on the forestry estate. It has been estimated that approximately 12 000 ha of fynbos are conserved in the Forest Management Units in the Fynbos Biome.

Measures that can be used

- ✓ any fynbos vegetation on the forest estate should be protected from unplanned fires and managed in accordance with a specialist developed fire management plan;
- ✓ the fire management plan should specify the frequency of control burns and weather conditions under which the control burn should be implemented and the direction of the fire;
- ✓ invasive species control on the estate should focus on the removal of any volunteer pine as a priority and then other invasive species in accordance with a management plan; and
- ✓ invasive species control beyond the estate boundary should be undertaken in a partnership with the adjoining landowner/s and any Government, Provincial or Municipal alien and invasive species control programmes, such as the Working on Fire and Working for Water Programmes managed by National Government.

STATEMENT OF INTENT:

Fynbos should be protected by firstly avoiding or preventing significant impacts on the species composition and associated ecosystem services; secondly, if the impacts cannot be avoided, by minimising impacts on the species composition and ecosystem services and thirdly by rehabilitating fynbos that has been negatively affected by forestry operations.

4.5 Conservation Areas: Cliff Edges and Rocky Outcrops

Cliff edges and rocky outcrops often have high levels of biodiversity and are aesthetically important features. Many indigenous plants have a special affinity for rocky areas and may not be found anywhere else. Certain bird species such as chats, stonechats, larks, pipits, long-claws, prinias and cisticolas find refuge in this habitat while small animals such as scrub hare, porcupine, aardvark, mongooses and mice are also common residents.

Measure that can be used

- ✓ planting should not be closer than approximately one tree length from the edge of a cliff or significant rocky outcrop which is larger than 0.25 ha;
- ✓ conservation areas should be separated from the planted area by a road to facilitate practical management options for the cliff edges and rocky outcrops; and

STATEMENT OF INTENT:

Landowners or manager should avoid the establishment of plantation forests on rocky outcrops and within a tree length of a cliff edge.

- ✓ regular planned veld burning to maintain the remaining biodiversity and the health and vigour of the plants, many of which may be fire dependent or fire adapted, should be practiced.

4.6 Conservation Areas: Archaeological, Cultural and Traditional Sites

These sites are protected in terms of the National Heritage Resources Act No. 25 of 1999 (NHRA). They may not be destroyed, damaged, disfigured, excavated, altered, removed from their original site or exported from the Republic without a permit from the South African Heritage Resources Agency (SAHRA).

Such sites may include:

- burial grounds;
- graves;
- structures older than 60 years;
- archaeological and palaeontological sites;
- meteorites; and
- ruins, or any other signs of human habitation (e.g. rock paintings).

Section 38 of the Act requires that any person who intends to undertake a development (includes afforestation) categorised as:

- construction of a road, wall, power line, pipeline or canal or barrier exceeding 300 m in length;
- construction of a bridge exceeding 50 m in length;
- development or other activity which will change the character of the site exceeding 5 000 m² in extent;
- rezoning of a site exceeding 1 hectare in extent;
- must at the earliest stages of initiating the development, notify the responsible Heritage Resources authority and furnish it with details relating to the location, nature and extent of the proposed development (afforestation, dam construction, roads etc.)

“Development” is defined as meaning “any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of a heritage authority in any way result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well-being, including:

- a. construction, alteration, demolition, removal or change of use of a place or a structure at a place;
- b. carrying out any works on or over or under a place;
- c. subdivision or consolidation of land comprising, a place, including the structures or airspace of a place;
- d. constructing or putting up for display signs or hoardings;
- e. any change to the natural or existing condition or topography of land; and
- f. any removal or destruction of trees, or removal of vegetation or topsoil”.

Measures that can be used

- ✓ new afforestation sites larger than 10 000 m² should be assessed for the existence of any potential heritage resources;
- ✓ construction of a bridge exceeding 50 m in length should be assessed;

STATEMENT OF INTENT:

All archaeological, cultural and traditional sites should be protected from the potentially negative impacts of commercial forestry plantations.

- ✓ construction of a road longer than 300 m in length should be assessed;
- ✓ a buffer of at least 5 m should be maintained around these sites, unless directed otherwise by the responsible authority. If there is potential for any damage during operational activities, this distance should be increased to exclude such impacts; and
- ✓ if any national heritage resources are discovered in the course of planting, harvesting or replanting, or in the course of any other operational practice, all activities must cease and the National Heritage Resources authority must be contacted.

4.7 Conservation Areas: Species or Ecosystems Declared as Threatened or Protected

4.7.1 Threatened or Protected Ecosystems

The National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004) recently revised the National List of Ecosystems that are Threatened or in need of Protection (GG No 47526 NO. 2747 of 18 November 2022). These are now linked to Listing Notice 3 published under the National Environmental Management Act, 1998 (Act No, 107 of 1998) (NEMA). Some of the activities listed in Listing Notice 3 require an environmental authorisation when they are carried out in a threatened ecosystem as identified in the list. The List of Ecosystems has also been used throughout South Africa as a decision-making support tool in environmental authorisation application processes.

The Revised National list of Ecosystems that are Threatened or in need of Protection covers all 458 terrestrial ecosystems described in South Africa. The revised list identifies 120 threatened ecosystem types (55 Critically Endangered, 51 Endangered and 14 Vulnerable types)

Full results can be viewed on <http://ecosystemstatus.sanbi.org.za>.

The stewardship programme works with landowners and assists them to draw up agreements of varying degrees of legal commitment and resulting benefits to the landowner. The site can become a conservation area (a decision that is not legally binding and of no specific duration), a landowner can enter into a legally binding stewardship agreement, or the property can be contracted into a nature reserve (a legally binding long-term contract). All options are entered into voluntarily and the landowner retains the property title deed. As part of the agreement, the nature conservation agency draws up a sustainable land management plan tailored to suit the specific needs of the owner and the property. At the contractual levels of agreement, the agency undertakes all legal work and provides extension services.

At the highest level, the agency approaches the Minister of Environmental Affairs, Forestry and Fisheries on behalf of the landowner for official declaration of the site as a nature reserve in terms of section 23 of the National Environmental Management: Protected Areas Act 57 of 2003, and offers substantial assistance with rates and tax exemptions, habitat management and marketing. The Nature Reserves attract compulsory zero-based rates in terms of the Local Government Municipal Property Rates Act. Regardless of whether a farmer enters into a biodiversity stewardship agreement, they are encouraged to establish in which ecosystem they fall and to take proactive steps in implementing best management practices for the natural ecosystems in their care.

4.7.2 Threatened or Protected Species

The Minister of Environmental Affairs and Tourism in terms of section 97 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), made regulations relating to listed threatened and protected species in the GG No 29657 No R152 of 23 February 2007. These regulations, as amended, were repealed and replaced by regulations called the Regulations pertaining to threatened or protected terrestrial species and freshwater species, 2023, and took effect on 01 April 2023 (GG 47984 Vol 692 dated 1 February 2023).

The NEMBA is thus the national regulations that provide for the protection of threatened species – plants and animals. These include those species identified in the Red Data species lists or Listed Threatened and Protected Species regulated by NEMBA. For the effective conservation of these species, their presence should be identified and mapped, and appropriate management prescriptions and monitoring programmes initiated. Typical animal species that would be found in the country where forestry is practiced include:

- **critically endangered species:** are at extremely high risk of extinction and include wattled crane, blue swallow and cape parrot;
- **endangered species:** face a high risk of extinction in the wild in the near future and include blue and grey crowned crane, oribi, geometric tortoise, and most vulture species;
- **vulnerable species:** are species that face a risk of extinction in the wild in the medium-term future and include samango monkey, bald ibis, grass owl, leopard and pangolin;
- **protected species:** are species of high conservation value or national importance and require national protection and include southern ground hornbill, cape clawless otter, spotted neck otter, African marsh harrier, Denham's bustard, honey badger, southern reedbuck, and the African rock python.

Major threats to the South African flora are identified in terms of the number of plant taxa Red-Listed as threatened with extinction as a result of each threat: (www.inaturalist.org/projects/redlist-s-afr)

Anyone may contribute, and if you post an observation of a threatened species, you may be invited to contribute. Any observation requires the following to contribute to this project: Join this project: "red-list" & fill in the following fields: Population Size Estimate: (CREW): this is an estimate of numbers. Population Size & Extent: how many seen or estimated and what area encompassed by the population you observed. Population Threats: those visible or present influences that might threaten the existence of this population.

4.7.3 Other legislation

The NWA focuses specifically in water resources (rivers and wetlands) and, in terms of this legislation, certain restrictions on water use pertaining to wetlands in particular and certain listed catchment areas or rivers.

Farmers may also visit their local municipality for information on priority ecosystems as according to the Local Government Municipal Systems Act 32 of 2000 they are required to protect ecosystems by the adoption of a land-use plan within an integrated development plan (IDP).

Measures that can be used

- ✓ all natural and cultural assets, untransformed land as well as transformed (planted) land should be included in a farm land use plan/management plan, appropriate to the scale of the operation (size and complexity);
- ✓ natural ecosystems (including water resources) should be identified and mapped;
- ✓ management planning should include the entire farm and provide for operations such as invasive plant control, controlled burning (firebreaks and block burns), poaching control, hunting, game counts, species check lists, etc.;
- ✓ the level of management and data collection should be appropriate to the scale of the operation (size and complexity);
- ✓ where plantations are planted in or close to the edge of water courses and wetlands (or even in wetlands), foresters should remove such timber, using the Wetland Delineation Guideline to define the buffer zone (but see Chapter 4.2.1) Note: About 70% of plantations in South Africa were established prior to 1972 when there was no legislation governing the planting of alien species. Some of these plantations were established in close proximity to wetlands and other water resources. Best practice is that when they are harvested, re-establishment should not occur within 20 metres of the edge of the buffer zone. However, from a legal perspective, the responsible authority may not direct that such buffer zones be applied to plantations established prior to 1972. This would constitute land expropriation for which compensation is payable. Best practice and the FSC and SAFAS standard will apply to those plantations certified to one or both of these schemes which should be consulted;
- ✓ rehabilitation of cleared areas using local or commercially available species such as *Eragrostis curvula* or other appropriate species to provide for a vegetation cover on the soil should be considered;
- ✓ in the case of the harvesting of indigenous flora, sustainable extraction rates and monitoring systems should be carried out and be appropriate to the size and complexity of the forest management unit;
- ✓ where livestock ranching or game farming is carried out on the same farm, significant opportunities for maintaining biodiversity integrity may be possible. In the sourveld grasslands, livestock ranching may not be the best options for maintaining biodiversity due to the sensitive nature of the soils.;
- ✓ high intensity systems and continuous sheep or goat grazing are undesirable for maintaining biodiversity integrity in any veld type;
- ✓ foresters should attempt to document the presence of any listed threatened or endangered species and threatened or endangered ecosystems that occur on the forest management unit; this may involve the use of specialists to undertake the identification process;
- ✓ plantation trees with active nests of birds of prey should be left in a buffer of surrounding trees and recorded, mapped, marked in-field and should not be disturbed;
- ✓ compartments with known nesting sites should not be harvested during the breeding season;
- ✓ if a new bird nesting site is identified before or during harvesting or road construction operations, it is important to:
 - alert competent and relevant authorities if the species is of conservation significance (e.g. a listed protected or threatened species);
 - map the site and document the management practices;
 - protect the site from accidental damage by indicating it clearly on the ground; and
 - prevent such indicators or signage compromising the protection of the site.

STATEMENT OF INTENT:

Landowners should determine whether any listed protected ecosystems occur on their farm/s and determine whether there is any specific management activity that can be implemented that will assist in their protection.

4.8 Conservation Areas: Indigenous Forests

4.8.1 Protection of Indigenous Forests

The NFA defines a “natural” or indigenous forest as being:

- a group of indigenous trees (i.e. two or more);
- whose crowns are contiguous (i.e. where a closed canopy exists); or
- which has been declared as such by the Minister.

In terms of Section 7 of the NFA, it is illegal to cut, disturb, damage or destroy indigenous trees in or to remove or receive them from an indigenous forest unless:

- a licence to do so has been issued by the Minister; or
- the Minister has issued an exemption.

Given the above, it is clear that no exemption is in force for commercial forestry operations, or indeed any other land use.

The natural forest biome, although the smallest (covering less than 500 000 ha – 0,5% of the surface area of South Africa) and most fragmented of all the seven biomes, has the highest plant diversity per hectare at 418 species per unit area compared to 98 species per ha for the fynbos biome.

Every effort must be made to protect the Forest Biome and the plant and animal species associated with it. This includes species such as the black stinkwood, the three species of yellowwoods and other indigenous protected trees that are listed annually in the Government Gazette under the National Forest Act, as well as Listed Protected and Threatened Species under the NEMBA such as the critically endangered cape parrot, the vulnerable samango monkey, suni and blue duiker. A landscape approach is necessary to conserve these species as despite the presence of the laws, the implementation is poor.

Different types of forests are characterized by varying ecological characteristics, such as forest regeneration, canopy cover and moisture levels and the impact of fires. The most relevant attributes that forest managers must consider is the buffer zone or ecotone between the forest margin and the adjoining vegetation. This vegetation may be natural grassland or fynbos, commercial forest plantations or less commonly another form of land use. The forests in the Grassland Biome along the eastern seaboard of the country are relatively small patches rarely exceeding 2 000 ha in extent and are located most often in areas of high rainfall, cooler south-facing slopes, the edge of escarpments and along rivers and other drainage lines. Because they have dense vegetation which remains green all year round, they are resistant to fires but can become susceptible to fires associated with berg winds that are common at the end of the dry winters.

The forests in the Fynbos Biome in the Western Cape and along the southern seaboard on the other hand may adjoin natural fynbos, commercial forest plantations, pastures and other forms of land use.

The main contribution that forest managers can play in protecting natural forests is the management of the fire regime on the forest margin and the control of alien and invasive species, including the invasion of commercial forest species into the natural forests.

It has been calculated that the extent of natural forest on plantation forest management units is almost 80 000 ha which represents in the region of 25% of the remaining natural forests in the country.

Fire has an important effect on the structure of the forest margin. Many of the forest margin species are able to coppice after being burnt, so the fire has

more of an impact on the structure of the ecotone, rather than the species composition. When fire tolerant forest margin species coppice after being burnt, the young shoots are much higher in protein content than shoots that have not been burnt. For example, ouhout (*Leucosidea sericea*) coppice can have a crude protein content of up to 28% after being burnt, while the unburnt new growth is only around 8%. As mentioned earlier, the structure of the woody biomass changes as a result of the effects of fire and the new growth is at a lower level than unburnt plants, which allows greater access to browsers than new growth from plants that have not been burnt.

However, the presence of woody alien and invasive species can compromise the fire resistance of the indigenous forest as the fuel load is much higher when these alien and invasive species are present. Typical alien and invasive species are bugweed (*Solanum mauritianum*), black wattle (*Acacia mearnsii*), silver wattle (*Acacia dealbata*), tick berry (*Lantana camara*), trifid weed (*Chromolaena odorata*) some *Eucalyptus* spp and various pine species (e.g. *Pinus radiata*). In addition, fuel loads will accumulate if the fire is prevented from burning the forest margin at regular intervals, with potentially devastating effects. Margins are burnt right back and fire sensitive species are exposed to the fire and the forest interior becomes susceptible to invasive species establishment.

Natural forests offer little in the way of suitable food for grazing animals; however, selective browsers such as bushbuck and duiker can exist but do so at low densities. They are not herd animals so any impact as a result of browsing is limited while their density is limited by food quality and quantity. But cattle are a different matter, especially if they penetrate the forest in large numbers when their bulk will break saplings while the impacts of their hooves will disturb the soil making it prone to increased soil loss as well as invasion by alien and invasive plant species.

Human activities may also impact the natural forests, especially where the degree of protection from illegal timber harvesting is poor. Farmers who are privileged to have natural forests on their land are encouraged to ensure that unlawful access and timber extraction is prevented or minimised.

Measures that can be used

- ✓ the loss of any forest, as defined in the NFA, should be prevented;
- ✓ alien and invasive species in the interior of natural forests should be controlled through physical removal or through preventative means by maintaining a closed canopy which limits the growth of such invader plants;
- ✓ forest margins should be managed through the removal and control of alien and invasive species;
- ✓ forest margins should be protected from unscheduled fires by burning adjacent grasslands under cool, moist conditions to reduce fuel loads and minimise the heat of the fire;
- ✓ forest margins next to grass stands should not be left unburnt for more than 2-3 years as the fuel load will build up to such an extent as to cause both structural and species composition damage on the margin and possibly into the forest as well if the fires are accompanied by hot and strong winds;
- ✓ forest margins next to fynbos and thickets should be protected from fire;
- ✓ forest margins should be protected from the potential impacts of existing plantation harvesting operations through directional felling and good harvesting planning;
- ✓ for any new afforestation in the vicinity of a natural forest, expert advice should be sought in terms of the buffer zone. This will normally form part of EIA approval for the afforestation;

STATEMENT OF INTENT:

The structure and biodiversity of natural forests should be protected, conserved and maintained.

- ✓ for the more endangered forest types, 100 m may be necessary, or up to 600 m if rare, endangered or threatened species are present in the forests (see <http://redlist.sanbi.org> for more detailed guidelines);
- ✓ at the time of establishment of a commercial forest plantation, a buffer of at least 20 m should not be planted around the edge of any indigenous forest;
- ✓ this buffer should be kept free of alien and invasive plants and the indigenous vegetation which exists or regenerates must be protected;
- ✓ where the indigenous forest invades the buffer zone, it is important to maintain the plantation boundary as originally demarcated;
- ✓ should there be potential for damage of the forest edge during operational activities, the boundary should be increased to a distance that will prevent any damage to the forest margin; and
- ✓ the buffer zone thus established should not be used for any other activities such as roads or other infrastructure (fire detection systems, etc.).

4.9 Fire Protection

The National Veld and Forest Fire Act No.101 of 1998 (NVFFA) was amended on 3 April 2024 and is now known as the National Veld and Forest Fire Amendment Act, 2023 where the purpose of this Act is to prevent and combat veldfires throughout the Republic.

Fire protection is a legal requirement in terms of the NVFFA and may also be necessary for fire insurance purposes. It is a legal requirement of the NVFFA that the local Fire Protection Association (FPA) be consulted prior to any fire protection activity (especially the burning of firebreaks or block burns) being undertaken.

A Fire Protection Association may be formed by owners who wish to co-operate for the purpose of predicting, preventing, managing and extinguishing veldfires in respect of an area which has:

- a. regular veldfires or
- b. a relatively uniform risk of veldfire or
- c. relatively uniform climatic conditions or
- d. relatively uniform types of forest or vegetation.

“Veldfire” is defined in the NVFFA as meaning a veld, forest or mountain fire.

An application for registration as a Fire Protection Association must be made in the prescribed way. The relevant municipality as well as the owner in respect of State land must join any FPA registered in the area in which the land lies.

One very big advantage of belonging to an FPA is that the burden of proof in any civil court cases where damages are claimed as a result of loss caused by fire, is put onto the person claiming the damages if the defendant is a member of a Fire Protection Association. In other words, it is presumed that the defendant was negligent until the contrary can be proved, if the plaintiff can prove that the defendant caused the fire or that it started on or spread from land owned by the defendant, unless the defendant is a member of an FPA in the area where the fire occurred.

The Department of Forestry Fisheries and Environment have produced a guideline (VERSION 3) of the NVFFA which provides information for the when interpretation and application the Act. The guidelines also help those involved in veldfires to understand how the Act relates to other policies and laws, such as the National Disaster Management Act, and the Conservation of Agricultural Resources Act.

www.dffe.gov.za/sites/default/files/legislation/guide%20interpretationimplementation_nationalveldforestact.pdf

4.9.1 Integrated Fire Management Plan

An adequate and appropriate fire management plan is imperative to ensure that the plantation forest resource, together with its ecological and other associated values, is protected. A fuel management plan, which considers the management of plantation debris, is also a useful tool. This latter approach is used to reduce the fuel load present under both immature and mature trees, thereby limiting the spread of fire. However, special precautions and expertise are needed to develop and implement this tool.

Measures that can be used

- ✓ a planned firebreak system;
- ✓ a fire protection system;
- ✓ a resources management system and check list that includes personnel protective equipment, firefighting equipment (water carrier with a pump, hose, fire extinguishers and fire beaters), communications equipment and training of personnel;
- ✓ firefighting safety policies, procedures and training of staff have been implemented;
- ✓ the forester must be a member of the local Fire Protection Association (FPA); and
- ✓ an integrated fire management plan should be prepared and implemented that meets the legal obligations in terms of firebreaks, high fire risk areas and provision of adequate access through roads and water points.

STATEMENT OF INTENT:

A fire management plan should be prepared and implemented in a manner that provides protection of infrastructure, plantation forests and other sensitive features as well as to meet the requirements of the law.

4.9.2 Firebreaks

Legal Obligations and Requirements

Fire is the biggest cause of damage to plantations, with pests and disease a poor second. Since the year 1980, almost 600 000 ha of plantation forests have been lost to fires, with particularly devastating fires experienced in 2007 and 2008. Fire protection of plantations and associated infrastructures is thus of paramount importance and the early preparation of tracers and firebreaks to aid in the prevention of fire damage should be properly planned and implemented.

The NVFFA places a legal obligation on landowners on whose land a veld fire may start or from whose land it may spread, to prepare and maintain firebreaks on the boundaries of their property. The right or duty to prepare and maintain a firebreak in terms of the NVFFA prevails over any prohibition in any other law on the cutting, disturbance, damage, destruction or removal of any plant or tree, except that the owner must where possible, transplant any plant which is protected in terms of any law; or where it is safe and feasible, position the firebreak so as to avoid such plant or tree.

Firebreaks may be prepared through measures other than burning but if the landowner intends to prepare the firebreak by burning, the following measures can be used to check the implementation of the desired outcome.

Measures that can be used

- ✓ the landowner must agree to a mutually acceptable date / dates to burn with all adjoining landowners and must inform the local Fire Protection Association (FPA), if any, of this / these dates;
- ✓ if no agreed date / dates can be reached then all adjoining landowners and the FPA, if any, must be given 14 day's written notice of the intention to burn (fire danger rating permitting);

- ✓ all adjoining landowners who have agreed to a date / dates or have been informed of the date / dates to burn:
 - must also burn their firebreaks on the boundaries concerned on the same date / dates;
 - be present in person (or through an agent) and ensure that sufficient people are present on his or her side of the boundary to control the spread of the fire;
 - if, for whatever reason, the burning could not be done on the stipulated date / dates, all adjoining landowners and the FPA, if any, must be notified of this fact (no new written notice is required for any additional dates needed to undertake the burning);
 - if a landowner intends to be absent for a period of more than 14 days during the period in which burning normally takes place, he or she must supply all adjoining landowners with a contact address and telephone number (a landowner can however carry out burning if the adjoining landowner is not present or has not supplied any contact details).
- ✓ a landowner cannot carry out burning if:
 - the FPA objects to it;
 - a fire danger warning has been issued for that particular area;
 - in the absence of a fire danger warning system, the prevailing or predicted weather conditions are not conducive to burning.
- ✓ In addition, a landowner should ensure that firebreaks are:
 - wide enough and long enough to have a “reasonable” chance of preventing a veldfire from spreading to or from neighbouring land;
 - do not result in soil erosion; and
 - are “reasonably” free of inflammable material capable of carrying a veldfire across it.

Firebreak Guidelines

The current system of external firebreaks on the plantation boundaries with an internal firebreak system is not always the most efficient and cost-effective system. A locally adopted system based on fuel load management designed to create a pattern of adjoining areas/farms that have no fuel or a reduced fuel load that will stop a fire or reduce it to that of a moderate fire and serve as a buffer zone from where successful ground and aerial firefighting can take place should be considered. This requires planning at a local or FPA level.

Measures that can be used

- ✓ where possible, firebreaks should be wide enough to permit burning each half in alternate rotations, where mowing cannot be practiced;
- ✓ foresters should consider that areas greater than 10 ha in size may require additional cut-off breaks;
- ✓ foresters should establish firebreaks using, in order of priority, mowing, slashing and preparation of fire tracer belts using a desiccant and finally burning;
- ✓ desiccant treatment of tracer belts prior to burning should be applied on alternate strips where possible to avoid the possibility of over-application by staff when traversing steep terrain (but see www.tipwg.co.za regards the application and risks associated with the use of chemical desiccants);
- ✓ foresters should ensure adequate water provision at the location of the fire;
- ✓ foresters should avoid using firebreaks as landings and depots during periods when there is a high risk of fire;

NOTE:

An agrochemical can have health effects and personal protective clothing is important when handling and applying any agrochemical.

- ✓ foresters should control alien and invasive plants before burning to reduce the fuel load; and
- ✓ foresters should use roads and natural features in the landscape as the boundaries for firebreaks as this is both safe and cost effective.

High Fire Risk Areas

Villages, offices, storerooms, workshops, fuel storage facilities, power lines, rubbish dumps, recreation sites and associated ablution facilities, vehicle parking lots and sawmills are high fire risk areas and should be prioritised for fire protection and managed throughout the year to reduce fire risks.

Measures that can be used

To decrease risks, fire protection of the high-risk areas must receive priority protection through:

- ✓ provision and maintenance of adequate firefighting equipment;
- ✓ reduction in any nearby fuel load;
- ✓ special attention should be paid to fuel bowsers with fire depressants readily available; and
- ✓ annual maintenance of fire extinguishers.

Provision of Adequate Access

Provision of adequate road access reduces the risks of fire to human life, infrastructure and timber compartments. Known water points should also be identified on the fire management plan and signs indicating the direction to these water points should be provided at road junctions to assist in the location of these water points, particularly if vision is impaired by smoke, or for fire fighters who are not familiar with the farm.

Measures that can be used

- ✓ roads should be readily accessible during the fire season and provide permanent, well-marked, easy access to the location of the fire;
- ✓ signs should be used to assist those fighting the fires, such as directional signs for water points and to warn them of cul-de-sac (dead-end) roads;
- ✓ during the fire season, all road verges should have a minimum fuel load to assist in stopping a fire from where successful ground firefighting can take place; and
- ✓ should roads be closed due to fire operations and harvesting, signage to this effect must be erected.

4.10 Conservation Fire Plan/Veld Burning

Grasslands cover almost one third of the country's land surface and fall into what is known as the Grassland Biome. The plant biodiversity is second only to that found in the Fynbos Biome and are critically important water production landscape. In this regard it contains 42 river ecosystems and most of the country's threatened wetland ecosystems. 92% of forest plantations can be found in the Grassland Biome.

As much as 40% of the Biome is considered to have been irreversibly changed and only 3% is under formal protection. The protection against further transformation is of paramount importance and foresters that have intact grassland ecosystems on their farms should make every attempt to conserve the structure and functioning of this important biome.

Many of South Africa's ecosystems are fire dependent and management or use of fire is necessary to promote both biodiversity and to reduce the fuel load and thus fire hazard. Fire can also be used to control invasive plants as well as indigenous invasive plants and to improve the quality of grazing, since recently burnt grassland has higher crude protein content than grassland that has not been burnt for some time.

Much of the eastern half of South Africa is characterised by fire-climax grasslands or savannah that owe their very nature to their long history of association with fires. The sour grasslands in particular require regular top-growth removal by fire, since adequate removal by grazing alone is difficult in these grasslands. There are normally four major objectives for using fire in veld management:

- to burn off unpalatable growth that remains from the previous season and which if left unburnt, will result in a moribund grassland;
- to stimulate growth at the end of the dry season;
- to destroy parasites such as ticks; and
- to control the encroachment of undesirable plants (both woody and forbs) – this is usually only successful in a limited number of applications, usually where grazing pressure is very light.

While these are largely agricultural reasons, fire also plays a significant role in maintaining ecosystem functioning. For example, most grassland species (both plants and animals) are well adapted to a frequent fire regime, which, in the absence of fire, may be reduced in number and behaviour (e.g. decrease in fire dependent animals and reduction in flowering of fire adapted plants). The regular application of fire in grasslands therefore serves both the agricultural requirements a landowner may have, as well as maintaining ecosystem functioning.

Sourveld grass (occurs in the high rainfall areas where most of plantation forestry is practiced) that is burnt in the winter or early spring emerges within days of the fire and growth response will depend on when the fire was put in. In an early winter burn, it may take a few weeks but a spring burn can solicit a flush of green grass within 10 days of the burn. This new green grass has much higher crude protein (CP) content than unburnt grass and is an important if not vital food source for grazing animals at the end of winter and early spring. The CP of grass species can be as high as 18-20%, depending on the species whereas forbs in burnt grassland can reach much higher levels than grasses – up to 30% in the case of legumes. Unburnt grass in winter will contain less than 2% CP and if it remains unburnt through to the next winter, the CP of the new green grass will reach less than 10% (the old dry grass leaves will remain below 1-2%). If the grass remains unburnt for three years, the CP of any emerging green grass will be less than 5%. In two and three-year-old grass, any emerging green grass leaves will be increasingly difficult for herbivores to graze since the presence of the old and unpalatable grass leaves does not allow easy access to the green leaves.

Unburnt sour grasslands will result in a decline in biodiversity for a number of reasons:

- the above ground biomass in unburnt sour grassland increases over time and although there is some decline in above ground biomass as the winter approaches, the mat of grass that remains unburnt has the ability to prevent the emergence of associated forbs or to prevent their flowering due to insufficient light conditions;
- the thick and unburnt grass hampers movements of rodents and terrestrial birds;

- the reduced flowering of grasses and forbs results in less food available for rodents, terrestrial birds (francolins depend on visual sightings of flowering bulbous species to locate the corms and underground bulbs of plants which is their prime food source) and insects;
- the reduction in rodents, terrestrial birds and insects has a knock-on effect on their predators and these species such as genet, civet, lynx, serval and jackal decline in numbers;
- the thick mat of unburnt two to three-year-old grassland results in increased rainfall run-off since the above ground biomass acts like a “thatch” and instead of water penetrating the soil, it runs off the “thatch” into the water courses; and
- the fire hazard of grasslands older than two years since the last burn increases the risk of unplanned fires or risk of arson fires.

In savannah, the application of fire is dependent on the nature of both the grass and the tree layers. In sour mixed bushveld areas, the objectives for burning would be largely to remove unpalatable grasses, as well as to control bush. In sweet savannah, fire is not usually as effective in reducing bush as the rainfall is usually erratic and there may not be a sufficient accumulation of grass fuel (due to the higher stocking rates of herbivores) to provide for regular fires.

As a general rule of thumb, fire in un-grazed sour grasslands should be applied annually or every two years. Annual fires can also be used to reduce the fire hazard, as block winter burns serve as a fire protection mechanism (especially in areas of high fire risk). If bush control is required, a less frequent fire regime, which allows for the accumulation of sufficient fuel to have an impact on the bush, should be applied. Head fires (with the wind) are more effective against bush encroachment than a back burn (against the wind) but can pose increased risks for the landowner and the neighbours. There are practical ways of resolving this, such as starting with a back-burn and then initiating a head fire that will burn towards the back-burn.

The fynbos biome is also fire dependent and fire is used largely to maintain biodiversity and reduce the fuel load. By maintaining fynbos biodiversity, the management of the wildflower picking industry is maintained, invasive species are controlled and water yield in the catchments can be improved. The interval between fires in the fynbos is not as frequent as in the grasslands or savannah and depending on the objectives of the landowner, can vary between 8 and 20 years. When selecting a combination of frequency, season and intensity for management, it is important to recognise that there is no optimum regime for conserving diversity. A fixed regime will inevitably lead to the impoverishment of diversity by repeatedly favouring the same species at the expense of others, and variation in the fire regime is important for ensuring species coexistence. Where possible the fire period should be determined by ensuring that the proteas in any block to be burnt have flowered at least 3 times before burning is considered, in order to allow them to set seed.

Each compartment should be burned as close to the prescribed frequency (8–20 years) as possible, starting with compartments with the greatest post-fire age.

A mosaic of vegetation ages should be created to break up uniformly continuous fuel beds. When feasible, conservation fynbos areas on the plantation should be burnt when adjacent fynbos reaches a post-fire age of half the prescribed fire interval.

Fire intensity is dependent on fuel load, fuel moisture, relative humidity, wind speed and the nature of the ecosystem (volatile oils tend to increase the fire intensity). Fuel-load itself is dependent on the rainfall, history of the

burning and stocking rate. A heavy stocking rate can negate the effectiveness of fire. Certain indigenous plant communities such as natural forests are usually sensitive to fires. Adequate protective measures should be taken in this regard to minimise damage to forest margins. This could be done by minimising the fuel load adjacent to forests through the regular application of fires and/or initiating fires at the forest margin and burning away from the forest. This is not always practicable on a large-scale – if at all – and thus more regular burning tends to have the desired effect of reducing fire damage to forest margins because of the lower fuel load adjacent to the forests.

The National Veld and Forest Fire Act 32 of 1998 is aimed at preventing and combating veld fires through a system of prohibitions on burning veld under certain conditions, the preparation and maintenance of annual firebreaks and the formation of Fire Protection Associations. See Chapter 4.3.

Measures that can be used

- ✓ fynbos should be burnt in autumn or according to prescriptions set out in a burning plan. A mosaic of irregular burning of between 8 and 20 years is preferable but may be more frequent in certain high fire risk areas;
- ✓ sour grassland should be burnt in winter or early spring (when the grasses are dormant) and should be in response to specified objectives set out in a burning plan. A mosaic of irregular burning every two to three years is preferable;
- ✓ in savannah/sour bushveld, the frequency of burning will depend on the available fuel load and the objectives of the fire plan;
- ✓ invasive plant control operations should precede burning (to reduce the fuel load) but any chemical control measures should take place well in advance of the burn to ensure the efficacy of the active ingredient; and
- ✓ burning of wetlands should be on a biennial (once every two years) rotational basis and timed to avoid the peak breeding seasons of wildlife, particularly those of cranes which breed in the wetlands in winter. Annual burning can also be practiced if it is necessary to reduce the potential impact of unplanned or arson fires on the timber crop.

Wetland burning in the fynbos biome should generally adhere to the burning cycle which is applied to the adjoining fynbos areas. Shorter rotations could be considered if riparian zones have to be burnt for fire protection reasons but only in areas where priority biodiversity or peat is not present.

STATEMENT OF INTENT:

To implement a fire management programme to meet the conservation needs of the indigenous vegetation and associated wildlife present on the timber farm.

Chapter 5

Integrated Pest Management



Photo: www.forestrysouthafrica.co.za

5.1. Integrated Pest Management

The definition of a pest is any species, strain or biotype of plant, animal or pathogenic agent injurious to plants and plant products, materials or environments and includes vectors of parasites or pathogens of human and animal disease and animals causing public health nuisance (Source: FAO International Code of Conduct on Pesticide Management).

In the intricate realm of the commercial plantation forestry Industry, pests are identified based on their potential harm to the plantation ecosystem affecting timber productivity and ecological balance. Balancing the management of these species requires a nuanced approach to prevent outbreaks and mitigate the associated environmental, social and economic costs. Navigating through various legislative requirements further complicates pest control in contemporary commercial plantation forestry practices.

In the realm of forestry governance, the National Forest Act (NFA) stands as a cornerstone, emphasizing the government's pivotal role in safeguarding forests, upholding their health, and maximizing their benefits. This legislation places a paramount focus on the sustainable management of forests, balancing economic, social, and environmental considerations to ensure their enduring vitality. Reinforcing the NFA, additional legislative frameworks, including the Plant

Improvement Act, Agricultural Pests Act, and Agricultural Research Act, wield authority over pests within commercial plantation forestry practices.

Addressing the prevention of plantation forestry pests' introduction is the responsibility of the National Department of Agriculture Land Reform and Rural Development's Plant Health Directorate. Pertinent aspects of pest management are effectively governed by the National Agricultural Pests Act and the Plant Improvement Act. Further, the critical domain of tree health research finds its primary locus in the Forestry and Agricultural Biotechnology Institute (FABI), particularly through the Tree Protection Co-operative Programme (TCP). This comprehensive legal and research infrastructure underscores the multifaceted commitment to ensuring the resilience and sustainability of forestry practices in the broader South African landscape.

Highlighted in the "Development of an Integrated National Forest Protection Strategy for South Africa" (January 2011) is the global upsurge in challenges posed by pests in commercial plantation forestry. This escalation is attributed to the heightened ease of travel and trade between countries and continents. The global trade routes have facilitated the movement of people and goods, including pests, at an unprecedented rate. This has led to a substantial increase in pest incidents globally, and a parallel trend in South Africa, evidenced by the recorded pest incidents on Eucalyptus since its introduction.

In South Africa, the impacts of introduced pests in the commercial plantation forestry industry are evident, with non-native pests significantly affecting plantation forestry. For example, the introduced wood wasp, *Sirex noctilio*, caused an estimated loss of R100 million in 2005/6, constituting approximately 2.4% of the total turnover of forestry operations in the country.

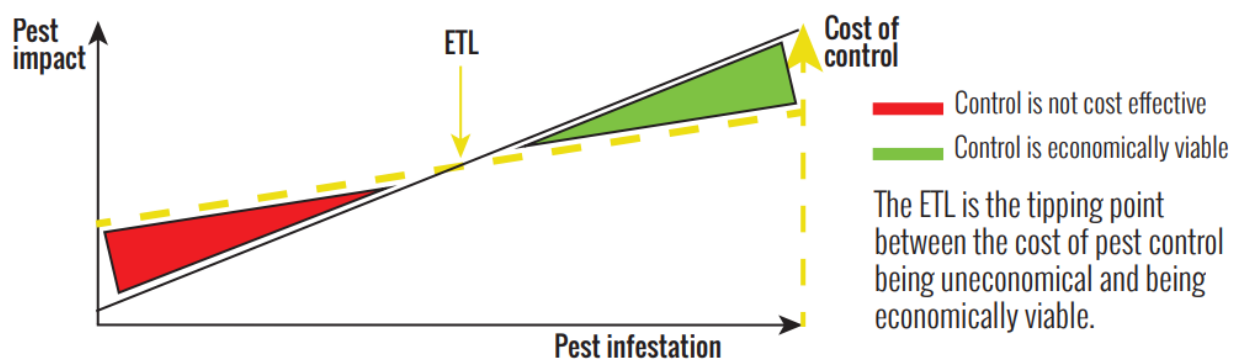
Simultaneously, the reduction in the availability of agrochemicals is a growing reality. This reduction is driven by (1) heightened awareness and understanding of the human health and environmental implications of certain agrochemicals; (2) an increased demand for end-products produced with fewer chemical inputs; (3) the availability of socially and environmentally acceptable chemical products; and (4) a heightened demand for certified products from international bodies like Forest Stewardship Council® (FSC®) and Programme for Endorsement of Forest Certification (PEFC), which have stringent guidelines on agrochemical use.

Pests wield a profound impact on the sustainability of the commercial plantation forestry industry and the equilibrium of natural ecosystems. They influence the choice of commercially grown tree species in specific areas, escalating costs associated with replanting (blanking) and agrochemical applications, and contribute to yield loss and a decline in end-product quality.

Unlike the past reliance on agrochemical control measures, the contemporary approach integrates a broader perspective known as Integrated Pest Management (IPM). IPM considers all available pest control techniques, emphasizing measures that discourage pest population development while keeping interventions at economically justifiable levels. The Food and Agriculture Organization (FAO) defines IPM as an ecosystem approach to crop production that combines diverse strategies to cultivate healthy crops while minimizing pesticide use.

The IPM framework, discussed later in detail, advocates strategic decision-making, including the option to "take no action" when appropriate. Plantation managers face the challenge of finding the equilibrium between inaction and implementing control measures. This necessitates a comprehensive understanding of the pest, available control methods, and the economic, environmental and social costs associated with both the pest and its management. A critical aspect is identifying the threshold level at which action becomes necessary.

At the core of Integrated Pest Management (IPM) strategies lies the concept of an Economic Threshold Level (ETL), a pivotal metric determining when pest treatment becomes necessary. The ethos of IPM centers on strategic pest management rather than outright eradication, recognizing the impracticality and high costs associated with attempting to eliminate entire pest populations. Instead, IPM programs prioritize establishing acceptable pest levels, known as action thresholds, which are specific to both the pest and the site. For instance, what might be deemed acceptable for weed presence, such as white clover, at one site may not hold for another. By allowing pests to persist within reasonable thresholds, the approach mitigates selection pressure, reducing the likelihood of pests developing resistance to management methods. This strategic retention of non-resistant specimens serves to dilute the prevalence of resistant genes within the overall population. Likewise, the proactive rotation of various management methods helps thwart the development of pest populations that are excessively resistant to any single method, embodying the dynamic and adaptive nature of effective IPM.



The Economic Threshold Level (ETL) serves as the crucial tipping point where the balance shifts from pest control being economically unviable to becoming a financially sound decision. This pivotal metric is not static but is influenced by a myriad of factors, necessitating continual reassessment. Variables such as the specific tree species, the desired end-products, and market demand, along with climatic and weather conditions, the type of pest species, the stage in the growing season, and the control methods employed, all contribute to determining the ETL. Moreover, economic fluctuations and shifts in the market landscape further underscore the need for constant revision of the ETL. In the dynamic ecosystem of Integrated Pest Management (IPM), recognizing and adapting to these multifaceted influences on the ETL is essential for fostering economically viable and environmentally sustainable pest control strategies.

5.1.1 The FSA: TIPWG IPM Generic Guidance Framework

There are five basic steps

1. Identifying the problem
2. Consideration of control options
3. Decision-making process
 - a. No Action
 - b. Avoidance
 - c. Remedial action
 - i. Non-chemical
 - ii. Chemical

4. Application, if necessary
5. Monitoring and recording

This process is based on the continuous improvement model because monitoring and recording of action, or inaction, feeds into the knowledge base to ensure the next decision is a better one.

Step 1 Identifying the problem

Characterizing the biotic and abiotic factors (both the threat (aka pest) and the tree species being damaged). Identifying and understanding factors such as the life cycle of the pest, distribution and density, damage, ETL and limiting factors such as natural enemies which may exist.

Mistaken identification of a pest may result in ineffective actions. For example, plant damage due to over-watering in a nursery could be mistaken for bacterial infection, since many bacterial pathogens thrive under moist conditions. Once the pest has been identified, knowledge of its lifecycle provides the optimal intervention points. For example, weeds reproducing from last year's seed can be effectively managed with mulches and pre-emergent herbicides.

Step 2 Consideration of control options

Taking into consideration if any regulatory requirements dictate that control is required e.g. NEMBA. Then assessing the risk in terms of environmental, social and economic impact of both the damage and the control. Consider landscape-scale planning or conservation designations that might limit the use of various control measures.

Possible interventions include non-chemical methods such as mechanical/physical, cultural, biological control and agrochemical control methods. Mechanical/physical controls include picking pests off plants, or using netting or other material to exclude pests such as birds or rodents. Cultural controls include keeping an area free of conditions conducive to pests by, for example, removing waste or diseased plants, flooding and the use of disease-resistant crop varieties. Biological controls are numerous and include the conservation or augmentation of natural predators.

Step 3 Decision-making process

Decision-making or risk assessment is the consideration of all information at hand and determining any potential effects of the various control measures.

Options include:

- a. No Action – no action is taken because the perceived “cost” or economic threshold level (social, environmental and / or economical) is higher than the desired result.
- b. Avoidance – avoidance of pest / damage through preventative measures such as breeding, site-species matching, plant quality, planting quality and stand management to avoid or deter high levels of pest infestation and resulting damage.
- c. Remedial action – consideration of cultural, biological and chemical options.
 - i. Non-chemical – cultural and biological controls to manage the pests / damage below the ETL.

Biological control is the use of the pest's natural enemies and physical responses – i.e. predators, parasites, pathogens and competitors and pheromones, to manage the pest and their damage. Biological insecticides, derived from naturally occurring microorganisms (e.g. Bt, entomopathogenic fungi and entomopathogenic nematodes), also fall in this category. Augmentation, inoculative release and inundative release are different methods of biological control that affect the target pest in different ways. Augmentative control includes the periodic introduction of predators (e.g. *Sirex* Control Programme). With inundative release, predators are collected, mass-reared and periodically released in large numbers into the pest area (e.g. *Cleruchoides* release for *Thaumastocoris* control). This is used for an immediate reduction in host populations but is not suitable for long-term use. With inoculative release, a limited number of beneficial organisms are introduced at the start of the growing season. This strategy offers long-term control as the organism's progeny affect pest populations throughout the season. With seasonal inoculative release the beneficials are collected, mass-reared and released seasonally to maintain the beneficial population.

- ii. Chemical – consideration of agrochemical control options and their application method; taking into consideration certification requirements, if necessary.

Chemical control is the use of agrochemicals to manage the population of the pest. This is the application of pesticides, such as herbicides, insecticides and / or fungicides. Agrochemicals are classified by their mode of action (MOA) and it is imperative that different MOA's are used to combat the pest to prevent resistance. Rotating between agrochemicals with different modes of action minimizes pest resistance.

Synthetic agrochemicals are used as required and often only at specific times in a pest's life cycle. Many newer agrochemicals are derived from plants or naturally occurring substances (e.g. nicotine, pyrethrum and insect juvenile hormone analogues) but the toxophore or active component may be altered to provide increased biological activity or stability. Applications of agrochemicals must reach their intended targets. Matching the application technique to the crop, the pest and the agrochemical is critical. The use of low-volume spray equipment reduces overall agrochemical use and labour cost.

NOTE: In the decision-making process, the aim is to always choose the least harmful control method.

In some instances, the application of an agrochemical may be the least harmful control method, which may not seem logical because of all the bad press agrochemicals have received. Used in a safe and responsible manner, according to the label recommendations, there are instances where socially, environmentally and economically the best decision to make is to apply agrochemicals.

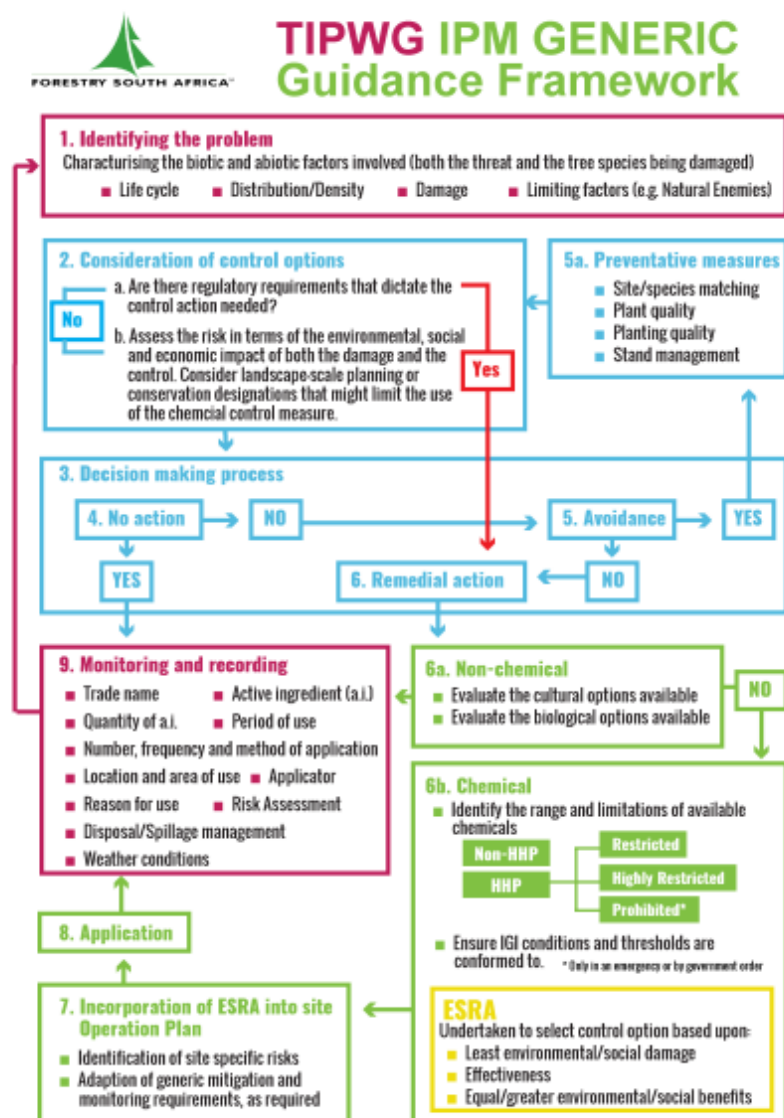
Step 4 Application

This is the actual application of the chosen control method, taking social, environmental, economic, legislative and certification requirements into account.

Step 5 Monitoring and recording

Monitoring and recording the decision-making process; chosen control technique; details of control; timing of application; weather at time of application; number, frequency and method of application; applicator; location and area and the

results of the chosen control method is critical to ensure effective control was achieved. In addition to this, any negative consequences can be recorded and addressed, if necessary and all this information goes into the knowledge base



to ensure the continued improvement in the decision-making process and management, going forward.

In summary, the evolution from solely relying on chemical controls to adopting IPM reflects a holistic and adaptive approach to pest management in commercial forestry. This approach emphasizes sustainability, considering economic, environmental, and social factors while navigating the intricate landscape of pest control regulations and certification requirements.

5.2 Damage-causing Animals

5.2.1 The Legal Background

The NEM: BA Threatened or Protected Species (TOPS) Regulations deal in detail with the permit system for the control of listed threatened or protected damage-causing species. Foresters who are faced with timber damage or livestock loss from listed threatened or protected damage-causing species must be aware of

the regulations and comply strictly with the conditions contained in the permit. While any person may, in terms of section 88(1) of NEMBA, apply for a permit, the actual process is dependent on a number of requirements. In brief, when considering a permit application, the issuing authority must take into account:

- all applicable legal requirements;
- whether the species is listed in terms of section 56 of NEMBA as a critically endangered species, an endangered species, a vulnerable species or a protected species; and
- whether the restricted activity (e.g. hunting) is prohibited, e.g. regulation 26 prohibits certain methods of hunting of a listed species – such as by means of poison, traps, snares, dogs and various forms of firearms.

When it comes to damage-causing animals, the Provincial Department responsible for the conservation of biodiversity in a Province must determine whether a listed species can be regarded as a damage-causing animal (regulation 14(1)). In the case of damage-causing animals originating from a protected area, the regulations provide for various control options (regulation 14(2)) that must be exercised by the relevant authority. However, regulation 14(1) does not prevent a landowner from killing a damage-causing listed species in self-defence where human life is threatened.

Despite the regulations published under NEMBA which permits, under certain circumstances, the use of lethal control measures for listed threatened or protected damage-causing species, there is a strong thrust towards non-lethal, holistic, ecologically acceptable and ethical management of all damage-causing animals, whether listed as a TOPS or not.

5.2.2 International Consensus Principles for Ethical Wildlife Control

Sustainable wildlife management is described by the Food and Agriculture Organisation (FAO) as the sound management of wildlife species to sustain their populations and habitat over time, taking into account the socioeconomic needs of human populations. All land-owner should be aware of and consider the effects of their activities on the wildlife resources and habitat. Inevitably, human wildlife conflicts emerge and usually invoke widely divergent views based, *inter alia*, on perceptions by those who practice culling in the absence of scientific evidence that damage has occurred and believe that culling will solve the problem and those who support nonlethal methods without evidence that this approach will achieve the desired outcome.

In 2016, a total of 18 experts compiled a list of seven principles that, based on a systematic approach, would result in a consensus position (Dubois, S. *et al.* 2016. International consensus principles for ethical wildlife control. Conservation Biology, Volume 31, No. 4, 753-760). The seven international principles have been adapted for the management of human-wild conflict situations in South Africa.

i. Modifying human practices

Human-wildlife conflicts often originate from human activities that result in habitat change. This change can disadvantage a species and result in its localised reduction or even extinction due to habitat change and reduction in food and water resources. In other cases, the change may result in the transformation of the habitat into a form that is advantageous to the species by providing new food and water resources, cover and relative safety from predators due to the localised extinction of those predators.

The move towards improved co-existence between humans and wildlife underpins the first principle.

ii. Justification for control

The principle of wildlife control should only be justified with evidence based on monitoring; for example, harm caused to people, property, livelihoods and damage to crops and livestock. The extent of the problem should be objectively considered or measured and methods of control as well as no control options should be evaluated.

Justifying wildlife control can be complicated since it requires reconciling both perceived and real damage as well as conflicting values or world views. Any wildlife control programme should distinguish between nuisances and real damage. Real and extensive damage may, in the absence of any non-lethal control methods, require lethal control based on what people perceive as the maximum number of animals that will be tolerated on any one area – known as the cultural carrying capacity. In some cases, minor damage is not necessarily sufficient justification for any control, both non-lethal and lethal.

iii. Clear and achievable outcome-based objectives

The desired outcome of a wildlife control programme such as a reduction in animals resulting in severe financial losses should be clear, achievable, monitored and adapted based on lessons learned.

To improve decision making, an understanding of the ecology of the damage causing animal is necessary. This includes population size, behaviour, reproductive capacity, demography and the effectiveness of any selected control method in place. What is often overlooked is the need for continuous monitoring. It is one of the most important aspects of wildlife control and the outcome of a population reduction programme can only be validated with this important step in place.

In most cases, complete eradication of damage causing animals is impossible and an outcome-based objective on acceptable losses should be established.

iv. Animal welfare

Any control method should cause the least harm to the animals' welfare and to the least number of animals. Opposition to control of wildlife may arise because animal welfare concerns are not necessarily related to their control *per se* but to the methods used, especially if the potential for the suffering of the target animal and non –target animal is realised.

Control methods vary considerably in type and may require a different approach for different animal species, age, sex, social organisation and others. Essentially, control methods fall into two categories – lethal and non-lethal.

The control of wildlife has been a conflict between protagonists for lethal control and protagonists for ethical and non-lethal control that has endured many years of debate. Advocating culling without evidence that the problem will be solved is a poor approach to a reduction in wildlife. The same applies to those who insist on ethical and non-lethal methods without evidence that this method will result in least harm to the animals' welfare or even achieve the desired outcome.

Note: Ethical includes that the need, benefits, feasibility and costs to people and wildlife are taken into account when considering an approach to culling of wildlife.

v. Social acceptability

Community values should be considered alongside scientific, technical and practical information and decisions often involve balancing the harm and benefits. Scientific and technical information must be sound and clarify the potential benefits as well as the consequences of failing to act (increased damage).

Inevitably, decisions regarding wildlife control involve human values which differ from person to person and in particular between interested (but not affected) or affected parties (those who suffer the brunt of the damage).

This diversity requires an open and transparent process of stakeholder engagement in which different world views are considered in order to develop a consensus or compromise solution. This is not always possible to achieve and may result in the unfortunate breakdown of stakeholder participation.

vi. Systematic planning

Decisions on wildlife control should not be *ad hoc* but integrated into a long-term systematic management programme. *Ad hoc* approaches do not lead to long-term solutions and are short lived, particularly where control involves a prolific number of damage-causing animals. Low level culling of such numbers results in senseless killing as numbers rebound quickly.

vii. Decision-making by specifics rather than labels

Control of damage causing wildlife must be based on the target species and not simply because that species has earned a reputation as a problem animal. For example, the control of black backed jackal may not be necessary in one area simply because it has a negative reputation in another (killing sheep).

viii. Questions to be asked

These principles can be used in sequence when decisions about human-wildlife conflict are made and will ensure that they are followed. Hence:

- Can the problem be mitigated by changing human behaviour?
- Is the harm serious enough to warrant wildlife control?
- Is the desired outcome clear, achievable and based on monitoring?
- Does the proposed method carry the least animal welfare cost to the fewest animals?
- Has scientific, technical and practical information been considered alongside stakeholder values?
- Is the control programme part of a systematic long-term management programme?
- Is the decision warranted by the specifics of the problem rather than the negative label attached to the animal?

5.2.3 Rodents

Of the approximately 75 indigenous rodent species, about 25% can be considered agricultural pests. In the agricultural context, field crops can be damaged by porcupines, springhares, cane rats, giant rats, multi-mammate mice and gerbils. There are a number of control methods but most importantly is the planning of a pest control programme. This should hinge on:

- measures that are effective in pest control;
- affordable control;
- avoidance of ecological damage or, where this is not possible, minimisation of such damage.

General recommendations for rodent pest control include biological control (for long-term protection) and artificial control (when the need arises and only after a full analysis of the actual pest problem has been carried out). These controls include:

- encouragement of predator activity (protection from disturbance or set asides of natural vegetation, management of veld adjoining timber lands, erection of raptor perches to encourage the presence of owls, kestrels, hawks etc.);
- ensuring clean timber harvesting to minimise rodent population growth; and
- modifying habitat surrounding vulnerable plantations to reduce cover for smaller rodents which will help keep the population densities low.

For an IPM rodent control poster see: www.tipwg.co.za/wp-content/uploads/2019/06/Rodents-Poster.pdf

Should it be absolutely necessary to use agrochemical control, the following points should be considered. For more detailed Standard Operating Procedure (SOP) control measures see www.tipwg.co.za/wp-content/uploads/2022/09/SOP-Rodenticide-1.pdf.

- do not routinely using rodenticides, as the poisons are a danger to predators of the rodents;
- only use regulated rodenticides with no secondary poisoning impacts and consider the following: (For more details see Timber Industry Pesticide Working Group Approved Pesticide List www.tipwg.co.za);
- impact on non-target animals;
- the likelihood of resistance developing when used repeatedly at the same locality;
- rodenticides are effective only in the short-term;
- capture methods that do not require poisons (e.g. snap traps); and
- location of rodenticides inside square pipes which results in the subsequent death of the rodent but which prevents access of the poisoned rodent by birds and other animals.

Measures that can be used

- ✓ the presence of raptor perches in newly planted forest compartments;
- ✓ harvested compartments and adjoining depots are clean and clear of unwanted forest residue;
- ✓ surrounding natural vegetation is managed and not left rank and unburnt; and
- ✓ the use of registered rodenticides placed inside square pipes of approximately 20 cm long.

5.2.4 Other Damage-causing Animals

Baboons and Other Primates

During the last three decades, damage to timber plantations by baboons (*Papio ursinus*) in South Africa has reached alarming proportions.

Baboons bite into the trunk of a tree to inflict a wound. Once the bark is penetrated, a strip is removed using claws and teeth. The bark strip is later discarded and left to accumulate at the base of each damaged tree. This process may be repeated until bark is removed from the ground level to the tree top. Damaged trees may eventually die or become deformed, thus compromising the quality of wood material. Frequently, damaged trees exhibit stress and are often prone to fungal infection or the attraction of opportunistic damaging agents such as the woodwasp, *Sirex noctilio*. Additionally, baboons can remove newly planted seedlings and destroy cones from pine trees, making it difficult to collect genetic material for tree breeding and improvement and ultimately threatening the value chain in forest resource production. Damaged compartments are often salvaged as losses are too severe to retain profitability at full rotation.

Apart from these implications and the additional cost of field operations, such as when thinning or clear-felling of damaged trees, the low quality of wood material results in defective products, delaying critical processing time and risking machinery damage at timber-processing plants. (See Kabir Peerbhay, Ilaria Germishuizen and Riyad Ismail Kabir Can remote sensing detect, monitor and track baboon-damaged *Pinus* plantations located in South Africa? Journal of Spatial Science, 2018 <https://doi.org/10.1080/14498596.2018.1453882>).

STATEMENT OF INTENT:

Ethical and non-lethal control of damage-causing animals should be the preferred choice of a forester. Where non-lethal control has been shown to be ineffective in reducing damage to trees, specific lethal methods may be justified.

Monitoring of baboon troops and their demographics undertaken during the mid-2000s indicated that the baboons in plantations occur at a density of 8-10 baboons per km², while the unplanted and essentially untransformed habitat has a density of just under 2 baboons per km². Following the removal of baboons from a pilot area over a three-year period (which resulted in a reduction of baboon density to just over 2 baboons per km²), there was a reduction in evidence of baboon damage as determined by on-site monitoring. The implications of these initial findings are that baboon numbers would need to be reduced by 70% before damage to pine trees is reduced.

Plantation damage inflicted by baboons has previously been recorded using an annual ground-based survey, with new damage sometimes recorded when noticed during other routine field operations.

Recently, remote sensing technology has been investigated to test the potential to detect key vegetation parameters that can provide information on forest health. Resolutions using Landsat 8 (30 m) and Sentinel -2 (10 m) proved successful in identifying damage caused by baboons, but it was not clear whether all damage was caused by baboons or other stress factors. However, use of PlanetScope data combined with deep neural network (DNN – when a network has one or more layers of hidden units) has improved the results of other remote systems by providing higher level resolution information on the tree level as opposed to the results provided at a compartment level.

A protocol was developed in 1998 and revised in 2007 to guide timber plantation owners in the choice of various control methods. The numbers of methods that can be considered are extensive, but are mostly ineffective in the long term. The current method of trap and shoot (using a silenced weapon) is favoured and has been in use since 2011.

In 2019, a DRAFT Code of Good Practice for the Management of Human Wild Life Conflicts: The Case for the Chacma Baboon *Papio ursinus* was developed based on the seven international consensus principles for ethical wildlife control referred to earlier. The Code was replaced by a “Guideline for the Management of Human Wild Life Conflicts” available on the FSA website www.forestrysouthafrica.co.za

Measures that can be used

- ✓ The forester should adopt a systematic approach to the control of baboons and use the Guideline for the Management of Human Wild Life Conflicts (2024) to substantiate the need to cull damage-causing baboons.

Browsing Antelopes

Certain antelopes such as grey duiker, bushbuck, kudu and eland may cause isolated damage to saplings of various species. The damage can be significant in isolated cases (duiker damage to seedlings, for example) but in general, the extent of the damage remains tolerable. Should damage become extensive and financially unacceptable, farmers should consider the capture and release of the offending species, or removal through the use of a qualified hunter or marksman or as provided for in the provincial hunting regulations.

Measures that can be used

- ✓ The forester should only resort to the control of browsing antelope where damage to seedlings has exceeded a level of 10% and/or requires blanking to maintain the sustainability of the forest management unit; and
- ✓ Control methods should comply with the relevant legislation pertaining to the control of the species.

Domestic Livestock

Some landowners may farm domestic livestock such as cattle, sheep and/or goats in addition to their timber operations. Others, particularly large timber organisations, may permit grazing or be impacted by illegal grazing of domestic livestock from their neighbours. Such grazing may have the potential to damage newly planted compartments through trampling of the young trees and through foraging. From an environmental perspective, grazing pressure should be limited to the natural carrying capacity of the veld as contained in the CARA Regulations or as advised by an agricultural extension officer, or as calculated by the farmer.

Measures that can be used

- ✓ where applicable, landowners should achieve a stocking rate that does not exceed the legislated carrying capacity of the veld type or as advised by an expert (See CARA Regulations, Regulation 11 (2) and Table 2);
- ✓ where applicable, foresters should take precautions to protect newly planted timber seedlings from damage caused by foraging livestock. This may be through a combination of veld management (appropriate veld burning) or by imposing restrictions on the location of grazing/browsing livestock herds;
- ✓ sensitive areas, such as wetlands and riverbank edges should be monitored and if needed, protected from damage;
- ✓ rare grasslands and rare species within grasslands, where identified, should be protected from overgrazing and continuous grazing through a rotational grazing system; and
- ✓ grazing should occur on a rotational basis, with grassland areas provided for rest and recovery periods.

Illegal grazing should be combated through a stakeholder liaison process, to identify cattle owners and develop protocols to prevent the impacts of illegal grazing.

5.3 TIPWG Approved Pesticide List (APL)

“Pesticides are any substance, or mixture of substances, of chemical or biological ingredients intended for repelling, destroying or controlling any pest or for regulating plant growth” – FAO, 2021

Pesticides are substances that are meant to control pests and include all of the following: herbicides, insecticides, insect growth regulators, nematocides, termiticides, molluscicides, piscicides, avicides, rodenticides, predacides, bactericides, insect repellents, animal repellents, antimicrobials, fungicides, disinfectants (antimicrobial), and sanitisers.

Target pests can include insects, plant pathogens, weeds, molluscs, birds, mammals, fish, nematodes (roundworms) and microbes that destroy property, cause nuisance, spread disease, or are disease vectors i.e. they carry and transmit an infectious pathogen on or into another living organism.

The most commonly used pesticide is herbicides, accounting for approximately 80% of all use.

Most pesticides are intended to serve as plant protection (also known as crop protection).

TIPWG has developed an APL for the Industry based on national legislative requirements and certification requirements. The APL is available to download from the TIPWG website.

All information provided in the TIPWG APL was correct at time of publishing. The information has passed all TIPWG checks and conforms to other certifications' policies, where necessary, for South African plantations and nurseries. All products appearing on the APL are registered under the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act 36 of 1947 and have an L number.

In South Africa, our legislation is quite strict with regard to the registration of pesticides. In the Approved List you will find icons, denoting commercial plantation, conservation areas, and nurseries. These indicate the areas where the pesticides are registered to be used and can only be lawfully used.

When a new pesticide has been legally approved for use in South Africa, it must go through a TIPWG approval process to be added on the TIPWG APL. TIPWG members may request for new products to be added to the APL. Members must ensure that:

- New products to be added are needed by the industry;
- All documentation (e.g. COA, labels and SDSs) are in order;
- Certification requirements are also checked to ensure new products conform.

A TIPWG review is done by an independent expert who carefully reviews the documentation.

Measures that can be used

- ✓ compliance with Legislation: Use only pesticides that are listed on the TIPWG Approved Pesticide List (APL) and registered under South African law (Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act 36 of 1947);
- ✓ area-specific Application: Follow the icons on the APL that indicate where each pesticide can be used, such as commercial plantations, conservation areas, or nurseries, ensuring lawful application;
- ✓ regularly consult the TIPWG APL for updates or changes to ensure compliance with the most current approved products and practices;
- ✓ read the Agrochemical product label;
- ✓ there is often confusion when it comes to reading and interpreting pesticide labels. This guide (www.tipwg.co.za/standard-operating-procedures/admin-and-other/) will hopefully clear up any confusion with regard to the reading and interpreting of labels.

A few important notes:

- A label MUST have a registration number on it (e.g. an L-number).
- All labels must also be GHS compliant (as per SOP example).

When trying to determine if a product is applicable for your intended use, you need to read the WHOLE label. The “declaration regarding formulation and use” on the front page of the label is often insufficient.

The TIPWG APL stipulates if a product is suitable for:

1. Compartment
2. Conservation
3. Firebreak prep
4. Nursery
5. Industrial.

Measures that can be used

- ✓ check for registration: Ensure the label has a valid registration number (e.g., an L-number) before using the product, confirming it is legally approved for use in South Africa.
- ✓ verify GHS compliance: Confirm that the label is compliant with the Globally Harmonized System (GHS) for classification and labeling of chemicals, ensuring it meets safety standards.
- ✓ read the entire label: Thoroughly read the entire label, not just the “declaration regarding formulation and use” on the front. This will provide comprehensive information about the product’s proper application, safety measures, and potential risks.

5.4 Vegetative Management

It is important to note that in the plantation forestry context, vegetative management can be divided into two main categories i.e. (1) alien and invasive species control and (2) vegetative management of “weeds” (aka unwanted plant species) within the compartment.

Vegetative management aka weed control is one of the most important silviculture operations in terms of early stand growth and uniformity. Benefits of good weed control include reduction in seedling mortality, faster canopy closure, better uniformity, improved yields and a reduction in fire hazard. Control of weeds is also important in terms of managing the spread of seeds in the plantation and into neighbouring properties and beyond.

Tree lines should be kept relatively weed-free until canopy closure. Weed growth in the inter-row is acceptable providing it does not touch the young tree canopy. This inter-row vegetation can have an important soil protective effect on sensitive sites. However, woody weeds should be targeted while grasses, which bind the soil, can be left.

In stands with high tree mortality, wide spacing or species with small or sparse canopies, the effect of canopy closure and complete shading is lost. Under these situations there is the potential for the development of significant understory vegetation and it is necessary to selectively control noxious weeds.

Weeds can be controlled using cultural (e.g. manual, mechanical, mulching etc.) or chemical methods. Manual control relies on the removal of weeds by hoeing, slashing, or pulling out by hand. The cost and time required for manual labour restricts the use of this practice to an area immediately adjacent to the tree. Mechanical weed control uses tractor-drawn implements to either cut or incorporate vegetation into the soil. This method has the advantage of allowing for large areas to be managed rapidly and cost-effectively. There are some disadvantages under these situations including access, slope of land, damage to tree root systems, compaction, reduction in carbon content of the soil and soil disturbance. Mulches are effective because they exclude light, provide a physical barrier and positively affect soil temperature and moisture but is a costly operation. The retention of post-harvest residue has been shown to reduce the occurrence of weeds.

Chemical weed control is the most widely used method of weed management.

This method allows for large areas to be managed cost-effectively.

Measures that can be used

- ✓ a vegetative management plan should be developed that ensures that all weeds are controlled in timber compartments;

- ✓ tree lines should be kept relatively weed free (1 – 2 m wide) until canopy closure;
- ✓ inter-row vegetation can be retained to protect soils but woody weeds must be controlled;
- ✓ post canopy weed control should be selective, focusing on woody species;
- ✓ manual weeding should be limited to ring or line weeding (across the slope);
- ✓ mechanical weeding can be used selectively; and
- ✓ chemical weeding operations must adhere to recommended best operating practices. See TIPWG website for more information.

5.4.1 Alien and Invasive Species Control

Alien and Invasive Species (AIS) are listed in Regulations published in terms of NEMBA and weeds and invader plants as listed in Regulations published in terms of the Conservation of Agricultural Resources Act, are required by law to be eradicated or controlled (see Chapter 2).

It is a lawful requirement, to undertake the control of alien and invasive plants/weeds. For the sake of brevity, this Guideline will use the acronym AIS (Alien and Invasive Species) to apply to all Listed Alien and Invasive Species that are plants as well as weeds included in the CARA Regulations published in 2001. (As described above, the CARA provisions on the control of AIS are to be repealed by the AIS Regulations under NEMBA and for all practical purposes, the relevant Government Departments are focusing on compliance with the NEMBA AIS Regulations.)

The AIS Regulations are lengthy and are in many cases impractical to apply but the development of an AIS Management Plan that quantifies the problem and which provides for a phased implementation programme and provides adequate financial resources is necessary for a cost-effective analysis.

Any AIS Control Programme Consists of Three Phases:

- an **initial control**, which, as its name implies, is the first attempt to control an invasive species infestation. This may be a dense population of the target species, or simply a few scattered plants. Depending on the type of AIS, this may involve obtaining access with the use of chainsaws, brush cutters, fire or slashing. Initial controls are seldom 100%, especially in dense infestations.
- a **follow-up control**, which, again as its name implies, is the second attempt to control an invasive species. Access is normally easier than in the initial control and allows for the easier application of herbicides. If a follow-up is not completed timeously (normally the next growing season), the site can rapidly revert to its original infested state. Follow-up operations should be completed before implementing a new initial control in another area.
- **maintenance control** is reached when the follow-up control phase has been completed.

5.5 Management Plan

A management plan should be proportional to the scale and density of infestation. Thus for a small farm, a hand drawn map will suffice but for bigger operations a more detailed plan may be required. The map/plan should include the following:

- clear illustration of the extent of infestation. This can be quantified using a four-point scale: high infestation (50-100% of the target area); medium

infestation (20-49% of the target area) and low (10-19% of the target area) and maintenance phase (less than 5% of the target area). It is suggested that monitoring be done annually to determine the extent of the infestation following the initial clearing and to monitor clearing progress;

- calculation of the area that can be treated annually within the limitations of available resources (labour and finances);
- calculation of the costs of the control operations which should include transport of labour, direct labour costs, costs of herbicides, any training that may be necessary, PPE, purchase and maintenance of equipment (knapsack sprayers, etc.). The cost effectiveness of the control operations should be quantified;
- timing – depending on the species to be controlled and other work-related priorities, it is important to use the best opportunities that will result in a successful operation. For example, treating bramble with a herbicide will achieve a better kill rate during late summer or early autumn when the plant is translocating above ground nutrients (and thus the herbicides) in the leaves into the rootstock. Note that in some cases, it may be necessary to allow for more than one control operation in the growing season due to the vigorous growth of certain species;
- catchment approach – in areas of high biodiversity and conservation importance, foresters should initiate control measure at the top of a catchment and work downstream to improve the success rate.

5.5.1 Application Methods

- **manual control (cut stump)**

As its name implies, manual control ranges from the use of chainsaws, bow saws or similar tools for the cutting of woody plants. This method can be used primarily on AIS that do not coppice (pine), or on large specimens of other species to encourage coppicing at a height above the ground that allows for the application of an herbicide treatment. It is important to allow sufficient regrowth of leaves to allow for an effective uptake of the herbicide.

- **use of agrochemicals**

In many cases, the use of herbicides has been found to be effective in AIS/ weed control, both in terms of the kill rate and the costs. However, some biological control agents are available for some species and advice in this regard should be sought from the local agricultural extension officer, or from the Agricultural Research Council Plant Protection Research Institute (www.arc.agric.za). The Plant Protection Research Institute produces Fact Sheets on Alien and Invasive Plants and their Biological Control Agents and these can be accessed on their website (www.arc.agric.za/arc-ppri/Pages/ARC-PPRI-Homepage.aspx)

In addition, the Forestry South Africa Timber Industry Pesticides Working Group (TIPWG) specifies an approved list of pesticides that should be used by foresters. For further information see TIPWG website www.tipwg.org.za

Measures that can be used

- ✓ all agrochemicals must be stored, mixed, transported and applied correctly and used agrochemical containers must be disposed of according to the requirements of the law;
- ✓ select agrochemicals that have the least impact on human health and the environment;
- ✓ agrochemicals must only be used and applied according to the manufacturers' recommendations and in terms of their registered use for a particular weed, pest or disease;

STATEMENT OF INTENT:

Agrochemical control of alien and invasive species should preferentially use herbicides that have the least effect on human health and the environment.

- ✓ mixing of different agrochemicals in a combination should only be done if it is a registered tank mix under the Fertilisers, Farm Feeds, Agricultural Remedies Act 36 of 1947. Some active ingredients are not compatible and can affect the efficacy of the tank mix;
- ✓ agrochemicals should not be transported to field operations in bulk but should be mixed in a safe environment and away from any risk of water or soil pollution;
- ✓ agrochemicals must only be applied by trained operators wearing the necessary protective clothing;
- ✓ agrochemicals should be applied when the weather is cool and calm to prevent drift from the application point;
- ✓ equipment used to apply agrochemicals should not be cleaned in-field but in an environment where run-off into soil or water systems can be prevented (NOT minimised);
- ✓ all contractors used for agrochemical control must be registered according to the requirements of the Fertiliser, Farm Feeds, Agricultural Remedies and Stock Remedies Act, Act 36 of 1947 and have a valid Pest Control Officer (PCO) licence; and
- ✓ care must be taken not to spray non-target plants; hence avoid windy conditions which will increase the risk of spray drift.

5.5.2 Herbicide Scheduling

Forestry-owned land is a mosaic of compartments, conservation areas, fire breaks, roads and buildings. All of these require vegetative management. As no compartments or conservation areas are the same control methods and the scheduling of herbicides will differ dramatically from one to another and even within each land use zone. This makes vegetative management incredibly challenging and the correct scheduling is essential.

See: www.tipwg.co.za/standard-operating-procedures/admin-and-other/#Herbicide%20Scheduling for a herbicide scheduling tool.

Measures that can be used

- ✓ tailor scheduling to land use zones: Develop herbicide schedules specific to each land use zone (compartments, conservation areas, firebreaks, roads, buildings), considering the unique vegetative management needs of each area;
- ✓ assess and adapt: Regularly assess each zone's vegetation and adapt the herbicide schedule as needed to address varying growth patterns and environmental conditions;
- ✓ utilise the herbicide scheduling tool: Use the TIPWG herbicide scheduling tool to assist in planning and optimizing the timing of herbicide applications, ensuring effectiveness and compliance with best practices;
- ✓ coordinate with vegetative management goals: Align herbicide schedules with broader vegetative management goals, such as preventing invasive species, protecting conservation areas, and maintaining clear firebreaks; and
- ✓ monitor and review: Continuously monitor the effectiveness of herbicide applications and review schedules regularly, making adjustments to respond to changes in vegetation or land use conditions.

5.6 Storage of Agrochemicals (Pesticides and Fertilisers)

In terms of SANS 10206-2010 Ed. 2.2, all handling, and storage and disposal requirement of the South African Standards (SANS) must be observed by the landowner. Refer to www.tipwg.co.za for further information on the storage of chemicals and pesticides.

- See TIPWG Standard Operating Procedure: Storing pesticides.
- Storage of agrochemicals must be in a building/storeroom of sound construction, be well ventilated and secure and have adequate warning signs posted both externally and internally.
- Highly toxic Group 1 hazard substances need to be secured in a separate locked storage area (Hazardous Substance Act No 15 of 1973 which was enacted to provide for the control of substances which may cause injury or ill-health to or death of human beings).
- No agrochemicals may be stored near food or animal feed and the building or storeroom must not be accessible to unauthorised people.
- The storage area must be bunded to insure where there is a spillage it can be contained.
- Normal safety requirements must be available, such as water and washing facilities, firefighting equipment and any other special requirement specified on the product label.
- All relevant by-laws must also be complied with in relation to the management of pesticides and fertilisers.

Measures that can be used

- ✓ **compliance with SANS 10206-2010 Ed. 2.2:** Ensure all storage and handling practices adhere to the South African Standards (SANS) 10206-2010 Ed. 2.2 requirements, covering building construction, ventilation, security, and signage;
- ✓ **designated storage area:** Store agrochemicals in a dedicated building or storeroom constructed with durable materials, ensuring it is well-ventilated, secure, and equipped with clear warning signs both inside and outside the facility;
- ✓ **separate storage for highly toxic substances:** Securely store highly toxic Group 1 hazard substances in a separate, locked storage area in compliance with the Hazardous Substance Act No 15 of 1973;
- ✓ **prohibition of storage near food or feed:** Ensure that agrochemicals are not stored near food or animal feed to prevent contamination, and restrict access to authorized personnel only;
- ✓ **spill containment:** Install bunding in the storage area to contain any potential spills and prevent environmental contamination;
- ✓ **safety facilities:** Equip the storage area with essential safety facilities, including water and washing stations, firefighting equipment, and any other safety measures specified on product labels; and
- ✓ **compliance with bylaws:** Adhere to all relevant local by-laws governing the storage and management of pesticides and fertilizers to ensure full regulatory compliance.

5.7 Spill of Agrochemicals

The storage of pesticides is well regulated through legislation. The TIPWG SOPs have been developed to include legislation as the minimum standard while

reducing the risk of potential spills when storing pesticides. www.tipwg.co.za/standard-operating-procedures/transport-and-storage/#Spills

Measures that can be used

- ✓ **immediate containment:** Quickly contain any spills using appropriate materials (e.g., absorbent pads, sand) to prevent the spread of agrochemicals to surrounding areas;
- ✓ **proper cleanup procedures:** Follow the TIPWG SOPs for spill cleanup, ensuring all spilled materials are safely collected, stored, and disposed of according to environmental regulations;
- ✓ **spill kits availability:** Ensure that spill kits are readily available in storage areas and on transport vehicles, equipped with all necessary tools for effective spill management;
- ✓ **employee training:** Train all employees involved in the storage and handling of agrochemicals on spill response procedures, including how to use spill kits and report incidents; and
- ✓ **regular inspections:** Conduct regular inspections of storage facilities and transport vehicles to ensure compliance with safety standards and identify potential risks for spills.

5.8 Transport of Agrochemicals

The transport of pesticides is well regulated through legislation. The TIPWG SOPs have been developed to include legislation as the minimum standard while reducing the risk of potential spills when transporting pesticides.

www.tipwg.co.za/standard-operating-procedures/transport-and-storage/#Transport

Measures that can be used

- ✓ **secure packaging:** Ensure all agrochemicals are securely packaged and labeled according to legal requirements before transport to prevent leaks or spills.
- ✓ **safe loading practices:** Follow safe loading practices, making sure that containers are properly secured in transport vehicles to minimize movement and reduce the risk of spills during transit.
- ✓ **emergency preparedness:** Equip transport vehicles with emergency spill kits and ensure drivers are trained on how to respond to spills during transit.
- ✓ **compliance with legislation:** Adhere to all legislative requirements for the transport of agrochemicals, including proper documentation and the use of certified transport methods.
- ✓ **routine checks:** Perform routine checks on transport vehicles and equipment to ensure they are in good condition and meet all safety and regulatory standards.

5.9 Handling and Application of Agrochemicals

The handling and application of pesticides is well regulated through legislation. The TIPWG SOPs are developed for legal compliance as a minimum standard while reducing the risk of environmental contamination and exposure to those working with the pesticides. These SOPs are also developed to ensure users get the maximum efficacy from their equipment and pesticides used, so there is no unnecessary re-application required due to over- or under-application.

The following SOP's are covered in this section of the TIPWG website:

- Handling and application
- Knapsack application
- Spills while handling
- PPE
- Aerial spraying
- Mechanical spraying
- Mixing
- Mist blower
- Calibration
- Drones

www.tipwg.co.za/standard-operating-procedures/handling-and-application/

5.10 Pregnancy and Breastfeeding

FSA developed and published the Pregnancy Guidelines based on the Code of Practice on the Protection of Employees During Pregnancy and After the Birth of a Child as required under the Basic Conditions of Employment Act No.75 of 1997. Please note, this is only a guidance document. You are responsible for how the Code is implemented into company policies and procedures.

www.tipwg.co.za/pregnancy-guidelines/

5.11 Training and Pest Control Operators (PCOs)

The Fertiliser, Farm Feeds, Agricultural Remedies and Stock Remedies Act No 36 of 1947 published Regulations for the registration of Pest Control Operators in the Government Gazette No 34020 No R98 on 18 February 2011. The regulations require that pest control operators be registered, and foresters should ensure that registered pest control operators supervise the handling and application of agrochemicals on commercial plantation forestry landholdings.

The Occupational Health and Safety Act: Regulations: Hazardous Chemical Agents 2021 informs us of the information, instruction, and training required when handling or applying agrochemicals.

Employer Responsibility: Before any employee is exposed to a Hazardous Chemical Agent (HCA) (or agrochemical), employers must provide them with the necessary information, instruction, and training. This should be done after consulting with the workplace's health and safety committee and must be repeated as recommended by the committee.

The training should include:

- Regulations: Information on the rules and regulations about HCAs, including chemical substance regulations and occupational exposure limits (OELs).
- HCA Details: Information about the specific chemicals employees might encounter, their potential dangers, and where they can be found in the workplace.
- Safety Data Sheets (SDSs): How to access SDSs and understand the information they provide.
- Labeling: Explanation of what the labels on chemical containers mean.
- Work Practices: Safe procedures for handling, storing, and disposing of HCAs, as well as what to do in emergencies.

- **Monitoring and Protection:** The importance of air sampling, biological monitoring, medical check-ups, and using protective equipment.
- **Safety Equipment:** How to use and maintain safety equipment and engineering controls.

Emergency Procedures: Employers must provide written instructions to employees on how to handle spills, leaks, or emergencies involving HCAs.

Employer and Contractor Agreement: Employers and contractors must have a written agreement on how to comply with these training and information requirements.

Measures that can be used

- ✓ **compliance with legislation:** Ensure all handling and application practices adhere to relevant legislation, including the Fertiliser, Farm Feeds, Agricultural Remedies, and Stock Remedies Act No 36 of 1947, and the Occupational Health and Safety Act: Regulations: Hazardous Chemical Agents 2021;
- ✓ **use of TIPWG SOPs:** Follow TIPWG Standard Operating Procedures (SOPs) to meet legal compliance and reduce environmental contamination and worker exposure. The SOPs cover handling, application methods, spills, PPE, and more;
- ✓ **equipment maintenance:** Regularly service, wash, and calibrate application equipment to ensure it remains in good working order and achieves maximum efficacy during pesticide application;
- ✓ **method-specific application:** Ensure that registered Pest Control Operators supervise the handling and application of agrochemicals, especially on commercial plantation forestry landholdings, as required by the Government Gazette No 34020 No R98;.
- ✓ **pest Control Operator (PCO) supervision:** Ensure that registered Pest Control Operators supervise the handling and application of agrochemicals, especially on commercial plantation forestry landholdings, as required by the Government Gazette No 34020 No R98;
- ✓ **pregnancy and breastfeeding considerations:** Implement company policies and procedures in line with the FSA Pregnancy Guidelines to protect employees during pregnancy and after childbirth, ensuring a safe working environment;
- ✓ **training and information provision:** Develop and provide written instructions for employees on how to handle spills, leaks, or other emergencies involving hazardous chemical agents (HCAs), ensuring quick and effective responses;**emergency preparedness:** Develop and provide written instructions for employees on how to handle spills, leaks, or other emergencies involving hazardous chemical agents (HCAs), ensuring quick and effective responses; and
- ✓ **employer – Contractor agreements:** Establish a written agreement between employers and contractors detailing compliance with training and information requirements, ensuring consistent adherence to safety standards across all operations

5.12 Disposal of Agrochemical Containers and Unused Agrochemicals

The disposal of agrochemical product containers must be done responsibly and consistently with the Waste Act and other applicable laws. All containers must be triple-rinsed after use. This activity must be carried out in an area specifically

designed for disposal (with a sealed sump). Containers must then be punctured or cut up, to ensure they cannot be re-used. Containers can then be removed by an approved collector or delivered to an approved recycling facility. See also Timber Industry Pesticide Working Group Standard Operating Procedure for Disposal of both containers and unused and expired pesticides.

Incorrect disposal of pesticide containers, residues and spill wastes can have a potentially negative effect on both the environment and people. Using our well-regulated legislation as a minimum, this SOP has been developed for easy understanding of your legal obligations.

The CropLifeSA website is a useful tool when it comes to the disposal of waste products. In particular, when trying to find an approved container collector and/or recycler – Certified Recyclers.

In areas where there are no approved recyclers, contact Dr. Gerhard Verdoorn gerhard@croplife.co.za or Hires Ramanand hires@croplife.co.za

Measures that can be used

- ✓ **compliance with legislation:** Ensure all disposal activities align with the Waste Act and other relevant South African laws governing the disposal of agrochemicals and their containers.
- ✓ **triple rinsing:** After using agrochemical containers, perform a triple-rinsing process to remove all residue. This should be done in a designated disposal area equipped with a sealed sump to prevent contamination.
- ✓ **container destruction:** Once rinsed, puncture or cut the containers to prevent any possibility of reuse. This step is crucial to ensuring that containers are not repurposed in an unsafe manner.
- ✓ **approved disposal methods:** Arrange for the removal of containers by an approved collector or deliver them to a certified recycling facility. Utilize resources such as the CropLifeSA website to find certified recyclers.
- ✓ **handling unused and expired agrochemicals:** Recognize the potential negative impacts of improper disposal, including environmental contamination and health risks to humans. Adhere to best practices and legal requirements to mitigate these risks.
- ✓ **preventing harm:** Recognize the potential negative impacts of improper disposal, including environmental contamination and health risks to humans. Adhere to best practices and legal requirements to mitigate these risks.
- ✓ **access to resources and guidance:** Use the CropLifeSA website as a resource for finding approved container collectors and recyclers. In areas lacking approved recyclers, contact experts such as Dr. Gerhard Verdoorn or Hires Ramanand for guidance.
- ✓ **documentation and record-keeping:** Maintain records of all disposal activities, including the triple-rinsing of containers, the destruction process, and the details of approved collectors or recyclers used. This ensures traceability and compliance with legal obligations.

5.13 Biological Control

Biological control is a key component of Integrated Pest Management (IPM) in the South African forestry industry. It involves using natural predators, parasites, or pathogens to manage pest populations, reducing the reliance on chemical pesticides. In South Africa, where forestry is vital to the economy, biological control offers a sustainable solution to protect valuable tree species from pests without harming the environment. By incorporating biological control into IPM

programs, the forestry industry can maintain healthier ecosystems, reduce pesticide resistance, and promote long-term pest management strategies that are both effective and environmentally responsible.

There has been some success with biological control in South Africa. Below are some examples:

- *Sirex* control (www.tipwg.co.za/wp-content/uploads/2019/06/Sirex-Poster-1.pdf)
- *Gonipterus* control (www.tipwg.co.za/wp-content/uploads/2019/06/Gonipterus-Poster.pdf)
- Bugweed control (www.tipwg.co.za/wp-content/uploads/2021/05/Bugweed-Poster-v2.pdf)
- *Leptocybe* control (www.tipwg.co.za/wp-content/uploads/2019/06/Leptocybe-Poster.pdf)

Partnerships with FABI allow the Industry to collaborate on research and introduction of biological control agents, particularly to insect pests and pathogens. This is also regulated through legislation.

In South Africa, the research into the introduction of biological control agents for AIS is primarily the task of ARC: PPRI.

Measures that can be used

- ✓ **incorporate biological control into IPM:** Engage in partnerships with research bodies such as FABI and ARC: PPRI to stay informed on the latest developments in biological control agents. Participate in collaborative research projects for the introduction and regulation of these agents;
- ✓ **collaborate with research institutions:** Engage in partnerships with research bodies such as FABI and ARC: PPRI to stay informed on the latest developments in biological control agents. Participate in collaborative research projects for the introduction and regulation of these agents;
- ✓ **implement successful biological control examples:** Adopt biological control as a primary tool for sustainable forestry management. This approach reduces the risk of pesticide resistance and supports the long-term health of ecosystems;
- ✓ **promote sustainability and environmental responsibility:** Adopt biological control as a primary tool for sustainable forestry management. This approach reduces the risk of pesticide resistance and supports the long-term health of ecosystems;
- ✓ **educate and train staff:** Provide training and resources to forestry staff on the importance and application of biological control within IPM. Ensure that all staff involved in pest management understand the principles and benefits of biological control;
- ✓ **monitor and evaluate biological control efforts:** Regularly assess the effectiveness of biological control measures in managing pest populations. Use monitoring data to refine strategies and ensure that biological control remains a viable and effective component of IPM;
- ✓ **adhere to legal and regulatory requirements:** Follow all relevant legislation and guidelines related to the introduction and use of biological control agents in forestry. This includes complying with regulatory frameworks governing the use of these agents and ensuring all activities are legally compliant.

5.14 IPM for Infrastructure Pest Management

Integrated Pest Management (IPM) for infrastructure in the forestry industry is crucial for maintaining the integrity and safety of buildings, such as offices, storerooms, workshops, and housing. IPM in this context involves a strategic approach to pest control that combines preventative measures, monitoring, and the use of non-chemical and chemical methods only when necessary. This approach helps minimize pest infestations that could damage property, contaminate stored materials, or create health hazards for workers and residents. Effective IPM practices for infrastructure include proper sanitation, regular inspections, sealing entry points, and using targeted treatments to address pest issues without compromising the health of the environment or the people using these facilities.

For more information see: www.tipwg.co.za/wp-content/uploads/2020/04/SOP-IPM-4-IPM.pdf

Measures that can be used

- ✓ **implement regular sanitation practices:** Ensure that all infrastructure, including offices, storerooms, workshops, and housing, is kept clean and free from food waste, debris, and other materials that may attract pests. Regular cleaning schedules should be established and adhered to, minimizing the likelihood of pest infestations;
- ✓ **conduct routine inspections:** Identify and seal any gaps, cracks, or openings in the infrastructure that could allow pests to enter. This includes sealing around windows, doors, vents, pipes, and electrical conduits. Weatherstripping and caulking should be regularly maintained to prevent pests from gaining access;
- ✓ **seal entry points:** Identify and seal any gaps, cracks, or openings in the infrastructure that could allow pests to enter. This includes sealing around windows, doors, vents, pipes, and electrical conduits. Weatherstripping and caulking should be regularly maintained to prevent pests from gaining access;
- ✓ **use physical barriers:** Install physical barriers such as screens, door sweeps, and mesh coverings on vents to prevent pests from entering buildings. These barriers should be inspected regularly and repaired or replaced as needed;
- ✓ **employ non-chemical control methods:** Prioritize the use of non-chemical control methods, such as traps, sticky boards, and ultrasonic pest repellents, to manage pest populations within infrastructure. These methods help reduce reliance on chemical treatments and minimize environmental impact;
- ✓ **monitor pest activity:** Implement a monitoring system using traps, bait stations, or visual inspections to track pest activity. Monitoring should be ongoing, with data collected and analyzed to inform decisions on when and where to apply treatments;
- ✓ **apply targeted chemical treatments when necessary:** Provide training for all staff and residents on the principles of IPM and the specific measures they can take to prevent and control pest infestations. This includes understanding the importance of sanitation, recognizing signs of pests, and knowing how to report pest activity;
- ✓ **educate and train staff:** Provide training for all staff and residents on the principles of IPM and the specific measures they can take to prevent and control pest infestations. This includes understanding the importance of sanitation, recognizing signs of pests, and knowing how to report pest activity;
- ✓ **develop a pest management plan:** Ensure that waste disposal systems are effective and that waste is stored in pest-proof containers. Regularly remove waste from the premises to prevent it from attracting pests;

- ✓ **maintain proper waste management:** Ensure that waste disposal systems are effective and that waste is stored in pest-proof containers. Regularly remove waste from the premises to prevent it from attracting pests;
- ✓ **document and evaluate IPM practices:** Emphasize the importance of protecting both the environment and human health in all pest management activities. This includes using eco-friendly products, minimizing chemical use, and ensuring that any treatments applied do not pose a risk to the people using the facilities;
- ✓ **promote environmental health and safety:** Emphasize the importance of protecting both the environment and human health in all pest management activities. This includes using eco-friendly products, minimizing chemical use, and ensuring that any treatments applied do not pose a risk to the people using the facilities.

5.15 Aquatic weed control

- ✓ From time to time, it may be necessary to control weeds in an aquatic environment, particularly as a legal obligation with regards to AIS. TIPWG has developed the following SOP to assist: www.tipwg.co.za/wp-content/uploads/2020/11/SOP-Aquatic-Weeds.pdf

Measures that can be used

- ✓ **identify aquatic invasive species:** Begin by identifying the specific aquatic weeds that need to be controlled, ensuring they are classified as AIS under relevant legislation. Accurate identification is crucial for selecting the appropriate control methods;
- ✓ **monitor and assess infestation levels:** Use mechanical or manual methods to remove aquatic weeds. Techniques such as hand-pulling, cutting, raking, or dredging can be effective for managing smaller infestations. Ensure that all plant material is removed to prevent re-growth;
- ✓ **implement physical control methods:** Use mechanical or manual methods to remove aquatic weeds. Techniques such as hand-pulling, cutting, raking, or dredging can be effective for managing smaller infestations. Ensure that all plant material is removed to prevent re-growth;
- ✓ **utilise biological control agents:** When chemical control is necessary, select herbicides that are approved for aquatic use and apply them according to label instructions and legal requirements. Ensure that treatments are targeted to minimize impact on non-target species and aquatic ecosystems. Consider using selective herbicides that specifically target the invasive species;
- ✓ **apply chemical control responsibly:** When chemical control is necessary, select herbicides that are approved for aquatic use and apply them according to label instructions and legal requirements. Ensure that treatments are targeted to minimize impact on non-target species and aquatic ecosystems. Consider using selective herbicides that specifically target the invasive species;
- ✓ **implement preventative measures:** Prevent the spread of aquatic weeds by managing water flow, controlling nutrient levels, and minimizing disturbances to the aquatic environment. Installing barriers or silt curtains can help contain the spread of weeds to unaffected areas;
- ✓ **engage in restoration efforts:** Provide education and training for staff, contractors, and the local community on the importance of aquatic weed control and best practices for managing AIS. Involve stakeholders in monitoring and reporting new infestations to ensure timely and coordinated responses;

- ✓ **educate and involve stakeholders:** Provide education and training for staff, contractors, and the local community on the importance of aquatic weed control and best practices for managing AIS. Involve stakeholders in monitoring and reporting new infestations to ensure timely and coordinated responses;
- ✓ **follow regulatory guidelines:** Keep detailed records of all aquatic weed control activities, including methods used, areas treated, and outcomes achieved. Regularly evaluate the effectiveness of the control measures and adjust strategies as needed to improve results;
- ✓ **document and evaluate control efforts:** Keep detailed records of all aquatic weed control activities, including methods used, areas treated, and outcomes achieved. Regularly evaluate the effectiveness of the control measures and adjust strategies as needed to improve results;
- ✓ **promote long-term plans:** Partner with research institutions, conservation groups, and government agencies to stay informed about the latest developments in aquatic weed control and to contribute to broader efforts to manage AIS in aquatic environments;
- ✓ **collaborate with research and conservation organisations:** Partner with research institutions, conservation groups, and government agencies to stay informed about the latest developments in aquatic weed control and to contribute to broader efforts to manage AIS in aquatic environments.

Chapter 6

Environmental Aspects of Silviculture



Photo: www.forestrysouthafrica.co.za

The silviculture system currently employed in most commercial plantations is that of an even-aged stand (clear-felling system). This is an efficient way of achieving uniform regeneration, good growth rates and allowing for simple and economical silvicultural and harvesting systems.

A silvicultural regime can be defined as a planned programme of silvicultural operations implemented during the life of a stand of trees. This includes the method of establishing or regenerating the stand and the tending operations implemented during the rotation to produce certain products.

Growth performance in plantations is influenced by the quality of sites, the species planted and silvicultural management. The management interventions include site species matching, timber residue management, soil preparation, fertilisation, weed control, thinning and pruning operations. The land available for plantation forestry in South Africa is limited. It is therefore important to ensure maximum timber production (without compromising sustainability) from timber compartments. This approach has the advantage of reducing the need to expand plantation areas.

The main environmental aspects that require attention is to reduce the impact of forestry operations on the soil, adjoining conservation areas and on any water resources that may be present. Soils are particularly vulnerable after harvesting and silviculture operations need to be planned to reduce the risk of damage to the environment and soils in particular.

Soil is a living, dynamic resource that supports plant life and on which agricultural and timber crops depend for their growth. Each soil type has its own characteristic chemical, physical and morphological properties. To make sound management decisions, landowners or managers should have a working knowledge of the soils on the property. Fertiliser and herbicide applications, tillage practices, conservation planning and timber species selection (and their varieties) are all soil dependent.

Soil health is a concept that embraces the chemical, physical and biological functioning of soils. Soil carbon is one of the most important factors in the biological functioning of soils and measuring total soil carbon (or soil organic matter content) is a good measure of soil health. Soil carbon:

- stores over 90% of the nitrogen of the soil;
- has many sites that hold minerals and thus increases the soil's available nutrients;
- prevents nutrient leaching by holding them;
- promotes good soil structure;
- encourages macro-organisms (e.g. earthworms) that form pores in the soil and thus assists plant growth by allowing micro-organisms to turn the nitrogen in the air into nitrate and ammonia in the soil; and
- improves soil water relationships by increasing rain absorption and decreasing water loss from run-off.

Measures that can be used

- ✓ when establishing new plantations, the timber plantation area should be clearly demarcated according to the plan that has been approved by the Department of Water and Sanitation (Planted Area Plan);
- ✓ where possible, retention of forest residue on the soil surface to minimise soil loss should be practiced;
- ✓ if residues need to be reduced using fire, a cool burn must be implemented;
- ✓ species selection that will result in vigorous resilient plantations that are suited to market requirements should be selected;
- ✓ implementation of site preparation techniques that minimise impacts on soil loss, damage to the soil structure and carbon loss through oxidation should be practiced;
- ✓ tillage should only be implemented when necessary;
- ✓ limited use of inorganic fertilisers, particularly synthetic nitrogen fertilisers, which cause a decline in soil carbon, should be practiced;
- ✓ fertilizer applications should be based on soil analysis;
- ✓ organic nitrogen fertilisers that contain a carbon source, such as composts, animal manures, green manures and legumes, should be used as an alternative to inorganic fertilisers;
- ✓ targeted weed control operations that control noxious weeds but allow for sufficient vegetation cover to prevent excessive soil loss should be implemented; and
- ✓ the use of heavy machinery should be limited and only employed when soil moisture conditions are suitable and the slope of the land permits the safe use of such heavy machinery.

STATEMENT OF INTENT:

To reduce the negative impact of silviculture activities on the soil, adjoining natural environment and on water resources and to promote soil health.

6.1 Site Species Matching

The timber growing regions of South Africa cover a range of growing conditions with regard to latitude, climate, altitude, lithology, soils, topography and biotic factors. A wide variety of timber tree species are grown for commercial purposes. The choice of species is an important factor influencing the success of a forestry enterprise.

Measures that can be used

- ✓ foresters should consider the soils of the site and the climatic conditions such as temperature and rainfall when selecting species for establishment or re-establishment;
- ✓ foresters should have a working knowledge of the soils on the forest management units (this includes effective rooting depth, soil texture, drainage status and soil sensitivity (erosion/compaction));
- ✓ foresters should have an understanding of other climatic factors that may influence the performance of the timber crops (frost, snow, hail, wind and drought);
- ✓ species (hybrids/clones/varieties) should be selected based on their resistance/tolerance to known or potential pests and diseases;
- ✓ species that are fire sensitive should not be planted on plantation boundaries but rather consider species that can tolerate under-canopy burning;
- ✓ known invasive species (hybrids/clones/varieties) should be avoided where possible;
- ✓ if known invasive species (hybrids/clones/varieties) are selected, foresters should take responsibility for the control of the spread of such species not only on their own land but also on adjoining properties and beyond; and
- ✓ product requirements and market factors (both current and predicted) should be taken into consideration when selecting species or their varieties, clones and hybrids.

STATEMENT OF INTENT:

Species should be selected so as to match the particular site requirements and to meet the specific market demands (current or predicted).

6.2 Monoculture Landscapes

Monoculture crops, which include timber plantations, pose a risk in terms of disease, reduced biological diversity and fire, which is increased when single clones or hybrids are planted. As monocultures are largely unavoidable, potential risks may be minimised by creating diversity in land use, age classes and genetic material.

Measures that can be used

- ✓ careful planning of land use to create diversity in the landscape, including biological corridors (representative eco-systems, riparian areas etc.) should be considered in the early stages of the land use planning;
- ✓ the forester should ensure that diversity exists in the plantation by planting a variety of genera/species or clones and ensuring a distribution of age classes;
- ✓ silviculture operations should be used to create diversity in compartments through retaining timber residue, selective weed control, spacing of seedlings, tending operations and rotation ages; and
- ✓ any outbreaks of pest and diseases should be reported to the appropriate organisation i.e. Forestry and Agricultural Biotechnology Institute (FABI).

STATEMENT OF INTENT:

Diversity is created in the landscape through careful planning of land use and management activities.

6.3 Land and Soil Preparation

The primary reason for site preparation is to achieve optimum tree growth through the improvement of soil as a medium for root growth and the removal of competing vegetation near the tree. The selection of a particular preparation method is largely determined by the status of the site (virgin land, ex-agricultural land or ex-forestry land).

On virgin grassland sites (new establishment) best tree growth responses are achieved when soils are intensively cultivated through surface ploughing. This operation is rarely practiced these days, as limited virgin land is available for forestry. This technique is unsuitable for steep slopes or highly erodible soil types and may be in contravention of CARA (see Chapter 2). If ploughing is not possible due to the risk of accelerated erosion or in contravention of the CARA Regulations, then pitting (pick, trowel or mechanical auger) can be used to prepare the land for planting. Competing vegetation along the tree line can be controlled using herbicides.

On ex-agricultural lands very firm “plough pans” commonly develop as a result of continuous historical tillage operations. This results in an abrupt change in soil strength from the loosened topsoil to a compacted underlying layer. Roots do not penetrate easily across such abrupt changes in soil strength, resulting in poor tree growth or tree growth that does not match the potential of the site. This “plough pan” layer can be loosened effectively by a ripping operation, implemented when soil moisture levels are low. The ripping operation can be followed by further cultivation to break up large clods and help control weeds. Ripping operations should be implemented across the slope to minimise accelerated soil erosion of the rip line.

Tree growth responses to site preparation on timber regeneration sites are not as clearly defined as on newly established sites. Improved growth response to intensive site preparation on regeneration sites is often not achieved and any initial responses do not generally persist. This is largely due to the fact that the competing virgin grassland has already been removed. In addition, the previous tree crop has altered site conditions through root activity, litter build up and changes in biological soil activity. It is therefore recommended that minimal tillage be implemented, usually in the form of a pitting operation (hand pick, trowel or mechanical auger).

De-stumping is sometimes implemented on sites with large multiple coppiced stumps to facilitate access for replanting and future harvesting/extraction operations. De-stumping methods that minimise soil disturbance should be selected (grinding or chipping rather than stump extraction).

Measures that can be used

- ✓ site preparation techniques should be selected that are appropriate to the site status (virgin, ex-agricultural or ex-forestry land);
- ✓ foresters must ensure that they comply with the definition of an existing lawful water use as described in the NWA for a stream flow reduction activity and have been issued a permit by DWS before preparing virgin land;
- ✓ foresters must ensure that they are in possession of an environmental authorisation from the competent authority for new afforestation (which is a listed activity) and must adhere to the conditions attached to that authorisation;
- ✓ ploughing must be limited to the establishment of new plantations on virgin land with slope percentages less than 15% or as directed in terms of the environmental authorisation;

STATEMENT OF INTENT:

Land preparation for rapid root growth and production of even aged stands should not compromise soil structure, nutrient status or soil carbon content.

- ✓ ploughing should be implemented in the form of strip cultivation across the slope or as directed in terms of an environmental authorisation;
- ✓ ripping should be limited to ex-agricultural lands or other sites with root impeding layers that can be loosened using a tine. Ripping operations are most effective on sites with clay percentages of over 35%;
- ✓ ripping operations should be implemented across the slope;
- ✓ minimum tillage operations should be utilised on regeneration sites (manual or mechanical pitting); and
- ✓ de-stumping should only be used on sites where old stumps hinder future access to the compartment. Methods that minimise soil disturbance should be selected (mulching, grinding or chipping rather than stump extraction).

6.4 Stand Density

Stand density, or spacing/espacement, refers to the distance between planted trees. A closer spacing will promote earlier crown closure and, consequently, earlier weed suppression than when planting at a wide spacing but it also induces earlier competition between trees. Stand density is determined primarily by the following factors:

- the desired product or species grown;
- the length of the rotation of the stand;
- the thinning regime employed; and
- site potential.

In addition, it has been established that planting at a lower density than the norm may reduce the impact of the plantation on the stream flow. However, weed control may need to be increased, as canopy closure takes longer than when planting at the recommended density.

Measures that can be used

- ✓ species have been planted at the correct density in terms of the site potential;
- ✓ species have been planted at the correct density for the desired product;
- ✓ thinning operations are implemented in terms of the desired product; and
- ✓ where appropriate, the impact of the stand density on the reduction of stream flow in any adjacent streams should be considered.

STATEMENT OF INTENT:

Foresters should consider all biological and market factors pertaining to planting density when establishing or re-establishing a timber plantation compartment.

6.5 Fertiliser Application

In South African, fertilisers are generally only applied at planting with the aim of stimulating early seedling growth. The small quantities applied do not alter site nutrition but rather provide limited localised nutrition. This assists with rapid establishment of seedlings and early canopy closure resulting in weed suppression and increased tree growth.

The use of fertilisers is controlled in terms of the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act No. 36 of 1947.

Measures that can be used

- ✓ fertilisers should only be used where research has shown a potential benefit in terms of increased growth rates;
- ✓ fertilisers should only be applied based on soil analysis results;
- ✓ fertiliser should not be applied unless appropriate weed control has been exercised;
- ✓ foresters should only purchase from registered suppliers;
- ✓ foresters should only use products registered for a specific use; and
- ✓ fertiliser should be stored under cover in designated storage areas.

STATEMENT OF INTENT:

Fertilisers should be used to promote rapid seedling establishment and canopy closure without polluting the environment.

6.6 Residue Management

The management of plantation residues is an integral part of any site preparation operation when regenerating plantations. Plantation residues retained on a site can have numerous beneficial effects on long-term productivity, namely:

- residues can provide a mulch effect, moderating soil temperatures and reducing evaporation of moisture from the soil;
- a mulch effect can also aid in the suppression of weeds and thereby assist in the control of competition between the trees and the weeds for resources;
- mulch aids in the protection of soils from wind and water born soil erosion; and
- residue retention helps to retain or enhance soil organic matter, which has an important effect on soil physical, chemical and biological status, particularly soil carbon levels. Harvest residues retained on a site therefore constitute an important nutrient source for future tree growth.

Residues can, however, present operational challenges. Working in broadcast residues is difficult and can result in lower productivity. Residues can provide a habitat for pests and trap heat, resulting in seedling mortality. However, the biggest challenge is the higher fuel load and resultant fire risk.

Residue management options that can be considered when regenerating compartments include:

- plantation residues can be spread across a site after harvesting (broadcasting). This system does incur additional costs but provides the best protection to soils from wind and water erosion;
- it is common practice for plantation managers to allow firewood collection by nearby communities. This reduces the fuel load and improves access into compartments;
- plantation residues can be stacked in the form of windrows. This facilitates easy access for both stacking and extraction operations. These rows generally run up and down slopes for convenience of access. In this case, heavy material can be stacked in the rows and lighter (bark, small branches etc.) should be left between stacks to minimise potential accelerated soil loss;
- windrows can also be placed across the slope with “gates” to allow for access. These windrows across the slope serve the purpose of minimising accelerated soil loss due to water;
- mulching or chopper rolling operations can be used to compact residues and thus improve access and reduce fire risk. These operations are energy intensive and costly but do result in effective mulch;
- fire can be used to manage plantation residues but it is essential that this method is only employed under the correct conditions. Hot fires can destroy soil organic matter and lead to a breakdown in soil structure resulting in greater susceptibility to erosion. Nutrients such as nitrogen and sulphur volatilise as

gases at high temperatures and nutrient rich ash material is susceptible to erosion. A cool burn is a controlled fire that is implemented when conditions are cool and moist, resulting in a partial reduction of litter loads; and

- burning should only be done when the topsoil and humus layers are moist so as to prevent damage to the soil.

Measures that can be used

- ✓ where practical, residues should be retained on site;
- ✓ residues should ideally be distributed as evenly as possible across the compartment;
- ✓ heavy residues can be placed in windrows but sufficient material (bark, leaves and small branches) should be left between rows to protect soils from accelerated erosion;
- ✓ mulching and chopper rolling can be used to compact residues, thus improving site access and reducing fire risk;
- ✓ residues should only be burnt when necessary and should only be done under favourable cool and moist weather conditions, where soils are not sensitive;
- ✓ residues should NOT be burnt under hot conditions such as when there is a high fire danger warning. Burning should not take place if the expected relative humidity will be below 40% and/or the expected temperature will be above 23°C;
- ✓ steep slopes and difficult terrain should be burned progressively downhill from the top of the slope to the bottom in the early morning, or at night when dew is present and wind speed is low to prevent damage to the soil and improve the safety factor; and
- ✓ burning should only take place in the presence of sufficiently well-trained personnel and adequate firefighting equipment.

STATEMENT OF INTENT:

Plantation residue management operations should be implemented to improve site access, improve soil organic matter and reduce the risk from pests, disease and fire, without compromising long-term site productivity.

6.7 Unsuitable Land

Trees should not be planted where they cannot be managed and harvested according to best practice. This applies particularly to steep, rocky and inaccessible areas where road access is not present, or where road construction would create unacceptable impacts on the environment (this would be determined through an environmental impact assessment process for new plantations as required by law). Trees should also not be planted on marginal sites, such as sites with shallow soils or dry aspects or where the climate is unsuitable and the impacts on the natural environment are the potentially significant.

Measures that can be used

- ✓ land unsuitable for plantation forestry must be identified and mapped in the planning stage i.e. when an application for a new plantation for a water use licence is lodged with the relevant authority; and
- ✓ such land should be managed for biodiversity conservation, protection of ecosystem infrastructure and protection of water resources.

STATEMENT OF INTENT:

Land that is marginal for timber production should not be planted and, where appropriate, managed for biodiversity conservation.

6.8 Water Use Optimisation

Water is a scarce resource in South Africa. Management interventions should be considered by landowners to optimally use the water that they have been allocated.

Measures that can be used

- ✓ the choice of species and clones should take into consideration the water use of the selected species, where this is known;
- ✓ plantations should be established within the landscape in a manner that reduces the impacts on water resources, such as avoidance of the headwaters of water courses and planting at or beyond minimum distances from wetlands and riverine habitats;
- ✓ slash or forest residue should be retained post harvesting to minimise soil and water loss from the compartment;
- ✓ all buffer zones should be delineated and protected to prevent sedimentation and reduce the impacts on the water resource;
- ✓ best Practice Silvicultural Operations should be implemented;
- ✓ listed Alien and Invasive Species should be controlled in terms of Regulations published under the NEMBA; and
- ✓ road networks and notably river crossings, should be minimised and efficiently managed to minimise impacts on water quality.

STATEMENT OF INTENT:

Water conservation and demand management should be practiced through various management interventions.

Chapter 7

Environmental Aspects of Forest Harvesting



Photo: ICFR

Harvesting costs can contribute as much as 70% of the total value chain expenses and have a significant impact on the soil environment. Harvesting operations should therefore focus on minimising the impacts associated with forest engineering on the soil, in particular soil compaction as a result of the use of heavy machinery, accelerated soil loss as a result of soil disturbance, planning of extraction routes, depot establishment, retention of post-harvest timber residue and site rehabilitation where necessary.

Foresters should also aim to reduce any wasted timber in-field as far as is practically possible but ensure that there is sufficient mulch left in-field to allow for nutrient recycling and protection of the soil from soil erosion associated with surface water flow and wind.

7.1 Planning

Since forest engineering is such a significant cost in the value chain, proper attention should be given to a tactical plan, annual plan of operations and an operational plan (compartment based). Since it is at the operational level that the impact on the environment manifests itself, focus in this Guideline will concentrate at this level. However, at all levels of planning, consideration should be given to the impacts on the environment, costs that may be necessary to be allocated to minimise these impacts and to rehabilitate when necessary.

The tactical harvesting plan should incorporate reliable maps at a suitable scale showing:

- compartment boundaries;
- special management or conservation zones;
- terrain classification (if available);
- haulage roads; and
- depots.

The Annual Plan of Operations (APO) should ensure that:

- it is in line with the tactical harvesting plan;
- large contiguous tracts of land are not harvested in a short period of time;
- there is a sustained supply of timber;
- there is an optimal extraction of marketable timber;
- ensure that compartments are only harvested during the appropriate season (i.e. wet versus dry);
- the most appropriate harvesting system is considered, taking the following into account:
 - terrain, ground conditions, ground roughness and slope;
 - soil sensitivity;
 - access constraints (lack of roads, wetlands, conservation areas and in particular indigenous forests);
 - aesthetics;
 - delivery timetables;
 - product;
 - economic conditions;
 - species harvested; and
 - available equipment options.
- to minimise harvesting and transport costs, the Annual Plan of Operations should:
 - optimise compartment access by means of the road and transport network;
 - provide for the total area that is to be harvested during that particular year;
 - include prescriptions for road work required for the anticipated traffic load.
- to ensure a continual timber supply, a contingency plan should be devised, in which alternative compartments are identified which could be harvested. The plan should allow for changes in weather conditions, changes in market conditions and the breakdown of equipment or unplanned stoppages.

The operational plan should be designed to achieve a timely, constant and sustainable delivery of the correct products to the customer and should comprise the following:

- large-scale contour map (e.g.1:2500);
- compartment boundaries;
- special management or conservation zones;
- landing locations;
- extraction routes;
- direction of timber flow, loading and haulage;
- streams and crossing locations;
- vulnerable drainage structures;
- general felling directions near special management or conservation zones, roads, firebreaks, telephone lines etc.;
- depot locations and hazards (such as public access);
- compartment data containing average tree size including volume, diameter at breast height (DBH) height and number of stems per hectare and estimated volume of timber per hectare;
- market and product considerations;
- markets and transport distances;
- product requirements and specifications;
- harvesting systems for each compartment (method of felling, conversion, extraction and transport) matched to the terrain;
- extraction direction;
- manpower and equipment requirements;
- sequence of felling and extraction;
- planned start and end times;
- slash management;
- stump heights and treatment;
- fire protection requirements (e.g. firebreaks and debris); and
- environmental requirements should be recognisable in-field according to the harvesting plan and map, the recommended management guidelines should be applied and should a new site or requirement be identified during harvesting operations (e.g. a heritage site such as an old grave), the site should be protected and the relevant authorities should be advised.

In order to determine safe and environmentally appropriate extraction methods such as terrain conditions, chainsaw safety and operating conditions, chute operating, cable operating systems etc. refer to the ICFR website www.icfr.ukzn.ac.za/publications.

7.2 Terrain and Topography

To minimise soil erosion and soil compaction of the site, the terrain should be classified to include:

- soil conditions (dry, moist or wet);
- soil types;
- ground roughness;
- slope;
- aspect (south facing slopes tend to remain wetter longer than north facing slopes); and
- gradient (steep gradients will exacerbate soil loss and pose a risk to water pollution).

Weather conditions at the time of harvesting need to be considered to avoid soil compaction and soil erosion associated with surface flows, particularly in wheel ruts and extraction routes.

Measures that can be used

- ✓ a terrain classification map, illustrating soil conditions, soil types, slope aspect and gradient will assist in minimising soil loss and soil compaction in a compartment.

STATEMENT OF INTENT:

To reduce the impact of harvesting operations on the soil, water and other environmental/heritage resources, to promote soil health and clean water and to optimise the volume of marketable timber from the site.

7.3 Harvesting System

The environmental conditions and product to be harvested should determine the type of harvesting system to be used. When choosing the most appropriate system, consideration should be given to:

- terrain conditions;
- weather conditions;
- extraction routes;
- timetables;
- yarding sites;
- soil sensitivity;
- access; and
- product size.

7.3.1 Felling Direction

To ensure protection of life and the environment, the following guidelines should be observed:

- use properly trained chainsaw/machine operators who are equipped with the necessary protective clothing;
- trees should not be felled into special management or conservation zones;
- if trees need to be felled adjacent to special management or conservation zones, felling aids such as winches, felling levers, felling wedges and tree jacks should be used to avoid damage to the special management or conservation zone; and
- trees in which there are active raptor nests should not be felled.

7.3.2. Extraction

When choosing a suitable extraction method, consider the following factors that have the potential to influence site productivity and product quality during extraction:

- timber size (piece volume);
- load size (total volume or weight);
- number of pieces per load;
- terrain (i.e. slope, roughness and condition);
- sensitivity of terrain (susceptibility to soil damage and erosion);
- size of area from which timber is to be extracted;
- extraction and felling directions (uphill, downhill or parallel (across) the slope);
- extraction distance;
- type and capability of extraction equipment;
- presentation (i.e. scattered, bunched or stacked; short lengths, long lengths or tree lengths; with branches or debranched);
- felling layout; and
- operator skills.

7.3.3 Extraction Routes and Landings

Both permanent and temporary landings should be designed in a manner that reduces the impacts of any potential sedimentation of rivers and wetlands. Foresters should ensure that the area of a landing, whether temporary or permanent, should not exceed 10% of the compartment. Where excavation of road edges is needed for mechanical systems, the same principles of minimising accelerated soil loss should be considered through:

- designated extraction or access routes should be identified and used correctly;
- landings should be identified and equipment and work methods applied as planned;
- special precautions should be taken when there is a particular risk of soil degradation;
- permanent and temporary river crossings should be kept to a minimum, even during the dry season (follow guidelines for permanent river crossings);
- extraction routes and landings must not be situated in riparian zones and/or watercourses; and
- timber stacking on landings should not impede water flow and road drainage.

7.3.4 Depots

Depots have the potential to cause an increased sediment load into adjacent watercourses if not properly constructed and maintained. The following guidelines should be followed:

- depots should be situated at least 40 m away from riparian zones and wetlands as well as other sensitive areas;
- depots should not be situated on slopes with a gradient of more than 6%;
- adequate drainage methods should keep the depot as dry as possible and should be kept free of debris to facilitate vehicle movement;
- debris should be moved regularly and used for rehabilitation of disturbed land or rehabilitation of quarries. Drains should direct water through an

adequate strip (minimum of 40 m) of buffer vegetation or silt trap and never directly into a watercourse;

- the depot boundaries should be clearly demarcated with immovable markers to prevent the “creep” of the depot boundary, stockpiles of bark or other debris into riparian zones or other sensitive areas; and
- during the wet season, log stacks should be sited to avoid blocking road drains.

Water depots are areas where logs are stacked and watered to prevent them from drying out.

7.3.5 Slash Management

Slash management is important for site hygiene, compartment presentation and the minimisation of soil loss. Accelerated soil erosion is responsible for most post-harvesting damage to the site and the management of the remaining biomass has an important influence on:

- the retention of nutrients;
- the prevention of moisture loss; and
- the minimisation of water run-off that may cause erosion.

Measures that can be used

- ✓ slash should be scattered or mulched to allow decomposition as this will accelerate nutrient recycling and hence improve soil protection; if this is not possible, slash should be stacked in rows;
- ✓ slash should be kept away from road edges, drains, special management or conservation zones and adjoining compartments;
- ✓ wetlands must be cleared of slash to prevent impeding water flow or blocking bridges and culverts;
- ✓ machines should not be allowed to enter wetlands to clear such slash;
- ✓ slash should be removed manually or winched out;
- ✓ if the slash poses no threat to water quality, streamflow or the inherent values of the conservation zone, it should be left in place;
- ✓ minimal extraction slash should be left outside the boundaries of a compartment and care must be taken not to damage plantings within adjacent compartments;
- ✓ burning after harvesting should be avoided as the slash contains important nutrients that should be left to be recycled;
- ✓ when burning of slash is unavoidable (e.g. minimise fuel loads), soil sensitivity burning method and climatic conditions should be considered to minimise damage to soils; and
- ✓ marketable timber should not be left in slash rows or piles.

7.3.6 Site Hygiene

Poor site hygiene (e.g. littering and oil spillage) can lead to pollution, pest outbreaks and degradation of the plantation in general. The following guidelines should therefore be followed:

- all marketable timber should be removed as soon as possible;
- appropriate fire prevention measures should be implemented;
- machines and vehicles should not be serviced or repaired infield. However, this is not always practicable and special care when servicing and repairing machines in-field should be used – oil and diesel should be drained into

containers and removed from the plantation together with discarded spares and unusable containers, unused or broken materials and equipment (e.g. cables, old guide bars);

- provision for the collection and removal of refuse for subsequent disposal to a waste disposal site should be implemented; and
- all timber, including anchor trees / stumps should be felled and removed, leaving the site tidy and safe.

Measures that can be used

- ✓ all marketable timber should be removed from the harvested site; and
- ✓ pollution of the site should be avoided, or when unavoidable, all evidence should be removed and disposed of at a waste disposal site.

7.3.7 Rehabilitation

To prevent or minimise negative environmental impacts caused by harvesting operations, rehabilitation measures should be undertaken throughout the operation and checked before the site is handed over to those responsible for silvicultural operations. These rehabilitation measures should include:

- the restoration of redundant depots by installing appropriate drainage, ripping areas that are to be planted and having stockpiled topsoil spread over the depots;
- the restoration of stream crossings (where applicable);
- the draining of skid trails (on slopes) and the placing of compartment debris in ruts to reduce soil erosion;
- the clearing of debris from roads and special management zones;
- the rehabilitation, upgrading or restoring of roads as required; and
- the opening of all drainage channels.

Measures that can be used

- ✓ a harvesting system should include a tactical plan, an Annual Plan of Operations and an operational plan; and
- ✓ interim audits and inspections will assist with ensuring compliance to the minimum requirements and allow for on-going improvements as required.

7.3.8 Revegetation of Harvested Forest Management Units

The focus in this Chapter is to implement management actions that minimise soil loss (sheet) erosion on old lands or harvested FMUs that were taken out of production and allowed to remain fallow indefinitely. This Chapter does not address gully erosion, erosion associated with roads, tracks, road cuttings, pipes and culverts, use of logs hollows or puddles for rehabilitation and geotextiles.

Land Restoration, Land Rehabilitation and Land Revegetation

The use of the words land restoration, rehabilitation and revegetation are used interchangeably and sometimes incorrectly, to describe the same activity (from Coetzee, 2005 and Mentis 2019)

- **Revegetation:** The establishment of only one or a few plant species with the objective to cover the ground with a protective vegetation cover. Results can be achieved quickly but there is no attempt made to achieve

the pre-disturbance state. Indeed, in many circumstances it is impossible to achieve a “natural” state for many reasons. For example, what was the “natural” state before the pre-disturbance activity such as the establishment of a plantation?

- **Rehabilitation:** The emphasis is on the re-instatement of the environment so that it looks and functions as it previously did and restores to the former land capability. This is the “high standard” of rehabilitation but ultimately begs the question “to what standard?”
- **Restoration:** Shares with rehabilitation the re-instatement of ecosystem processes to as close to the original structure and function as possible but differs in that it also includes the re-establishment of the pre-existing biotic species composition and community structure.

The differences between rehabilitation and restoration are vague and not necessarily relevant since the most important step following the withdrawal of a plantation from production is to minimise further anthropogenic soil loss from the FMU.

Reversible and Irreversible soil erosion

The very nature of the words reversible and irreversible indicate two opposite states. Thus:

- “reversible – characteristic of certain processes that can be reversed and the ecological system restored to its initial state without leaving net effects in the systems involved; and
- “irreversible” – impossible to return an ecosystem to its initial state and leaving permanent net effect/s on the systems involved.

Forms of soil erosion

- Sheet erosion – the progressive removal of layers of soil across extensive areas by wind and water as evidenced by pedestalling (grass tufts are noticeably elevated above the soil surface);
- Rills, gullies and terracettes – channels cut by flowing water and often associated with stock paths, roads and other features which may progressively cut back up-slope by water flow and the eroded material deposited in an alluvial fan down-slope of the feature; and
- Pedestalling – the removal of surface soil by erosion to the extent that the basal material of plants present is elevated by several centimetres above the surface of the ground. In severe situations exposed roots are clearly visible. Loss of vegetation precedes erosion.

Planning for soil erosion control

The emphasis in this section is to minimise soil loss from a harvested compartment which will no longer be replanted to commercial plantations. The reasons may be a result of the removal of a compartment or part of a compartment for conservation reasons (delineation of watercourse), poor tree growth, re-alignment of roads or other such structures. Before initiating any soil erosion control treatments, objectives must be clearly defined and then implemented, maintained, monitored, evaluated and adapted where necessary.

Objectives

Objectives for the control of soil erosion may differ from site to site but generally includes one or more of the following:

- To reduce the speed of rain water runoff;
- To retain the rainwater on the exposed soil surface for as long as possible;
- To increase the rate of water infiltration into the soil;
- To provide for methods to retain soil, plant debris and seeds; and
- To provide stable sites for pioneer vegetation re-establishment (this may entail the establishment of contours on steep land in addition to brush packs).

Methods for the control of soil erosion

The first essential step in the control of soil erosion from harvested compartments that are not scheduled for replanting of timber, is to hold the soil surface in place and then revegetate with grasses

i. Stabilise the soil

Brush packs: Given the fact that soil is greatly disturbed during plantation harvesting, soil stabilisation is a priority. Much of the plant residue post-harvesting available on site provides an ideal surface-protecting mulch, whose efficacy can be improved if reduced to a finer mulch.

Mulching: Covering the soil surface with organic plant material such as the *in-situ* forest residue.

The brush-packing or mulching is a valuable soil erosion control tool for the following reason

- ✓ Functions as a protective cover against rain splash erosion;
- ✓ Retains moisture in the soil;
- ✓ Decreases soil temperature;
- ✓ Improves microclimate for soil organisms;
- ✓ Restricts soil and humus movement in run-off by trapping soil and organic matter particles network of branches or mulch material on the soil surface;
- ✓ Protects the exposed soil against the effects of wind erosion and can trap wind-blown sand grains;
- ✓ Protects germinating plants from grazing animals;
- ✓ Contributes to organic soil content when the mulch decays; and
- ✓ Creates cover habitat for underground animals that burrow and aerate the soil.

These “brush packs” must be stacked in parallel rows along the contour. The distance between the brush packs will vary depending on slope steepness with shorter distances being necessary on the steeper slopes.

Care must be taken to ensure that most of the brush pack lies in close contact with the soil surface. The brush should be packed to a depth of up to 200mm to enable light and water to penetrate the brush or mulch cover to ensure seed germination and seedling growth.

ii. Site preparation

It is assumed that both the subsoil and topsoil are still present on the site. If not, the revegetation will be an expensive and long process.

Before revegetating, the site/soil should be examined to establish the presence or absence of any inhibitory factors. These would commonly be:

- ✓ Low soil organic matter – this can be avoided by retaining forest residue/ biomass on the surface which will break down to form a mulch and add to the existing soil carbon;
- ✓ Low soil fertility (P, K, Mg, Zn) – sample soils and subject to a laboratory analysis;
- ✓ Soil acidity or alkalinity – sample soils and subject to a laboratory analysis;
- ✓ Clayey soil – sample soils and subject to a laboratory texture analysis or perform texture-by-feel analysis; and
- ✓ P-fixation – no method of pre-determining exact P-fixation but much of the phosphate under these circumstances is rendered unavailable to plants. In acid soils the fixation is by Al and Fe and in alkaline soils by Ca.

Collecting soil samples for laboratory analysis is a formalised procedure. Representative samples are essential and can be collected systematically or randomly on the site for revegetation. At least one but preferably three or more soil samples for each different type of soil on the site to be revegetated should be collected. It is advised that the same analytical laboratory be used to assist in the comparison of analyses between sites and years.

The laboratory can advise on the minimum fertility requirements necessary for conventional grassing. They can also advise where more than one nutrient can be applied simultaneously to save fertiliser application costs.

Any form of site preparation should be completed during late winter in anticipation of grassing in spring or early summer. Application of fertiliser should be supervised and it is recommended that the fertiliser be applied at the same time that the grass is established to avoid loss of N by volatilisation, loss of P by P-fixation and general loss of fertilisers by leaching and erosion

iii. Establish a plant cover

Once the soil surface has been stabilised, the cleared compartment should be seeded with a fast-growing grass species at the same time that the fertiliser is applied. Commercially available species such as *Eragrostis curvula* (oulandsgras, mtshiki) is usually readily available and generally the most cost-effective. It is the commonest pasture grass in the moist grassland and is widely used in revegetation. Sow at 3 kg/ha.

Other suitable species include Rhodes grass (*Chloris gayana*) and Smuts finger grass (*Digitaria eriantha*) but these should not be used in conjunction with *E. curvula*. The Rhodes grass and Smuts finger grass are more palatable than oulandsgras and cattle, sheep or antelope will graze these two species selectively and under graze the oulandsgras.

iv. Maintenance

The regrowth of commercial forest trees in the site to be revegetated must be controlled as must other alien and invasive species. Pines will not coppice but grow from seeds in the ground accumulated during the period under plantation. Eucalyptus will readily coppice and the coppice growth should be controlled through the use of chemicals. The same will apply to wattle but the seed source is so prolific that the period of the maintenance phase is impossible to predict but can be reduced through regular use of herbicides. Although some claim that regular and continuous follow-up will eventually exhaust the seed bank for wattles, this is not likely to be achieved. The establishment of a plant cover of grass for a wattle plantation that will not be replanted will improve the success of wattle control but only if control using herbicides is applied continuously. Wattle is a legume and has nitrogen fixing abilities which implies that a pasture grass will benefit from the relatively improved nitrogen soil nitrogen content.

Once established, outlandsgras can survive grazing, trampling, dunging and urination better than just about any grass. However, it is sensitive to under-defoliation and becomes moribund easily. In this state it is fibrous and unpalatable and results in large tufts with a low basal cover and unable to protect against raindrop impact and surface wash. To maintain the vigour of the grassland, regular burning coupled with grazing will maintain a healthy sward of grass. If grazing is not an option, then an annual hot fire during late winter or early spring is recommended, obviously with an adequate fire protection system in place.

v. Monitoring

The reason for monitoring the revegetation is, *inter alia*, to judge against a standard for the revegetation to attain – in essence to say up front what you are looking for. It is therefore imperative that a pre-determined standard or reference be defined before any revegetation work is commenced. This standard could be reference photos for rating the extent to which the grasses cover the soil/the extent of bare soil. The ratings need to be simple, such as:

- 5 = lawn;
- 4 = nearly a lawn;
- 3 = more grass than bare ground (average for “good” humid grasslands);
- 2 = more bare ground than grass; and
- 1 = sparse to bare.

These reference photos must be taken in grassland adjacent to the revegetation site or in the same local area. Comparison of the reference photos to the revegetated compartment can then be used for monitoring over time and sites. It is a very simple method and has its inherent weaknesses but is simple and cheap to apply. Fixed reference photos should be taken from a position above to allow for comparison with the revegetated site.

A more advanced but still simple measure of the success of the revegetation is to determine the abundance of one or more nominated plant species in the site. For example, the nominated species might specify the abundance of outlandsgras, Rhodes grass or Smuts finger grass or some combination of these. Or the choice could just specify “perennial grass”.

A method that can be applied in the humid grasslands is the step-point method where the observer walks across the revegetated land and on every n^{th} step (where n is 1,2 or 3 steps of the right foot (or left) depending on the extent of the site for which species composition is required) the nearest species of live plant to the front of the foot is recorded. A sample of 100 points will suffice if interest is only on what are the predominant species. In a revegetated area covering an extensive area, as is likely the case when a harvested compartment or stand is to be revegetated, it is advised to that a number of step-point samples be completed to ensure a reasonable cover of the site. The location of the step points can be randomly located or stratified randomly. The principles for determining sample size for requisite accuracy can be determined from a number of pilot trial sample to estimate the variances to solve the formula:

$$N = s^2 \times t_{0.05}^2 / (X_1 - X_2)^2$$

Where $t_{0.05}$ is t -value in students t -distribution for appropriate number of degrees of freedom. The mean for each sample can be calculated where the mean of means is X_1 and the standard is X_2 .

The same approach must be adopted for measuring the standard and the revegetated site.

Measures that can be used

- ✓ set clearly defined objectives that aim to retain the rainwater on the exposed soil surface, increase the rate of water infiltration into the soil, retain soil, plant debris and seeds and that provide stable sites for pioneer vegetation re-establishment;
- ✓ establish a pre-determined standard or reference before any revegetation work is commenced. This standard could be reference photos;
- ✓ prepare the site by firstly collecting representative soil samples for laboratory analysis;
- ✓ stabilise the soil by the use of brush-packs and the even distribution of organic forest residue/slash on the surface of the soil;
- ✓ establish a plant cover with a fast-growing grass species at the same time that the fertiliser is applied;
- ✓ maintain the revegetated site by the control of woody alien and invasive species combined with grazing (trampling) and a regular burn when the grass cover is sufficiently dense to allow the fire to spread;
- ✓ monitor the achievement of the objective through annual fixed-point photographs and comparing these reference photos to the revegetated compartment; and
- ✓ use a simple-5 point scale rating system.

7.4 Size of Clear-felling

The “size” refers to the area of plantation that is clear-felled and can consist of one compartment or a number of adjacent compartments. This factor has a pronounced effect on the potential for accelerated soil erosion: the larger the clear-felled area the greater the potential for accelerated soil loss. However, smaller and more disjunct plantation units tend to negate the advantages of the consolidation of compartments for harvesting. The total area clear-felled within a catchment and thus its associated impacts, is dependent on topography, soils and climate, which will differ greatly between different regions and landscapes. The size of the clear-felled area should be decided on a case-by-case basis. Reference should also be made to the Visual Landscape Section for further details (Chapter 3).

Clear-felled areas may have the following potential negative impacts, which should be considered when planning the harvesting of a compartment. Note that the larger the clear-felled area, the greater the risk of negative environmental impacts:

- increased surface water run-off with increased soil erosion and subsequent sedimentation of nearby watercourses;
- exposure of indigenous forest edges, previously protected by the plantation, to wind and fire damage;
- destruction of habitat of animal species that use plantations for cover, nesting and foraging; and
- creation of localised areas with high dry fuel matter that increases the risk of fires with potentially significant in situ impacts on soil quality.

Measures that can be used

- ✓ clear-felled areas should be sufficiently separated to provide buffers that serve as soil sedimentation traps and escape routes or refugia for fauna; and
- ✓ within a catchment that feeds a permanent watercourse, no more than one third of the catchment should be clear-felled within a two-year period. This will minimise impacts on fauna as well as reduce the risk of sedimentation of watercourses.

7.5 Steep Slopes

Commercial plantation forests may occur in the steeper areas within catchments. Steep slopes are the least stable of all terrain types and, when coupled with a low soil-clay-content (less than 15%), disturbance in such areas carries potentially high environmental impacts through accelerated soil loss and sedimentation of water resources.

Amendments to the regulations published in the Government Gazette (GN R280 GG 22166 of 30 March 2001) in terms of section 29 of CARA prohibit the cultivation of virgin soil except under the authority of the executive officer. Further, no land user may cultivate any land if it has a slope of more than 20%, or if it has a slope of more than 12% on certain soils in areas specified in the regulations (Note: these are highly erodible soils) except on authority of the executive officer.

The regulations also provide for the protection of cultivated land against erosion through the action of water (reg. 4) and through the action of wind (reg. 5). In brief, every land user shall protect the cultivated land on his/her farm unit effectively against excessive soil loss as a result of erosion through the actions of water and wind. These measures include a suitable soil conservation work, cultivation of land in such a manner that the run-off speed of run-off water is restricted and the retention of a crop residue (in the case of timber farmers, this would be the plantation residue) such that it is sufficient to form a mulch. The slope classes according to the National Terrain Classification System for Forestry and should be used when planning any land preparation on slopes. (see Forestry South African Handbook <https://saif.org.za/forestry-handbook/>).

The negative aspects of the afforestation of steep and very steep slopes are:

- high soil erosion risk areas – the velocity and erosive power of the surface run-off water increases with the degree of slope;
- mechanical site preparation (e.g. ripping) is difficult if not impossible with increased risk of accelerated soil loss;
- harvesting costs are increased, since:
 - mechanised tree felling is impossible and expensive extraction by cable yarding is necessary;
 - permanent landings will necessitate extensive earthmoving and roadside landings limit the efficiency of the extraction process (space availability); and
 - precision directional felling (e.g. the use of felling wedges and/or winching of trees) becomes vital.
- increased road building and maintenance costs associated with a greater negative aesthetic impact on the landscape due to the volume of earthmoving required;
- increased soil disturbance and the potential for accelerated soil loss by road building;
- Increased vehicle operating costs;
- increased safety hazard of operating in very steep areas; and
- increased risk of fires spreading uphill while firefighting operations on steep slopes are difficult and extremely dangerous and can lead to potential injuries and loss of life.

In light of the increased environmental and operational costs of logging operations and road construction, the financial viability of the afforestation of steep and very steep slopes (i.e. slopes of greater than 35%) must be critically assessed in terms of the CARA Regulations and the following measures:

Measures that can be used:

- ✓ Slopes of more than 20% may be considered for new afforestation only if authorised by the Department of Agriculture Land Reform and Rural Development in terms of the CARA regulations and if:
 - soils are more than 60 cm deep (the greater the soil depth the more stable the slope);
 - erodibility of the soil is classified as low with a clay content of more than 15%;
 - ground conditions are very good to moderate under dry-moist conditions (1-3 in terms of the National Terrain Classification System for Forestry) (see South African Forestry Handbook);
 - access roads are constructed on flatter terrain (e.g. at the base of the slope);
 - new roads that need to be constructed in very steep areas (greater than 20%) will require an independent environmental impact assessment and if authorised, should be constructed using the end hauling method to create a full bench (removal of all road debris) as opposed to cut and fill. The “fill” would be unstable, making the scar worse and difficult to vegetate. The topsoil must be kept to re-surface and re-habilitate the cut-bank and side-drains;
 - areas with slopes greater than 60% must not be newly afforested due to the risks posed by significant water run-off and potentially unacceptable loss of soil and pollution of surface water bodies;
 - land that is currently afforested and is situated predominantly on slopes of greater than 60% should be considered for possible withdrawal from afforestation and rehabilitated to secure soil and reduce soil loss through the action of surface water; and
 - certain roads and extraction routes may need to be closed in wet weather to avoid accelerated soil loss.

Chapter 8

Environmental Aspects of Roads



Photo: www.forestrysouthafrica.co.za

Forest Engineering Southern Africa has produced a comprehensive South African Forest Road Handbook (2014) which can be accessed free of charge from the ICFR website and should be used as the source manual for road design, construction and maintenance. It has been designed specifically for South African conditions. (www.icfr.ukzn.ac.za/publications).

Forest roads provide required access for the management of forest resources. While roads are viewed as an asset to the forester, they can be a source of erosion and sedimentation of water resources which have a negative effect on the aquatic biodiversity and water quality. Further, forest roads use valuable forest land which could be used for timber production. Therefore, a well-planned road network contributes towards optimising road construction and spacing, reducing construction and maintenance costs and minimising negative impacts on both water quality and biodiversity.

In short, the surfaces of roads and burnt compartments are the main source of sedimentation of water courses in the forest plantation environment. The impact of sedimentation on rivers can be reduced through proper design, construction and regular road maintenance as well as the retention of slash on harvested compartments.

8.1 Road Planning, Construction and Maintenance

An Environmental Impact Assessment (EIA) may be required before the construction of any new road or the upgrading of any existing road (see Appendix 1 for guidance in this regard).

The planning, construction and maintenance of the forest road network, depots, landings and extraction routes is necessary to enable equipment and personnel to gain access to the compartments to remove products from the forests. An optimal balance between the number of forest roads, extraction routes, depots and landings to maximise the profitability of the forest estate, while minimising any potential environmental impacts, should be maintained.

Landowners should consider the following during the planning, construction and maintenance of roads and associated structures:

- soil properties and estimated volume of soil to be removed;
- the type of topography and terrain where the road is to be constructed;
- the local climate conditions which may dictate the ideal season in which to build roads;
- the availability of gravel and other material to construct roads;
- the availability and type of harvesting methods to be used once the trees are to be felled;
- the estimated volume of timber to be transported;
- flood events – roads should be designed to accommodate a 1:50 year flood and should not be located within demarcated buffer zones adjoining delineated watercourses;
- negative aesthetic and environmental impacts can be minimised by balancing cuts and fills (i.e. use of excavated material for fills) and by minimising the establishment of borrow pits (may also require an EIA) and soil dumps (may be regarded as “waste” in terms of the definition of waste in the NEMWA, especially if it is not to be used for fill);
- earthworks and exposed soil/subsoil surfaces should be kept to a minimum to avoid potential accelerated soils loss and increased sediment load in the rivers;
- natural topographical features such as saddles, ridge-tops, natural benches and flatter slopes should be explored in the siting of new roads;
- special management and conservation zones should be avoided or afforded appropriate protection;
- roads should not be routed within 20 m of a watercourse or wetland buffer zone except where they cross the watercourse;
- where existing roads are routed within the buffer zone of a watercourse they should, where practicable, be re-routed and/or decommissioned;
- roads should cross watercourses at right angles;
- run-off water should not be diverted directly into watercourses but should preferably be allowed to flow through 20 m or more of vegetation before entering them, or as directed in any environmental authorisation;
- there should be minimal interference with natural drainage – for roads that carry heavy traffic loads over extended periods of time, bridges rather than drifts / fords should be used;
- all construction should be carried out in a manner that causes minimal damage to the streambed and banks or as directed in any licence or environmental authorisation;

- the planning and design of road construction / upgrades should only be done with the assistance of qualified engineers working within the EIA process;
- cut and fill should be balanced as much as possible to reduce borrow pits and soil dumping;
- steep road gradients can impact negatively on the environment and increase transport costs. To prevent contamination of streams or rivers, major construction and significant reconstruction of roads or stream crossings should not be carried out in the high rainfall months; and
- the road surface should, where possible, not be out-sloped in steep or slippery terrain and must be provided with adequate culverts and drains and have more frequent drainage on approaches to streams to ensure the least amount of water is discharged directly into the streams.

8.2 Associated Road Structures/Crossings

8.2.1 Bridges

- bridges and other forms of river crossings may require an environmental authorisation in terms of NEMA from the competent authority (provincial environmental authority) before being developed or significantly upgraded;
- any river crossing that impedes or diverts the flow of water in a watercourse, or alters the bed, banks, course or characteristics of a watercourse is recognised under the NWA as a water use and thus requires a water use licence unless it satisfies the threshold for a General Authorisation (see Chapter 2.1.3);
- bridges should be designed and constructed by qualified civil engineers to minimise significant environmental impacts;
- bridges should not disrupt the movement of fish up- or down-stream;
- only rot resistant and/or treated timber should be used for crossings constructed of timber;
- kerbs should be used on the side of the bridge to stop fill material from sliding down the passage and into the watercourse;
- abutment fill should be controlled with wooden shutters or concrete abutments;
- run-off from the bridge surface should be controlled to minimise increased sedimentation of the watercourse;
- regular inspection and maintenance should be carried out especially during the rainy season; and
- bridge approaches should be protected and maintained to prevent runoff water running directly from roads onto bridges and into rivers.

8.2.2 River Crossings

- a water use licence may be required for a river crossing in terms of section 21 (c) and (i) of the NWA – see Chapter 2.1.3);
- crossings should be constructed on firm stable soil, on a concrete base or on rock sub-strata and be located below a straight and stable section of the river;
- the number of stream crossings should be minimised to avoid negative environmental impacts on the water source, as well as to avoid costly EIA processes and water use licence applications;
- drainage that diverts water away from the road and road surface should be stabilised with suitable vegetation or other material to reduce the potential

for soil erosion and possible water pollution through increased sedimentation arising from river crossings;

- special measures in high water flow velocity areas should be taken to reduce the erosion of drains (e.g. by lining with stones, concrete, grass or gabions which serves to break the force of the water);
- drains should be routinely maintained, cleared after road grading and kept free of invading vegetation; and
- where it is difficult to contain the velocity of water on road surfaces, water bars and cross-drains can be installed to assist in reducing water velocity.

8.2.3 Culverts

- culverts should be spaced according to road grade, soil erodibility and rainfall intensity and built on a well-prepared and compacted beds;
- the minimum diameter of culverts should be designed and constructed in relation to the condition of the road, rainfall history and size of the drainage area;
- fill should not be pushed into water courses or into a position where it can be washed directly into such a watercourse;
- the inlet and outlet of the culverts should be protected from any potential damage caused by the flow entering or discharging;
- sediment traps made of logs, rocks, treetops and branches or concrete can be used to further minimise any structural damage to the inlets and outlets of the culverts, as well as reducing soil runoff into the watercourse; and
- culverts should be regularly inspected, maintained and cleaned of any debris.

8.2.4 Drifts

- drifts are only suitable for seasonal access or for low usage roads and should be located below straight and stable sections of the river and at right angles;
- disturbance at drifts should be minimised by using a firm and stable streambed and approach (preferably consisting of rock).

8.2.5 Rehabilitation/Restoration

- riverbeds and stream banks should be rehabilitated once construction work has been completed;
- rehabilitation should focus on minimising soil loss by establishing a grass cover as soon as possible;
- any conditions attached to a water use licence or environmental authorisation must be fully implemented;
- the potential for the collapse of riverbeds and side walls should be minimised by using gabions, concrete or hyson cells;
- crossing embankments should be protected against potential collapse by using concrete, timber, gabions or vegetation;
- cuts, fills and all other exposed faces and slopes should be well-drained, protected from erosion and stabilised by re-vegetating or seeding with locally available commercial grass (*Eragrostis curvula*) or other suitable local vegetation;
- stockpiled topsoil should be used to cover exposed areas;
- slopes should be scarified before replacing topsoil so as to enhance bonding;
- topsoil along the outer edge of the road and down the fill should be used to enable re-vegetation and stabilisation with commercially available grasses

(*Eragrostis curvula* or similar) or any indigenous grass species available in the area;

- devices such as mats, pegs and mesh together with suitable grass species (vetiver may be necessary in extreme cases) should be used to improve the chances of successful revegetation and hence slope stabilisation – kikuyu grass is an effective and easily available species and if no other option is available, should be used in preference to doing nothing;
- seeding should be done as early in the growing season as possible to achieve a good soil cover within the first year of growth;
- suitable mulching on exposed areas should be carried out to achieve good seed growth;
- water velocity on re-vegetated slopes should be minimised to reduce accelerated soil loss; and
- wire mesh or a thin layer of shotcrete can be applied on rocky slopes prone to erosion or rock falls.

8.2.6 Borrow Pits

Borrow pits can be responsible for many degrading environmental impacts, including long-term visual impacts, soil erosion and water quality degradation. The Mineral and Petroleum Resources Development Act No. 28 of 2002 (MPRDA), provides that permits are required from the relevant regional Department of Mineral Resources (DMR) for the removal and or sale of any soil or gravel from the property. In addition, environmental authorisation may be required in terms of NEMA. The following guidelines should therefore be adhered to:

- an authorisation from the competent authority may be required before a quarry may be constructed (but in relation to a permit in terms of the MPRDA, only if the material is to be sold to a third party);
- information on the geology and soils occurring on a site proposed to be used as a borrow pit should be available on the soil map;
- material for new borrow pit sites should be tested to ensure it is the correct quality for the required application;
- borrow pits should not be established in soils with high erosion hazard (indicated on the soil map) or in areas where water quality could be negatively affected;
- wherever practicable, the borrow pit should be located behind a hill, ridge or other natural barrier that can act as a visual screen;
- for all new borrow pits, topsoil should be stored for subsequent rehabilitation of the site;
- pits should be drained through a filter strip and not directly into the watercourse, or as directed by the environmental authorisation; and
- when borrow pits are no longer required, they should be rehabilitated within two years of becoming redundant or as directed by any environmental authorisation.

Measures that can be used

Roads

- ✓ transport systems, costs and maintenance requirements and environmental impacts can be minimised by linking compartments and thus optimising road density according to the terrain and extraction routes;
- ✓ old or discontinued roads can be planted to trees to further minimise any potential soil loss and/or sedimentation of water courses;
- ✓ new roads may require an environmental impact assessment, as well as the upgrading of roads when the road is widened;
- ✓ properly planned and implemented road maintenance should ensure that soil erosion and watercourse sedimentation from exposed gravel as well as tar road surfaces is minimised;
- ✓ the presence and protection of roadside vegetation on either side of the road should act as a “sediment trap” for runoff water and should adhere to the minimum distance of 20 m between the road verge and any adjoining watercourse;
- ✓ all river or stream crossings, drifts, bridges and culverts should be inspected regularly for any blockages or infrastructure damage;
- ✓ all river or stream crossings, drifts, bridges and culverts should be maintained regularly;
- ✓ drains, silt traps, openings to bridges and culverts should be maintained and cleared regularly to avoid blockages and ensure unrestricted flow of run-off water; and
- ✓ low usage roads should be vegetated and mown rather than graded where this is practicable.

STATEMENT OF INTENT:

To minimise soil erosion, sedimentation of water courses, loss of productive land and negative visual effects as a result of road networks, landings, depots, planting on steep slopes and gravel pits.

Landings

- ✓ should be as small as practicably possible;
- ✓ should be situated more than 20 m from the buffer zones of wetlands and water courses;
- ✓ should not be situated in firebreaks;
- ✓ should not be situated in power line servitudes where there is a danger of flash-back; and
- ✓ should be situated on level ground or on gentle slopes (up to a maximum of 6%) or have sediment traps to facilitate drainage.

Depots

In addition to the requirements for landings, landowners should aim to achieve the following:

- ✓ new depots should be situated at least 20 m away from the buffer zones of wetlands and water courses;
- ✓ existing depots that are closer than 20 m to a wetland or watercourse should be closed and rehabilitated using commercially available grass such as *Eragrostis curvula*; and
- ✓ if closure is impractical, then depots should be managed in such a way as to minimise sedimentation of the watercourse, for example constructing soil berms to divert water containing sediment away from the watercourse or wetland.

Gravel Pits

- ✓ consider the need for the existence of gravel pits as a first priority;
- ✓ prepare a closure plan for any existing gravel pits that have reached their end of their use;
- ✓ implement the closure plan;
- ✓ maintain existing gravel pits to ensure that water run-off is managed in a manner that minimises soil loss and water resource pollution (through sedimentation); and
- ✓ any new gravel pits that meet the threshold as a listed activity in terms of the EIA Regulations will require an environmental impact assessment and an environmental authorisation from the competent authority.

Redundant Roads

- ✓ when roads are no longer required, they should be rehabilitated. Rehabilitation may involve the use of commercially available grasses such as *Eragrostis curvula* which will limit soil erosion from road surfaces and the construction of drainage to minimise erosion due to water runoff; and
- ✓ the available land for timber can be optimised by planting any redundant roads to trees.

Chapter 9

Non-timber Forest Products and Services



Photo: www.forestrysouthafrica.co.za

Commercial forestry land is a source of products and services other than timber. These are referred to as non-timber forest products (NTFP). Their importance should not be underestimated in terms of their financial value to the landowner and their contribution to local and regional ecological infrastructure and ecological services.

Multiple resource utilisation includes a host of direct activities such as mushroom collecting (commercial as well as recreational), wood collection (largely for fuel and infrastructure such as fencing and rural housing materials), fishing, hiking, trail running and mountain biking (both organised and informal), boating, birding and other natural resource-based activities. In some cases, grazing of domestic animals through an agreement with local communities can be achieved, although the potential for conflict should always be considered before entering into any such agreement.

The planning, implementation and maintenance of non-timber forest products and services should be fully integrated with timber activities and seen as an asset that may yield direct financial benefits or indirect social and environmental benefits.

9.1 Location and Scale

- land uses should be located where the products and services and subsequently the land use, can be optimised
- alternative locations should be considered for all NTFP activities and a site where impacts are negated and/or minimised can be selected.

9.2 Legal Requirements

There may be legal restrictions relating to the implementation and operating of other land uses on a forest estate and these should be explored with legal experts.

9.3 Responsible Use and Management of Non-timber Products and Services

Use of natural, cultural and recreational assets present on a forest estate is voluntary and the landowner can decide whether or not to make such use available to others, or not. These assets may include:

9.3.1 Rivers, Streams and Wetlands

Rivers, streams and wetlands may be important as a water resource for recreational fishing, as habitats for riverine vegetation, aquatic life (fish), birds and mammal species, provision of high-quality water on the estate as well as downstream and for providing natural corridors for biodiversity conservation.

Indigenous species should be used in preference to alien species such as trout, carp and bass, as alien fish may compete with indigenous species for habitat and food resources. There are 15 Invasive Fresh-water Fish Species listed in the Alien and Invasive Species Regulations, 2014. The Scope of Exemption from the Provisions of Section 71(3) and Prohibition in terms of Section 71A (1) of the AIS Regulations of 2014 are extensive and should be consulted before any approach is made to the regulatory authorities in your area.

If the introduction of alien fish is being considered, permission from the relevant Provincial authority must first be sought. Where alien fish are to be kept and feeding is necessitated, the impoundments should not be in the river course but located away from it. Any water released from a fish impoundment into a natural watercourse from this will need a water use licence in terms of section 21(f) or (g) (discharge of water containing waste) through the DWS and will be required to meet certain water resource quality standards in order not to pollute the watercourse.

9.3.2 Dams

Dams are important water resources for firefighting and recreational use (e.g. fishing, picnics sites and boating) and may provide a habitat for fish, bird and plant species. However, dams also interfere with the natural movement of water and organisms in a watercourse as they increase the surface water area which leads to an increase in water loss through evaporation. Any dam constructed after 1 October 1998 may require a water use licence at some point in the future. If the dam was in existence prior to this date, then it is regarded as an existing lawful water use. Existing dams should be checked by a qualified dam engineer to ensure that they meet dam safety requirements. (See Regulations regarding the safety of dams in terms of section 123(1) of the National Water

Act, 1998 (Act No. 36 of 1998) (Gazette No. 19182, Notice No. 1091 Published under Government Notice R 139 in Government Gazette 35062. Commencement date: 24 February 2012

Dams with a wall in excess of 5 m high or of a capacity exceeding 50 000 m³ of water will also require a safety permit from the DWS.

Any new dams may also be subject to an application for an environmental authorisation (preceded by an EIA) from the provincial competent authority before any construction may commence. Dam spillways will be required to allow for the frequency and intensity of flood events and be constructed to allow for the passage of organisms in the watercourse.

9.3.3 Hiking, Trail Running and Mountain Bike Trails

Hiking, trail running and mountain bike trails are widely utilised recreational activities associated with the forest estate. To ensure their long-term viability and to minimise environmental degradation, the following guidelines are recommended:

- designed to provide a variety of landscapes and experiences in a comfortable but challenging manner, without compromising their value;
- selected to reduce the risk of erosion and environmental degradation;
- where erosion cannot be avoided, preventative measures should be taken in the form of constructed steps and water drains;
- where erosion or environmental degradation has been identified, the track should be resurfaced and rehabilitated;
- consideration and provision should be made for toilet facilities (chemical toilets are an option), litter disposal, braai sites and firewood;
- toilets should be subjected to an Environmental Impact Assessment (EIA); and
- regular maintenance is a necessary and on-going requirement.

9.3.4 Grazing

Grazing within the forest estate is sometimes used by both traditional and commercial farmers. Uncontrolled grazing has the potential to cause significant grassland degradation but if limits in livestock units are imposed in terms of the stocking potential of the land, then any potential overgrazing can be minimised.

Particular care should be paid to allowing livestock access to wetlands, waterways and ecologically sensitive areas. The question of allowing grazing on a timber farm is more of a socio-political question and not only an ecological one. The solution should seek to address both issues sensitively and realistically.

9.3.5 Picnic and Camping Sites

Picnic and camping sites are important recreational and social amenities that may be provided voluntarily by the landowner. Security is of paramount importance, not only to the landowner but to adjoining landowners and picnickers / campers as well. Communication with neighbours is encouraged before access to land by visitors is made available. Consider the following when providing these:

- visitor carrying capacity should be determined beforehand and should not be exceeded as this can lead to overuse of the facilities and may impact on the enjoyment of other visitors;
- provision should be made for clean toilet facilities, waste disposal bins that can be segregated into recyclable and non-recyclable waste, braai fire sites and even firewood;

- construction of toilets should be subjected to an Environmental Impact Assessment (EIA) and should never be placed within 5000 m of a watercourse, or as directed by the competent authority; and
- regular maintenance is necessary to maintain the toilet facilities in a clean and safe state, collection of waste and proper disposal of the waste and maintenance of braai sites and picnic sites (regular mowing). Soak pits are likely to fall under a General Authorisation – see section 21 (f) and (g) of the National Water Act Chapter.....

9.3.6 Flora and Fauna

All timber farms provide important habitats for indigenous flora and fauna. Some animal groups may be important for specialised interest groups such as bird watching, while the harvesting of products such as medicinal plants, honey, mushrooms and wood can also be offered but under controlled conditions.

Permits may be required for some of these activities (e.g. medicinal plants) and the relevant authority must be contacted before any such activity takes place.

9.3.7 Agricultural Crops

Land preparation for agricultural crops is controlled by regulations contained in CARA. These refer especially to the prevention of soil erosion as a result of water and wind (see Chapter 1). In terms of the EIA regulations published in 2017 under NEMA (see Chapter 2), an EIA may be required for the conversion of agricultural land or conservation area to any other land use or grazing land to any other form of agricultural use.

9.3.8 Access to Privately Owned Forests

In terms of Section 21 of the NFA, the Minister may take steps to promote the voluntary granting of public access to privately owned forests by the registered owners of such forests. At the request of either the owner of the forest or a person seeking access to it, the Minister may set in motion negotiations between the interested and affected parties to determine whether or not the owner is willing to grant access and if so, on what conditions this access would be granted.

If an owner is willing to allow public access, he or she must provide the Minister with:

- a map of the estate showing the areas designated for public access; and
- a set of written rules setting out the conditions on which access will be allowed.

No person who is granted access will be allowed to invade the privacy of the owner or cause damage to his or her property. Where access has been granted by the owner, the Minister may provide funds or other forms of assistance from the National Forest Recreation and Access Trust to:

- assist with the cost of developing the area of the forest which has been designated for public access; and
- compensate the owner for any loss that may occur as a result of the public access being granted.

9.3.9 Promotion of Awareness of Environmental Values

The presence of National Heritage Sites as recognised under the NHRA, nature reserves and biodiversity stewardship agreements (as provided for under the National Environmental Management: Protected Areas Act) can be promoted by

the landowner to contribute to the public awareness of environmental issues. This can be done through formal or informal programmes that promote:

- the importance of the natural environment and its protection;
- the presence of particular natural assets on the forest estate such as rare flora and fauna species. However, care should be taken in advertising these assets as it can lead to the illegal collection of such species; and
- the importance of the contributions that the forest estate makes to production forestry, environmental conservation, the economy, local communities and to society in general.

Awareness of onsite assets may be increased by using notice boards, maps or hand-outs. These should be provided in various languages and forms (e.g. graphical) thereby allowing the message to be understood by as many users of the forest estate as possible.

Measures that can be used

- ✓ the provision of non-timber products and services should be on a voluntary basis;
- ✓ the location of any such products or services should be optimised and conflicting activities should be avoided;
- ✓ the operations should be cost effective so that management can be properly funded from the profits arising therefrom;
- ✓ the introduction of fish species must be compliant with relevant legislation;
- ✓ visitor numbers should be managed to allow for enjoyment by all;
- ✓ any grazing by domestic animals must be within the carrying capacity of the vegetation; and
- ✓ guidelines for the provision of visitor facilities should be followed.

STATEMENT OF INTENT:

The provision of non-timber forest products and services should be on a voluntary basis, be managed and legally compliant and be integrated with the timber management activities.

Chapter 10

Management of Staff Housing



Photo: ICFR

The South African Constitution states that everyone has the right to adequate housing (Section 26) and that the state must take reasonable legislative and other actions to achieve the realisation of this right. In addition, no one may be evicted from their home, or have their home demolished without an order of the court made after considering all the relevant legislation. The Government is obliged to realise this right, however, landowners have not only a legal responsibility but a moral responsibility, to ensure that farm workers and farm residents have access to adequate housing. In the South African context, two types of housing can be distinguished, namely, accommodation provided and traditional housing.

For accommodation provided by the landowner, it is suggested that landowners familiarise themselves with the National Building Regulations and Building Standards Act 103 of 1977 which provides technical information and specifications on buildings and their construction. The construction of any buildings will require authorisation from the local authority and must comply with the requirements of SANS 10400. It should also be noted that the Act requires that all other legal requirements must be complied with prior to the approval of building plans. This may also include an environmental authorisation if the building/s exceed a certain threshold (See Appendix 1)

In brief, buildings must be structurally safe, roofs must be durable, structure and roof must be waterproof, allowance should be made for cooking areas, waste disposal and sanitation facilities. Lighting and ventilation must be adequate (minimum of one window per room), sanitation must be appropriately designed and installed and meet the requirements of SANS 10400 while refuse disposal must consist of adequate containers. Stormwater management must be appropriate for the site while fire protection (adequate equipment) must be available with the approval from the local municipality for any fire installations.

When it comes to traditional housing, the UN Committee on Economic, Social and Cultural Rights have noted that culturally adequate housing must appropriately express a cultural identity. Landowners should attempt to ensure that traditional accommodation is structurally sound, that there is provision of potable water and that adequate waste management or disposal facilities are available. Of particular relevance to South African landowners is that traditional accommodation on a farm may house people not necessarily employed on the farm but elsewhere employed or even unemployed. Such people may have tenure rights.

The provision of staff housing calls for a variety of social and environmental considerations that should be taken into account. These include the following:

10.1 Water Supply

The availability of potable and adequate water supply is very important for health reasons. Water supplied for domestic use must be potable (i.e. of a sufficient quality for human consumption).

10.2 Site Hygiene

Maintenance of staff housing and house site hygiene is essential for the health of the inhabitants, prevention of pollution and the aesthetics of the land in general.

- See: 5.1.2 Rodents
- See: The TIPWG website (www.tipwg.co.za) provides Standard Operating Procedures and should be consulted for more detailed information

10.3 Waste Disposal

In terms of NEMWA, waste management licences for waste disposal sites meeting certain threshold levels will be required (See Chapter 1). Because of the expenses and impacts associated with the management of waste, landowners are encouraged to implement recycling of waste on the farm and to dispose of such waste off-site at a registered waste management site.

10.4 Location of Accommodation and Infrastructure

Before constructing new infrastructure, foresters should obtain the relevant permission from the local Municipality which will involve the submission of professionally prepared plans. The location of any infrastructure should avoid proximity to wetlands and other water resources and conservation areas. Drainage in particular should not compromise the integrity of water resources, particularly because of the risk of water pollution from water runoff. Disposal of water containing waste into soak pits/French drains must be the requirements of

the National Water Act (see sections 21 (f) and (g)). The location of such disposal sites should not be within 500m of a wetland.

Measures that may be used

- ✓ housing must be structurally sound and have durable roofs;
- ✓ structures and roofing must be waterproof;
- ✓ housing must have adequate lighting;
- ✓ proper waste disposal and sanitation facilities must be provided;
- ✓ adequate storm water drainage must be supplied; and
- ✓ sufficient potable water to meet the basic needs must be provided.

STATEMENT OF INTENT:

Any existing accommodation for farm workers and tenure residents should be structurally sound, be provided with potable water and have adequate waste management systems or facilities.

Chapter 11

Climate Change, Green House Gas Emissions and Carbon Tax



Photo: www.forestrysouthafrica.co

11.1 United Nations Framework Convention on Climate Change

South Africa has agreed to voluntary alignment and compliance with the United Nations Framework Convention on Climate Change (UNFCCC), countries Reducing Emissions from Deforestation and Forest Degradation (REDD+) and Intergovernmental Panel on Climate Change (IPCC) initiatives through the South African Department of the Forestry, Fisheries and the Environment (DFFE). These initiatives necessitate the reduction of greenhouse gas (GHG) emissions, mitigation of the causes and effects of past emissions and adaptation to climate changes caused through past emissions. Commercial forest plantations play a role in mitigating the effects of anthropogenic climate change through the

capture of atmospheric carbon dioxide (CO₂) and storage of carbon (C) in tree biomass, dead organic matter and soil carbon pools. The DFFE is tasked to provide an annual inventory of greenhouse gas emissions through the process of registration and reporting.

11.2 National Green House Gas Inventory

In response to its voluntary commitment to provide an annual inventory of GHG emissions, South Africa developed a National Green House Gas Inventory System (NGHGIS) to manage the climate change obligations under the UNFCCC. The system serves to track emission levels in relation to international pledges, commitments and other reporting obligations. DFFE is responsible for the provision of data for the GHG inventory report based on information from the FSA and DFFE statistics.

South Africa's National GHG Inventory Report for the period 2000 to 2020 was published in April 2023.

The overall AFOLU emissions totalled 14 088 Gg CO₂e (incl. FOLU) in 2020, and 40 775 Gg CO₂e excluding FOLU. Livestock contributed 31 372 Gg CO₂e (76.9% of total excl. FOLU). Aggregated and non-CO₂ emissions on land contributed 23.1% to the AFOLU (excl. FOLU) emissions in 2020, and the largest contributor to this category is direct N₂O from managed soils (56.1%). Nitrogen inputs from urine and dung contributed 14.9% to direct N₂O emissions, while 57.5% comes from crop residues and 19% from inorganic fertilisers. For the Land category the largest contributor to the sink is Forest land (24 575 GgCO₂e), followed by Grasslands (11 084 GgCO₂e). Other land (6 125 GgCO₂e) is the main contributor to the source in the Land category.

11.3 National Green House Gas Reporting

The National Greenhouse Gas Emission Reporting Regulations (NGERs) came into effect on 3 April 2017. The purpose is to allow the DFFE to gather information from businesses to assist South Africa to in updating and maintaining a National Greenhouse Gas Inventory, as required in terms of the National Environmental Management: Air Quality Act.

A person classified as a Category A data provider (any person in control of or conducting an activity above the threshold of 100 ha of plantation or forest land) must have registered their area of plantations on the South African National Atmospheric Emission Inventory System (NAEIS). These reporting regulations allow processing plants to claim carbon credits from their own or managed plantations in excess of 100 ha as well as additional carbon credits from entities that are outside the direct control of the processing plant.

The final guidelines were published on 28 January 2022 as Methodological Guidelines for Quantification of Green House Gas Emission: Carbon Sequestration in the Forestry Industry GG No 45816 No 1700. The Monitoring, Reporting and Verification (MRV) tool can be accessed through the South African Greenhouse Gas Emissions Reporting System (SAGERS) website:

<http://ghgreporting-public.environment.gov.za/GHGLanding/SAGERSHome.html>.

The purpose is to allow the DFFE to gather information from business to assist South Africa to update and maintain a National Greenhouse Gas Inventory as required in terms of the National Environmental Management: Air Quality Act (Act 39 of 2004)

However, the electronic completion of the MRV has proved to be challenging, both for members and the Department.

As a result, the Department issued a Government Gazette No 49984 No 4248 on 8 January 2024 allowing for manual registration of data providers. The reason for manual registration is that the South African Greenhouse Gas Emission Reporting System (SAGERS) will no longer be used for registration and reporting during the 2023/2024 and 2024/2025 reporting cycles due to planned system upgrades.

11.4 Green House Gas Verification and Validation Guidelines

Guidelines for Verification of Greenhouse Gas Emissions (Verification Guidelines) for purposes of the NGERs describes the process that will be followed to verify the GHG emissions data and submissions made by Data Providers in terms of the NGERs to the National Inventory Unit. The Verification Guideline provides further details to implement the requirements of Section 11 of the NGERs, which outlines the legal requirements for verification of information submitted by Data Providers to the Competent Authority. (GG 45452 No1496 dated 12 November 2021).

The purpose of the Verification Guideline is to support the implementation of the mandatory GHG reporting regime in South Africa. The Verification Guideline provides direction to the Competent Authority, Data Providers and Independent Verifiers on the verification process for the NGERs and details the responsibilities of these role players. This Verification Guideline is applicable to all anthropogenic emissions by sources and removals by sinks and is directed primarily to certified auditors since the verification has to be completed by an independent party.

11.5 Climate Change Act

The objects of the Act are to:

- a. provide for a coordinated and integrated response to climate change and its impacts by members of the public and all spheres of government;
- b. provide for the effective management of inevitable climate change impacts;
- c. make a fair contribution to the global effort to stabilise greenhouse gas concentrations in the atmosphere;
- d. give effect to the Republic's international commitments and obligations in relation to climate change; and
- e. protect and preserve the planet for the benefit of present and future generations.

The Act focuses largely on government interventions whereby every organ of state that exercises a power or performs a function that is affected by climate change, or is entrusted with powers and duties aimed at the achievement, promotion and protection of a sustainable environment must review and if necessary, revise, amend, coordinate and harmonise their policies, plans, programmes and decisions or decision-making processes, in order to—

- a. ensure that the risks of climate change impacts and associated vulnerabilities are taken into consideration; and
- b. give effect to the principles and objectives set out in this Act.

Every organ of state, province and municipality must therefore prepare a climate action plan.

The Act was signed on 23 July 2024 (GG No 50966 Vol 709) and will come into effect on a date fixed by the President by proclamation in the Gazette. Its focus is largely on the three tiers of government.

In addition to the Climate Change Act, a Presidential Climate Commission was formed in 2020 to facilitate and oversee this ambitious, just, and inclusive response to climate change to a climate-resilient green economy. The Commission is also tasked with advising government on the efficacy of its response to climate change

In its first independent assessment of the state of climate action in South Africa (The State of Climate Action in South Africa: Priorities for the Government of National Unity date July 2024).

Key findings from the report include the following:

- South Africa has a strong commitments and public support for tackling climate change and facilitating a just transition, however, progress is not happening at the pace and scale required to tackle a crisis of such proportion;
- Key barriers hindering progress include incoherent policies, weak governance structures, insufficient finance, inconsistent action by the government and other stakeholders;
- There is mismatch between commitments and actions, notably there is a strong public support and policy commitments for acting on climate change and driving a just transition in South Africa, but a disparity between policy ambitions and practical outcomes;
- Local governments have inadequate technical and financial capacity which constraints their role as the frontline responders to climate change and just transition;
- South Africa falls short on financing climate adaptation.

11.6 South Africa's Low-emission Development Plan

Changes in land use can result in the release of carbon stocks. The National Terrestrial Carbon Sinks Assessment (NTCSA) (2015) indicated that transformation of land through land uses including crop agriculture can reduce soil carbon by 40-60% from what previously existed in a natural grassland and savannah. Further, urban expansion and mining reduces above and below ground carbon, as does land degradation which increases soil erosion. In terms of total carbon sequestration, despite the small overall land coverage by forests (plantations and natural forests), over 90% of CO₂, absorbed in 2015, was attributed to forestland with the remainder being absorbed by grassland and savannah.

A draft Climate Change Mitigation Plan for the South African Agricultural and Forestry sectors, the Conservation Agricultural Policy and the Agroforestry Strategic Framework for South Africa have been developed to identify mitigation actions. For forestry, further growth in the establishment of plantations will lead to the sequestration of atmospheric carbon in soils and biomass.

However, the mitigation in the Agriculture, Forestry and Other Land Use (AFOLU) sector is limited in its extent, with the promotion of land afforestation, conservation agriculture farming methods (no-till, conservation till, precision farming, reduction of fuel consumption of farm vehicles, increasing yields and reduction in fertiliser use) and agroforestry the only real contributions to mitigation.

STATEMENT OF INTENT:

Registration and reporting of greenhouse gases must be in accordance with the National Environmental Management: Air Quality Act, 2004 (Act No 39 of 2004) National Greenhouse Gas Emission Reporting Regulations (Government Gazette No. 40762) of 2017.

Any person in control of or conducting an activity above the threshold of 100 ha of plantation must register all facilities (area of plantations) in terms of the National Greenhouse Gas Emission Reporting Regulations, 2017.

11.7 Carbon Tax Act

The GHG emissions reported by companies will be used as the basis for the carbon tax calculations. Companies in control of certain GHG emitting activities and with an associated capacity exceeding a predetermined threshold will be required to submit GHG emission data in a format prescribed by the Regulations. The IPCC categorises emission sources according to activities which are divided into the following categories: energy; industrial processes and product use (IPPU); (AFOLU); and waste.

Agriculture, forestry, other land use and waste sectors will be excluded from paying a carbon tax during the first five-year period largely due to the administrative difficulties in measuring and verifying emissions from this sector. The intention is to include them in the carbon tax regime five years after the promulgation of the Carbon Tax (1 June 2019) – i.e. 2024. However, a Carbon Tax Discussion Paper: Phase Two of the Carbon Tax published on 13 November 2024 proposes that the blanket exclusion and provision of the 100 percent basic tax-free allowance is retained for the next five-year period (until 2030). FSA will resist attempts to impose such a tax on an industry where emissions are minor. Plantations are the major contributor to carbon sequestration and storage of carbon in harvested wood products

In terms of ownership of credits or debits, liability for emissions from Harvested Wood Products (HWPs) outside the mill gate should be responsible of the user downstream of the primary HWP facility. This means that users of paper, pulp or wood products should be responsible for emissions from the products and this is not a debit against the primary processing facility. The rationale is the same for fertiliser or fossil fuel use, where users, not producers, are liable for emissions as a result of using the products. As a result, all carbon leaving the mill gates in paper, pulp, woodchips, bio-products or sawn timber should count as a credit for carbon tax purposes.

In accordance with the GHG Reporting Regulations and Carbon Tax Act, the reporting and accounting of GHG emissions/removals should be reported and accounted for annually. Reporting and verification of information should be done in such a way that there are checks and balances relating to the inflow of harvest into the HWP pool and the relationship between harvest and growth of forests.

As set out in the GHG Reporting Regulations, the threshold for registering and reporting on plantations is 100 ha. Mills use or purchase timber from its own plantations, as well as from external suppliers, many of which are smaller plantations. Support to smaller plantations provides a secure off-take and facilitates the sustainability of these plantations and associated socio-economic benefits.

All timber flows to mills are controlled and managed through a “Chain of Custody” control system. Every supplier and source of timber is labelled with a unique number, with a database of information on the supplier, product/species, tree age and mass, as well as the FSC accreditation status. Orders and invoices that are generated for each load include the suppliers name, product description, date of delivery and the quantity.

Where carbon credits have not been claimed by any entity for timber harvested, then these should be transferred to the purchaser of the wood, as the mill will be responsible for production of harvested wood products and carbon storage. The data management system will ensure that the source of wood can be verified and that there is no double counting of carbon credits. Regeneration of harvested sites is also audited by the mills to verify that the mass balance of timber is conserved. This is a requirement for FSC accredited plantations and is audited annually. Timber from other non-certified plantations is monitored and independently audited annually to ensure sustainable production. Records are maintained of harvesting dates and when areas are re-planted.

Chapter 12

1. Environmental Incidents and disasters



There are two Acts that require measures to be taken in relation in the event of an environmental incident or disaster.

NEMA (Act 107 of 1998) section 28 provides for a general duty of care to take “reasonable measures” in the following circumstances:

“Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.”

12.1 The Disaster Management Act

The importance of this section lies in its generality in that it applies to “every person” and also applies to a significant pollution or degradation that-

- a. occurred before the commencement of this Act;
- b. arises or is likely to arise at a different time from the actual activity that caused the contamination; or
- c. arises through an act or activity of a person that results in a change to pre-existing contamination.

The word “significant” has been described in more detail in Chapter 2.1.2 sub-paragraph “when is pollution or degradation significant?”

Without limiting the generality of the duty of care every person who is obliged to take reasonable measures, include an owner of land or premises, a person in control of land or premises or a person who has a right to use the land or premises on which or in which:

- a. any activity or process is or was performed or undertaken; or
- b. any other situation exists, which causes, has caused or is likely to cause significant pollution or degradation of the environment.

The measures required include to:

- a. investigate, assess and evaluate the impact on the environment;
- b. inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment;
- c. cease, modify or control any act, activity or process causing the pollution or degradation;
- d. contain or prevent the movement of pollutants or the causant of degradation; (Note: causant is correct!!!)
- e. eliminate any source of the pollution or degradation; or
- f. remedy the effects of the pollution or degradation.

Control of Incidents (Section 30)

Section 30 of the NEMA defines:

- a. an ‘incident’ as an unexpected, sudden and uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property;
- b. a ‘responsible person’ as any person who:
 - i. is responsible for the incident;
 - ii. owns any hazardous substance involved in the incident; or
 - iii. was in control of any hazardous substance involved in the incident at the time of the incident

The responsible person, of his/her employer where the incident occurred must immediately report the incident to the Director General (this would be the DG in the DWS, but for practical purposes, the Regional Head Office of the DWS, and/or the Regional Offices of the DFFE, the SA Police Services, the relevant Fire Protection Association, the relevant provincial head or municipality and all persons whose health may be affected by the incident. Section 30 (4)

to (10) of the Act stipulate the immediate measure that must be taken as soon as is reasonably practicable to minimise the effects on the environment and on people's health.

It is suggested that a proactive stance be adopted and an Emergency Action Plan be developed and made easily available - infographic poster/detailed written instructions/training, etc.

Emergency situations (section 30A)

In this section 'emergency situation' means a situation that has arisen suddenly that poses an imminent and serious threat to the environment, human life or property, including a 'disaster' as defined in section 1 of the Disaster Management Act, 2002 (Act 57 of 2002), but does not include an incident referred to in section 30 of this Act.

In the event of an emergency situation, Section 30A of NEMA provides for the competent authority on its own initiative or on written or oral request from a person, to direct a person verbally or in writing to carry out a listed or specified activity, without obtaining an environmental authorisation in order to prevent or contain an emergency situation or to prevent, contain or mitigate the effect of the emergency situation. The competent authority may direct the person to undertake specific measures within a specific time period in order to prevent or contain an emergency situation or to prevent, contain or mitigate the effects of the emergency situation. This means that, in an emergency, the competent authority is permitted to circumvent an activity that would normally require an environmental authorisation, but where it is necessary to intervene to protect the environment from further damage or to protect people's health or lives. This directive can be given to any responsible person. It may be the landowner, the municipality, an environmental control officer or a person specifically appointed by the responsible person to undertake remedial work.

The Disaster Management Act (No 57 of 2002 amended by the Disaster Management Amendment Act 15 of 2016) provides an integrated and coordinated disaster management policy that focuses on preventing or reducing the risk of disasters, mitigating the severity of disasters, emergency preparedness, rapid and effective response to disasters and post-disaster recovery. The act also ensures the establishment of national, provincial and municipal disaster management centres and disaster management volunteers.

Disaster is defined as a progressive or sudden, widespread or localised, natural or human-caused occurrence which causes or threatens to cause:

- Death or disease;
- Damage to property, infrastructure or the environment;
- Significant disruption to the life of a community;
- Or is of a magnitude that exceeds the ability of those affected by the disaster to cope with its effects using their own resources.

Measures that can be used

- ✓ Owners of land must take reasonable measures to prevent pollution or degradation of land and water from occurring, continuing or recurring.
- ✓ An Emergency Action Plan should be developed that focuses on preventing or reducing the risk of environmental incidents and disasters, mitigating the severity of such environmental incidents and disasters, emergency preparedness, rapid response to disasters and post-disaster recovery.

STATEMENT OF INTENT

Any incident that is unexpected, sudden and uncontrolled and has the potential to release a hazardous substance, including emissions, fires or explosions, and may cause significant harm to the environment, human life or property must be regarded as an environmental incident or disaster and responded to accordingly or as directed by the responsible authority.

12.2 Hazardous Substances Act (No. 15 of 1973)

The Hazardous Substances Act has been included in Chapter 12 as emergency situations/pollution incidents are likely to arise in relation to the use, operation, application, transport, disposal or dumping of such substances and products.

The Hazardous Substances Act is probably the most important chemical regulation in South Africa. It controls the production, import, use, handling and disposal of hazardous substances. Under the Act, hazardous substances are defined as substances that are toxic, corrosive, irritant, strongly sensitizing, flammable and pressure generating under certain circumstances and may injure, cause ill-health or even death in humans.

Hazardous substances are classified into 4 groups (see below). Anyone who intends to sell or distribute group 1 hazardous substances must apply for a license from the health authority first.:

- Group I: industrial chemicals (IA) and pesticides (IB)
- Group II: nine classes of wastes excluding Class 1: explosives and Class 7: radioactive substances
- Group III: electronic products and group
- Group IV: radioactive substances

Regulations of Hazardous Chemical Agents (HCA) (2021)

The Minister of Employment and Labour under section 43 of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), repeals the Hazardous Chemical Substances, 1995, and published new regulations known as the Regulations of Hazardous Chemical Agents (HCA) on 29 March 2021 (GG 443348 No R.280)

The newly published regulation applies to employers and self-employed individuals who carry out work at a workplace which may expose any person to an HCA at that workplace; as well as manufacturers, importers, and suppliers.

The Regulations have been aligned with the global practice in terms of the UN Globally Harmonised System. The changes from the Hazardous Chemical Substances Regulations, 1995 include, inter alia:

- The inclusion of new definitions (“Carcinogen” or “CARC”; “CAS Number” or “chemical identity”; “chemical agent”; “consumer product”; “container”; “cut-off value” or “GHS cut-off value” or “GHS concentration limit”, “Hazardous Chemical Agent” or “HCA”, etc.)
- More comprehensive training requirements on Hazardous Chemical Agents (“HCA”).
- Specific requirements relating to hazardous chemical agents to be included in mandatory agreements made in terms of section 37(2) of the Occupational Health and Safety Act 85 of 1993.
- The prohibition on the manufacturing, procurement, use, handling, or storage in the workplace of prohibited hazardous chemical agents, ozone-depleting substances and prohibited persistent organic pollutants.
- Classification of chemical agents as hazardous chemical agents by the manufacturer or importer of such chemical before it is supplied in the workplace.
- Preparation of Safety Data Sheet by the importer or manufacturer before manufacture, and if it is not reasonably practicable, immediately after manufacture but before import.
- More detailed labelling requirements for hazardous chemical agents.
- More detailed packaging requirements for hazardous chemical agents.

Employers and self-employed persons must acquaint themselves with the new Regulations, particularly where they relate to an employer who undertakes work which is liable to expose an employee to an HCA. Before any employee is exposed or may be exposed, after consultation with the health and safety committee established for that section of the workplace, must provide that employee with suitable and sufficient information, instruction and training, as well as thereafter inform, instruct and train that employee at intervals as may be recommended by that health and safety committee.

Measures that can be used

- ✓ Employers and self-employed persons must ensure accredited training is provided to employees who undertake work which is liable to expose an employee to an Hazardous Chemical Agents
- ✓ Employers and self-employed persons must provide employees with suitable PPE

STATEMENT OF INTENT

Employers and self-employed persons must acquaint themselves with the Hazardous Substances Regulations, particularly where they relate to an employer who undertakes work which may expose an employee to Hazardous Chemical Agents (HCA) and must provide any such employee with sufficient information, instruction, training and PPE.

Appendix 1

National Environmental Management Act and the Environmental Impact Assessment Regulations

Additional Information for Noting

South Africa's first dedicated environmental statute was the Environment Conservation Act 100 of 1982 (the ECA). It did not contain much in the way of substantive provisions regarding environmental management, dealing largely with the co-ordination of environmental matters within Government. It was replaced by the Environment Conservation Act 73 of 1989, which has, to all intents and purposes, been superseded by NEMA.

NEMA was founded on the White Paper on Environmental Management Policy for South Africa (1998) which was developed through an extensive public participation process. Two important characteristics of the White Paper and thus NEMA were, firstly, the emphasis placed on "sustainable development" and secondly, the emphasis in the White Paper on the transition to democracy and its socio-economic implications.

A typical national environmental policy usually attempts to be broad ranging, which can be problematic as the administration of government affairs is usually arranged along sectoral lines. Nevertheless, the incorporation of the intent of the Policy into law can only be lauded.

NEMA contains a number of environmental principles, which clearly state that they apply to "all organs of state". What is not clear is whether they apply to private legal citizens, that is the private sector in general; but it appears to be generally accepted that principles are in fact not only applicable to organs of state but also private juristic persons.

Important to note is that this obligation is non-exhaustive in that it refers to "every person". Despite this, NEMA later clarifies that there are three classes of person; an owner of land or premises, a person in control of land or purposes (such as a lessee) and sub-lessees, contractor and subcontractors.

In addition, the section has a retrospective effect, meaning that if a person had, for example, stored hazardous material on their property for decades, they would be obliged to undertake remedial work.

The persons referred to above do not have an absolute duty to prevent pollution or environmental damage, although the measures are wide ranging and include:

- investigate, assess and evaluate the impact on the environment;
- inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment;
- cease, modify or control any act, activity or process causing the pollution or degradation;

- contain or prevent the movement of pollutants or the causes of degradation;
- eliminate any source of the pollution or degradation; and
- remedy the effects of the pollution or degradation.

No guidelines are currently on offer as to what constitutes “significant” or in what context the word is used. However, foresters should be aware of the “Duty of Care” as a matter of principle and take all practicable steps possible to avoid unnecessary impacts on the environment as a result of forestry operations. These aspects are treated in more detail in the Guideline which essentially is a guide to best practice in the forestry Industry that seeks to minimise the impacts of forestry on soil, water, biodiversity, ecosystem services, ecosystem infrastructure and heritage resources.

When is pollution or degradation “significant”?

NEMA does not define what constitutes significant pollution or degradation. In the case of *Hichange Investments (Pty) Ltd v Cape Produce Company (Pty) Ltd t/a Pelts Products* 2004 (2) SA 393 (E), the Court, in discussing the meaning of the same term used in the duty of care in section 28(1), held that the assessment of what is significant is a subjective one and the standard is not a particularly high one. Legal academic Glazewski referred to this question and remarked that “[t]his must be considered in the light of the constitutional right to an environment conducive to health and well-being, as well as the relevant principles in the NEMA...” Glazewski referred specifically to the precautionary and polluter pays principles and continued: “If so viewed it is suggested that the threshold level of significance is not particularly high”. Jan Glazewski, *Environmental Law in South Africa*, Butterworths, First Edition, 2000: 178. Also see the Second Edition, 2005:150.

If the “reasonable measures” are not taken, the Director General or a provincial head of Department may direct a person who fails to take these measures, to do so. However, there are many checks and balances that need to be taken into account, such as the severity of any impact on the environment and the costs of any measure being considered. Since it is unlikely that a farmer who already operates his/her forestry operations in compliance with the law would ever be served a directive to take reasonable measures to prevent degradation, or further degradation of the environment, no further explanation of the “Duty of Care” principle will be addressed. Suffice it to say that implementation of the Guidelines (this document) should serve as evidence of a farmer’s responsible approach to protection of the environment.

The inclusion of both the terms “pollution” and “degradation” can be misinterpreted, especially by the regulatory authorities. The terms “pollution” is defined as:

“any change in the environment caused by –

- i. substances;
- ii. radioactive or other waves; and
- iii. noise, odours, dust or heat.

emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in or by any person or an organ of state, where that change has an adverse effect on human health or wellbeing or on the composition, resilience and productivity of natural or managed ecosystems or on material useful to people, or will have such an effect in the future.”

The application of the term “pollution” is normally through specific environmental acts or regulations, such as the NEM: Air Quality Act, which sets standards for air emission limits. However, the term “degradation” is not defined in law in SA, so one must revert to the definition found in a dictionary. The Concise Oxford English Dictionary (Eleventh Edition (revised) 2006) defines degradation as *“the condition or process of degrading or being degraded”*, which is not particularly helpful. However, the word “degrade” means *“to lower the character or quality of”* as well as to *“cause to break down or deteriorate”*. But it must be noted that if such *“pollution or degradation of the environment is authorised in law, then that person must take steps tominimise....such pollution or degradation”*. As stated earlier, the application of these Guidelines should be sufficient to minimise any transformation of the environment that has been authorised in law.

The area where a forester is most likely to be exposed to environmental laws and management is in the planting of new land to commercial trees. Section 24 of NEMA provides for certain listed activities that may not commence without an environmental authorisation from the relevant provincial environmental affairs Department (competent authority), or in some cases, from the national DFFE. “The physical alteration of virgin soil to agriculture, or afforestation for the purposes of commercial tree, timber or wood production of 100 hectares or more” is one such “listed activity”.

The application process, in order to obtain such environmental authorisation, requires that an environmental assessment must be carried out by an independent Environmental Assessment Practitioner (EAP). There are three lists of activities identified by the Minister that require environmental authorisation prior to being undertaken. The first list requires a basic assessment due to their acknowledged lower impact, while the second list, requires a more intensive assessment; viz. a Scoping Report and a full Environmental Impact Assessment (EIA). The third list contains activities identified in specific areas in the different provinces and require a basic assessment.

Note also that NO listed activity should be commenced in the absence of an environmental authorisation issued by the competent authority. Further, that such an environmental authorisation contains a list of conditions and compliance with such conditions is essential to avoid possible prosecution. An environmental authorisation has a timeframe within which commencement of the authorised activity must occur. Failure to do so may result in the withdrawal of the environmental authorisation.

The listed activities are comprehensive, and the Guideline has extracted only those that are most likely to be encountered by a forester or organisation involved in the timber industry. Since all these activities require the use of an independent environmental assessment practitioner (EAP), foresters are urged to discuss any development, expansion or transformation of land on their farm in the planning stages with an accredited EAP. This will ensure that legal compliance is followed.

This Guideline will not provide much detail on the process to be followed since the procedure is defined in law and must be followed by the appointed independent EAP. The focus will rather be on ALL the activities that a forester may encounter and which may therefore require an environmental impact assessment and subsequent environmental authorisation. The current listed activities which could apply to a forester and forestry activities are as follows:

Note that the most common activities are underlined

Listing Notice 1 Appendix 1 (Basic Assessment)

- Activity Number 12 – The development of:
 - i. dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or
 - ii. infrastructure or structures with a physical footprint of 100 square metres or more;where such development occurs—
 - a. within a watercourse;
 - b. in front of a development setback; or
 - c. if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —excluding—
 - aa. ...
 - bb. ...
 - cc. activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;
 - dd. where such development occurs within an urban area;
 - ee. where such development occurs within existing roads, road reserves or railway line reserves; or
 - ff. the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.
- Activity Number 13 – The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014
- Activity Number 19 – The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving —
 - a. will occur behind a development setback;
 - b. is for maintenance purposes undertaken in accordance with a maintenance management plan;
 - c. falls within the ambit of activity 21 in this Notice, in which case that activity applies;
 - d. ...
- Activity Number 19a – The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from—
 - i. the seashore;
 - ii. the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater; or

- iii. the sea; —
 - but excluding where such infilling, depositing , dredging, excavation, removal or moving —
 - f. will occur behind a development setback;
 - g. is for maintenance purposes undertaken in accordance with a maintenance management plan;
 - h. falls within the ambit of activity 21 in this Notice, in which case that activity applies;
 - i. ...
- Activity Number 24 – The development of (i) a road for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; a road with a reserve of 13.5 m or where no reserve exists where the road is wider than 8 m; BUT excluding roads which are identified and included in activity 27 Listing Notice 2 of 2014 (this notice); or roads where the entire road fall within an urban area

The development of a road —

 - i. for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or
 - ii. with a reserve wider than 13,5 m, or where no reserve exists where the road is wider than 8 m;

but excluding a road —

 - a. which is identified and included in activity 27 in Listing Notice 2 of 2014;
 - b. where the entire road falls within an urban area; or
 - c. which is 1 kilometre or shorter.
- Activity Number 26 – Residential, retail, recreational, tourism, commercial or institutional developments of 1 000 square metres or more, on land previously used for mining or heavy industrial purposes; excluding —
 - i. where such land has been remediated in terms of part 8 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; or
 - ii. where an environmental authorisation has been obtained for the decommissioning of such a mine or industry in terms of this Notice or any previous NEMA notice; or
 - iii. where a closure certificate has been issued in terms of section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) for such land.
- Activity Number 27 – The clearance of an area of 1 hectare or more but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for —
 - i. the undertaking of a linear activity; or
 - ii. maintenance purposes undertaken in accordance with a maintenance management plan.
- Activity Number 28 – Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:
 - i. will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or

- ii. will occur outside an urban area, where the total land to be developed is bigger than 1 hectare excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.
- Activity Number 29 – The release of genetically modified organisms into the environment, where assessment for such release is required in terms of the Genetically Modified Organisms Act, 1997 (Act 15 of 1997) or the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2001).
- Activity Number 30 – Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (Note: this would be any process or activity in a listed ecosystem identified as a threatening process. To date this has not occurred).
- Activity Number 35 – The expansion of residential, retail, recreational, tourism, commercial or institutional developments on land previously used for mining or heavy industrial purposes, where the increased development footprint will exceed 1 000 square metres; excluding –
 - i. where such land has been remediated in terms of part 8 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; or
 - ii. where an environmental authorisation has been obtained for the decommissioning of such a mine or industry in terms of this Notice or any previous NEMA notice; or
 - iii. where a closure certificate has been issued in terms of section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) for such land.
- Activity Number 48 – The expansion of –
 - i. infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or
 - ii. dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more;
 where such expansion occurs –
 - a. within a watercourse;
 - b. in front of a development setback; or
 - c. if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;
 excluding –
 - aa. ...
 - bb. ...
- Activity Number 50 – The expansion of facilities or infrastructure for the storage of water, including dams and reservoirs where the combined capacity will be increased by 50 000 m³ or more;
- Activity Number 54 – The expansion of facilities –
 - i. in the sea;
 - ii. in an estuary;
 - iii. within the littoral active zone;
 - iv. in front of a development setback; or
 - v. if no development setback exists, within a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever is the greater; in respect of –

- a. fixed or floating jetties and slipways;
 - b. tidal pools;
 - c. embankments;
 - d. rock revetments or stabilising structures including stabilising walls; or
 - e. infrastructure or structures where the development footprint is expanded by 50 square metres or more,
- but excluding —
- aa. ...
 - bb. where such expansion occurs within an urban area.
- Activity Number 56 – The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre –
 - i. where the existing reserve is wider than 13.5 metres; or
 - ii. where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.
 - Activity Number 63 – The expansion of facilities or infrastructure for the transfer of water from and to or between any combination of the following—
 - i. water catchments;
 - ii. water treatment works; or
 - iii. impoundments;

where the capacity will be increased by 50 000 cubic metres or more per day but excluding water treatment works where water is treated for drinking purposes.
 - Activity Number 66 – The expansion of a dam where —
 - i. the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, was originally 5 metres or higher and where the height of the wall is increased by 2.5 metres or more; or
 - ii. where the high-water mark of the dam will be increased with 10 hectares or more.
 - Activity Number 67 – Phased activities for all activities –
 - i. listed in this Notice, which commenced on or after the effective date of this Notice or similarly listed in any of the previous NEMA notices, which commenced on or after the effective date of such previous NEMA Notices; excluding the following activities listed in this Notice –
 - 17(i)(a-d);
 - 17(ii)(a-d);
 - 17(iii)(a-d);
 - 17(iv)(a-d);
 - 17(v)(a-d);
 - 20;
 - 21;
 - 22;
 - 24(i);
 - 29;
 - 30;
 - 31;
 - 32;
 - 34;
 - 54(i)(a-d);

54(ii)(a-d);

54(iii)(a-d);

54(iv)(a-d);

54(v)(a-d);

55;

61;

64; and

65; or

ii. listed as activities 5, 7, 8(ii), 11, 13, 16, 27(i) or 27(ii) in Listing Notice 2 of 2014 or similarly listed in any of the previous NEMA notices, which commenced on or after the effective date of such previous NEMA Notices;

where any phase of the activity was below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold.

Listing Notice 2 Appendix 1 (Full scoping report and EIA)

- Activity Number 11 – The development of facilities or infrastructure for the transfer of 50 000 cubic metres or more water per day, from and to or between any combination of the following –
 - i. water catchments;
 - ii. water treatment works; or
 - iii. impoundments;excluding treatment works where water is to be treated for drinking purposes.
- Activity Number 13 – The physical alteration of virgin soil to agriculture, or afforestation for the purposes of commercial tree, timber or wood production of 100 ha or more;
- Activity Number 15 – The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for –
 - i. the undertaking of a linear activity; or
 - ii. maintenance purposes undertaken in accordance with a maintenance management plan.
- Activity Number 16 – The development of a dam where the highest part of the dam wall as measured from the outside toes of the wall to the highest part of the wall is 5 m or higher, or where the high water mark of the dam covers an area of 10 ha or more.
- Activity Number 27 – The development of a road –
 - i.
 - ii.
 - iii. with a reserve wider than 30 metres; or
 - iv. catering for more than one lane of traffic in both directions;but excluding a road—
 - a. for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010, in which case activity 24 in Listing Notice 1 of 2014 applies;
 - b. which is 1 kilometre or shorter; or
 - c. where the entire road falls within an urban area.

Listing Notice 3 Appendix 1

An EIA is required in specific identified geographical areas only – since the EIA requirements differ in each of the nine Provinces the reader is referred to the relevant Government Gazette for guidance in this regard, viz. Environmental Impact Assessment Regulations: Listing Notice 3 of 2014 as amended in July 2018.

NOTE: Geographical areas based on environmental attributes: The various Provinces have different requirements in terms of areas that may require an environmental authorisation for a listed activity and may differ depending whether the activity is proposed to be established in an urban area or outside an urban area. It stands to reason that the requirements are less strict within an urban area than outside an urban area, since the character of the two categories are largely different. Since most forestry areas will be outside an urban area, the Guideline will focus on this category. These include, for example, outside an urban area, some of the following:

- a protected area identified in terms of the National Environmental Management: Protected Areas Act No. 57 of 2003 (NEMPAA) but excluding conservancies;
- National Protected Area Expansion Strategy Focus Areas;
- sensitive areas as identified in an environmental management framework
- sites or areas identified in terms of an international convention;
- critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
- core areas in biosphere reserves; areas within 10 kms of National Parks or World Heritage Sites or 5 kms from any protected areas declared in terms of NEMPAA) or from the core area of a biosphere reserve;
- sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs);
- sites identified within threatened ecosystems identified in terms of the National Environmental Management: Biodiversity Act (NEMBA);
- sites managed as protected areas by Provincial authorities or declared as nature reserves in terms of a Provincial Nature Conservation Ordinance;
- sites designated as nature reserves in municipal Spatial Development Frameworks (SDFs);
- important bird and biodiversity areas;
- trans-frontier protected areas managed in terms of international conventions;
- Community Conservation Areas;
- World Heritage Sites;
- Biodiversity Stewardship Programme Biodiversity Agreement areas;
- Activity Number 2 – The development of reservoirs, excluding dams, with a capacity of more than 250 cubic metres;
- Activity Number 3 – The development of masts or towers of any material or type used for telecommunication broadcasting or radio transmission purposes where the mast or tower – (i) is to be placed on a site not previously used for this purpose and (ii) will exceed 15 m in height – BUT excluding attachments to existing buildings and masts on rooftops;
- Activity Number 4 – The development of roads wider than 4 m with a reserve less than 13.5 m;
- Activity Number 7 – The development of aircraft landing strips and runways 1.4 km and shorter;
- Activity Number 10 – The development of facilities or infrastructure for the storage, or storage and handling, of a dangerous good where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 m³

- Activity Number 12 – The clearance of an area of 300 m² or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.
- Activity Number 14 – The development of –
 - i. dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or
 - ii. infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs –
 - a. within a watercourse;
 - b. in front of a development setback; or
 - c. if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.
- Activity Number 15 – The transformation of land bigger than 1 000 m² in size, to retail, residential, commercial, industrial or institutional use, where such land was zoned as open space, conservation or had an equivalent zoning on or after 02 August 2010.
- Activity Number 16 – The expansion of reservoirs, excluding dams, where the capacity will be increased by more than 250 cubic metres.
- Activity Number 18 – The widening of a road by more than 4 m or the lengthening of a road by more than 1 km².
- Activity Number 19 – The expansion of runways or aircraft landing strips where the expanded runway or aircraft landing strip will be longer than 1.4 kilometres in length.
- Activity Number 22 – The expansion and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage facilities or infrastructure will be expanded by 30 cubic metres or by more but no more than 80 cubic metres.
- Activity Number 23 – The expansion of –
 - i. dams or weirs where the dam or weir is expanded by 10 square metres or more; or
 - ii. infrastructure or structures where the physical footprint is expanded by 10 square metres or more;

where such expansion occurs —

 - a. within a watercourse;
 - b. in front of a development setback adopted in the prescribed manner; or
 - c. if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;

Note also that NO listed activity should be commenced in the absence of an environmental authorisation issued by the competent authority.

Appendix 2

National Environmental Management: Biodiversity Act Alien and Invasive Species Regulations

Additional Information for Noting

1. Invasive Species Monitoring, Control and Eradication Plans

Within one year of 1 October 2014 (by 1 October 2015) the Minister have to developed guidelines for the development of Invasive Species Monitoring, Control and Eradication Plans for Listed Alien Species (LIS). They were published in September 2015. These had to be published on the DFFE website and must be reviewed every five years. NOTE, that these are only guidelines for the development of such plans and NOT the plans themselves (see www.dffe.gov.za).

2. National Status Report

The 2022 status report “The Status of Biological Invasions in South Africa” can be found on www.sanbi.org/biodiversity/

3. Registers and Notification

Note: The issuing authority must establish and maintain a register of permits (including those that were refused), while a competent authority must establish and maintain a register of all notifications, directives and all Invasive Species Monitoring, Control and Eradication Plans. Note that in the case of all applications that were granted, a unique number must be assigned to each permit.

4. Risk Assessment

Section 87 of NEMBA provides, *inter alia*, for the issuing of permits authorising restricted activities involving alien species in terms of section 65 and listed invasive species in terms of section 71(1). A person may apply for a permit by lodging an application with the authority (on a prescribed form available on the DFFE website www.environment.gov.za). An issuing authority may request the applicant to furnish any additional information and require that the applicant to comply with such reasonable conditions as it may impose before granting the application. Before issuing a permit, the issuing authority may, in writing, require the applicant to furnish it, at the applicant’s expense, with an independent risk assessment or expert evidence as the issuing authority may determine (section 89). But in terms of section 91 of NEMBA, there are additional requirements relating to alien and invasive species, viz. that an issuing authority may issue a permit for a restricted activity involving a specimen of an alien species or a listed invasive species but only if (i) adequate procedures have been followed by the

applicant to assess the risks and potential impacts associated with the restricted activity; (ii) the relevant species has been found to have negligible or no invasive potential; (iii) the benefits of allowing the activity are significantly greater than the costs associated with preventing or remedying any resultant damage to the environment or biodiversity; and (iv) it is satisfied that adequate measures have been taken by the applicant to prevent the escape and spread of the species.

Therefore, any new afforestation or extension to an existing plantation in excess of 100 ha using the list of commercial forestry species contained in the AIS Lists, may require a risk assessment because a permit will be required to grow those species, which is a restricted activity. Subject to what is said above, existing commercial forestry plantations composed of species listed in the AIS Lists are exempted from requiring a permit for any restricted activity in terms of the Act, except in the Western Cape for certain pine species, which will require a permit to carry on with an existing plantation of certain species as well as for any extensions to an existing plantation or for a new plantation.

NEMBA allows for the issuing of integrated permits if the activity is also regulated in terms of another law. In the case of commercial forestry, this would be NWA for the regulation of a stream flow reduction activity, NEMA for the transformation/physical alteration of virgin soil to afforestation of 100 ha or more as identified by activity number 13 in Listing Notice 2 of 2014 (as amended) of the EIA Regulations and thus require an environmental authorisation and the National Heritage Resources Act which may require a heritage resources impact assessment.

5. Issuing, Amendments to or the Cancellation of Permits

A permit for commercial forestry species in new plantations can be issued for multiple restricted activities (possession, growing and transportation of seedlings), multiple specimens of species, multiple species and multiple instances of the same restricted activity.

An application for a permit must be made on a form to be obtained from the issuing authority. The application must:

- be submitted by the person to whom the permit must be issued or by such person's duly authorised representative (for example by a forestry company acting on behalf of a small grower or co-operative of small growers)
- be accompanied by the application fee as determined from time to time, (R100.00 for all restricted activities)
- be accompanied by details of the risk assessment facilitator and the risk assessment report
- any other additional information required by the issuing authority
 - be lodged with the issuing authority in a manner requested by the issuing authority and with the original or certified documentation in support of the application.

The issuing authority must request any further information within 30 days of receipt of the application and notify any Province that may be adversely affected by the proposed activity. The issuing authority must reach a decision within 60 days of receipt of the application but if further information is required, then the authority must make a decision within 30 days of receiving that additional information. If the application is approved, then the issuing authority must issue the permit and advise any objectors of the decision in writing. The notification must stipulate to which alien or invasive species the application relates, in the

case of forestry that the application relates to multiple specimens and what restricted activities are involved. This would be transporting from the nursery, planting, growing and having in possession, etc. A permit may not be issued with retrospective effect.

Finally, the issuing authority may issue a permit to carry out a restricted activity involving a specimen of an alien or listed invasive species subject to conditions which include control methods to be used as well as including the use of sterile varieties or the concurrent introduction of biological control agents.

Special provisions are made for the issuing of a permit to carry out a restricted activity involving a specimen of an alien or listed invasive species as part of a preliminary study into biological control methods or if the specimen forms part of an effective biological control programme. Restrictions and conditions are likely to be attached to such a permit

Permits may be amended for good reason, such as the adding or removing of a condition, amending a condition, amending any details on the permit and correcting a technical or editorial error. Permits may be renewed and accompanied by a renewal fee. (currently R50.00)

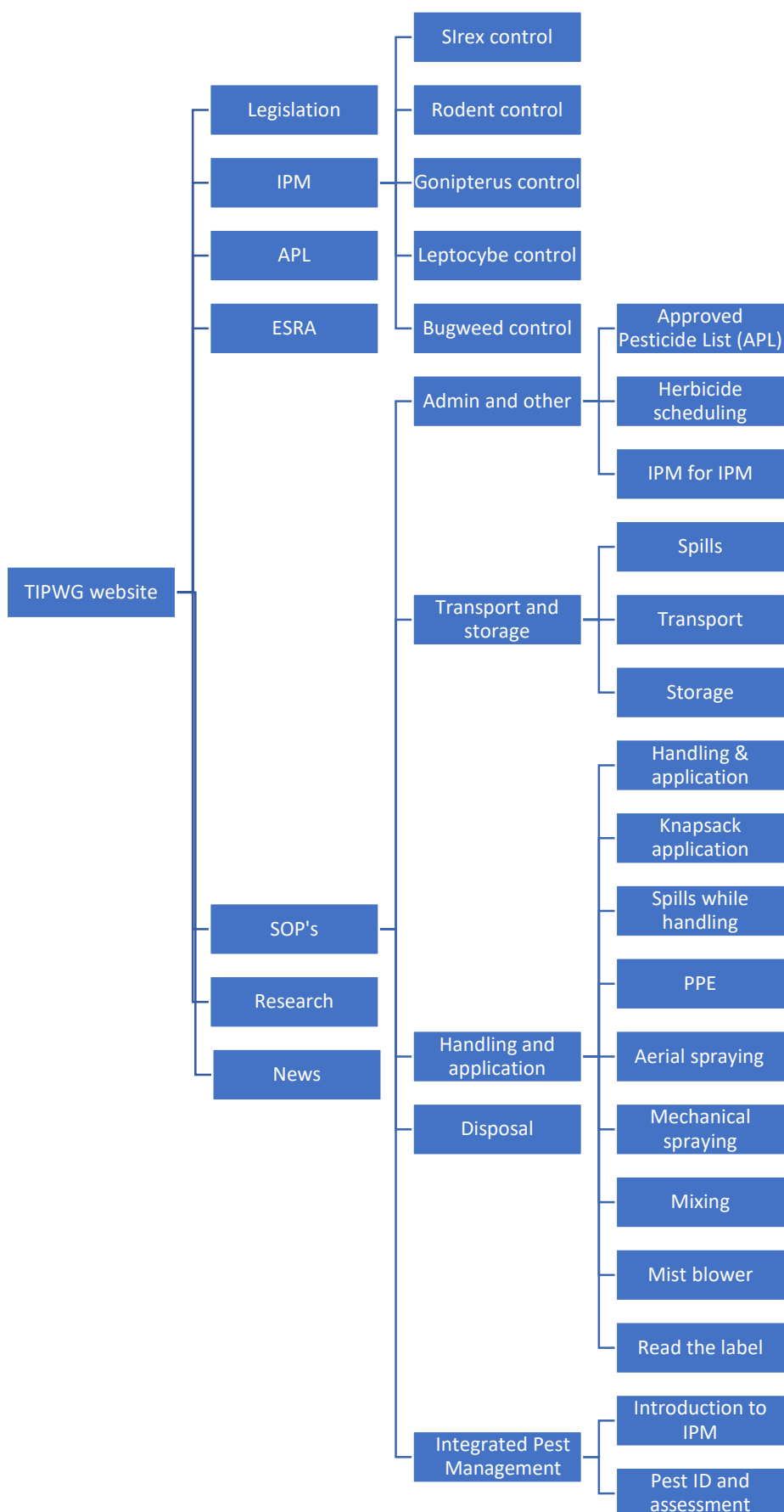
Finally, anyone who sells immovable property (land) must notify the purchaser of that property in writing of the presence of listed invasive species on that property. Note that the Listed Invasive Species include 559 species or groups of species, of which 379 are plants.

6. Compliance and Enforcement

Compliance and enforcement may be served by the issuing of directives by a competent authority. It should be noted that the Act (section 74) allows for any person to request a competent authority to issue a directive. The competent authority must reply to the request within 30 days, failing which the person who made the request may apply to a court for an order directing that the competent authority to issue the directive. This is a very powerful piece of legislation which, in effect, allows any person to ask a competent authority to issue a directive against a land owner to remove any listed invasive species from the owners land – the test is whether the landowner or permit holder is meeting his/her “duty of care” under NEMBA and the Regulations to prevent or minimise harm to biodiversity. An Annexure B form is provided with the new regulations for a request to issue a directive for a listed invasive species.

Appendix 3

The TIPWG flow chart



Glossary

A glossary is included for all terms that have a legal definition to ensure consistency of application. Terms have been used exactly as they appear in legislation or the Concise Oxford English Dictionary (Eleventh Edition (revised) 2006)) or as noted in definitions below with a different source such as Wikipedia

NEMBA	Biodiversity Act 2004 (Act of 2004)
NFA	National Forests Act, 1998 (Act No. 84 of 1998 as Amended)
COD	Concise Oxford English Dictionary
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998)
NEMWA	National Environmental Management: Waste Act
NWA	National Water Act, 1998 (Act 36 of 1998 as Amended)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
WRC	Water Resource Commission Report No. TT 610/14 p1

afforestation means to convert land into plantation forest for commercial exploitation (COD)

AFOLU: Agriculture, Forestry and Other Land-Use

agrochemical means a broad range of pesticide chemicals, including insecticide chemicals, herbicide chemicals, fungicide chemicals and nematicides. May also include synthetic fertilizers, hormones and other chemical growth agents (<http://en-wikipedia.org/wiki/Agrochemical>)

alter means any action affecting the structure, appearance or physical properties of a place or object, whether by way of structural works, by painting, plastering or other decoration or any other means. (NHRA).

alien species means –

- a species that is not an indigenous species; or
- an indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention (NEMBA).

archaeological means –

- a. material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures
- b. rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10 m of such representation
- c. wrecks, being vessels or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial water or in the maritime culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act 15 of 1994) and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which South African Heritage Resources Agency (SAHRA) considers to be worthy of conservation; and
- d. features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found (NHRA)

assessment, when used in Chapter 5 (of NEMA), means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to decision making (NEMA)

biological diversity means genetic diversity, species diversity and ecosystem diversity (NFA)

biological diversity or **biodiversity** means the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part, and also includes diversity within species, between species and of ecosystems (NEMABA)

buffer zone is a strip of land with a use, function or zoning specifically designed to protect one area of land against impacts of another (WRC)

carbon dioxide equivalent Global Warming Potential (GWP) means a metric that compares the radiative forcing a ton of greenhouse gas over a given period (e.g. 100 years for the purpose of annual greenhouse gas inventory) to a ton of carbon dioxide. By using GWPs, greenhouse gas emissions can be standardised to a carbon dioxide equivalent (CO₂-eq)

Carbon Tax Act came into effect on 1 June 2019 and provides for the imposition of a tax on the carbon dioxide equivalent of GHG emissions

competent authority in respect of a listed or specified activity, means the organ of state charged by this Act with evaluating the environmental impact of that activity and, where appropriate, with granting or refusing an environmental authorisation in respect of that activity (NEMA)

conservation, in relation to heritage resources, includes protection, maintenance, preservation and sustainable use of places or objects so as to safeguard their cultural significance (NHRA)

cultivation in relation to land, means any act by which the topsoil is disturbed mechanically and cultivated has a corresponding meaning (CARA)

cultivated in relation to land, means any act by which the topsoil is disturbed mechanically (NEMBA)

cultural significance means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance (NHRA)

damage-causing animals means wild vertebrate animals that, when interacting with humans or interfering with human activities, there is substantial proof that it –

- a. causes losses to stock or to wild specimens
- b. causes damage to cultivated trees, crops, natural flora or other property
- c. presents a threat to human life or
- d. is present in such numbers that agricultural grazing is materially depleted.

development means any physical intervention, excavation, or action, other than those caused by natural forces, which may, in the opinion of a heritage authority, in any way result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well being, including –

- a. construction, alteration, demolition, removal or change of use of a place or a structure at a place
- b. carrying out any works on or over or under a place
- c. subdivision or consolidation of land comprising a place including the structure or airspace of a place
- d. constructing or putting up a display, signs or hoardings

- e. any change to the natural or existing condition or topography of land and
- f. any removal or destruction of trees or removal of vegetation or topsoil (NHRA).

dormant plantation means a plantation that has not been operational, functioning as a plantation or does not have a valid authorisation in terms of section 22(1)(a) or (b) of NWA for a period of 10 years and where no reasonable attempt has been made to clear any listed invasive species

ecosystem means a system made up of a group of living organisms, the relationship between them and their physical environment (NFA)

ecosystem means a dynamic system of plant, animal and micro-organism communities and their non-living environment acting as a functional unit (NEMA)

environment includes the physical factors of the surroundings of human beings including air, land, water, climate, sound, light, odour, taste, micro-organism, the biological factors of animals and plants, cultural resources and the social economic factor of aesthetics and includes both the natural and the built environment” and the way they interact;

environmental assessment practitioner when used in Chapter 5 (of NEMA), means the individual responsible for the planning, management and coordination of the environmental impact assessments, strategic environmental assessments, environmental management plans or any other appropriate environmental instruments introduced through regulations (NEMA)

environmental authorisation when used in Chapter 5 (of NEMA), means the authorisation by a competent authority of a listed activity or specified activity in terms of the Act and includes a similar authorisation contemplated in a specific Environmental Management Act (NEMA)

exempted from an existing plantation means an existing plantation is exempted from requiring a permit for that specific species for any restricted activity in terms of NEMBA or the Alien and Invasive Species Regulation, 2014

existing plantation means a plantation which was operational, functioning and authorised to grow a specific listed invasive species in terms of section 22(1)(a) or (b) of NWA as at 18 October 2020 and does not include:

- a. any extension to a plantation;
- b. any new plantations, or
- c. any dormant plantation

which was established or recommissioned after 18 October 2020.

extension to a plantation means the increase of the area of the plantation beyond the limits, area or location specified in-

- a. a permit issued in terms of NEMBA or the Alien and Invasive Species Regulations, 2014; or
- b. an authorisation in terms of section 22(1)(a) or (b) of NWA; and
- c. the size of such extension will trigger the requirement to obtain and environmental authorisation in terms of the NEMA;

forest includes –

- a. a natural forest, a woodland and a plantation;
- b. the forest produce in it;
- c. the ecosystem which it makes up (NFA).

forest management unit means an area of land on all or on part of which there is a forest which is managed as an integrated unit (NFA)

forest product means an object or substance made from forest produce by a mechanical or chemical process (NFA)

forester means a person in charge of a forest or skilled in forestry (COD)

forestry means the management of forests, including the management of land which is not treed but which forms part of a forest management unit (NFA)

grave means a place of internment and includes the content, headstone or other marker of such a place, and any other structure on or associated with such a place (NHRA)

greenhouse gas means any of the following: Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O) “sulphur hexafluoride (SF₆), Perfluorocarbons (PFCs)” hydrofluorocarbons (HFCs) (NEM: AQA National Greenhouse Gas Reporting Regulations 2017)

habitat means the place where a plant or animal naturally grows or lives (NFA)

habitat means the place where a species or ecological community naturally occurs (NEMBA)

heritage resource means any place or object of cultural significance (NHRA)

heritage resources authority means the South African Heritage Resources Agency, established in terms of section 11 (of the NHRA), or, insofar as this Act is applicable in or in respect of a province, a provincial heritage resources authority

heritage site means a place declared to be a national heritage site by SAHRA or a place declared to be a provincial heritage site by a provincial heritage resources agency (NHRA)

indigenous means indigenous to South Africa (NFA)

indigenous species means a species that occurs or has historically occurred naturally in a free state in nature within the borders of the Republic but excludes a species that has been introduced into the Republic as a result of human intervention (NEMBA)

IPPC means the Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories (2006)

instream habitat means the physical structure of a watercourse and the associated vegetation in relation to the bed of the watercourse (NWA)

interested and affected party for the purposes of Chapter 5 (in NEMA) and in relation to the assessment of the environmental impact of a listed activity or related activity, means an interested and affected party contemplated in section 24(4)(a)(v) and which includes –

- any person, group of persons or organisation interested in or affected by such operation or activity; and
- any organ of state that may have jurisdiction over any aspect of the operation or activity (NEMA)

listed activity when used in Chapter 5 (in NEMA), means an activity identified in terms of section 24(2)(a) and (d)
(Note: those listed activities that are likely to apply to a forestry environment have been included in Appendix 1) (NEMA)

listed area when used in Chapter 5 (in NEMA), means a geographical area identified in terms of section 24(2)(b) and (c) (NEMA)

natural forest means a group of indigenous trees –

- a. whose crowns are largely contiguous; or
- b. which have been declared by the Minister to be a natural forest under section 7(2) (NFA).

National Greenhouse Gas Emission Reporting Regulations Government Gazette
No. 40762 of 2017

object means any movable property of cultural significance which may be protected in terms of any provisions of this Act, including –

- a. any archaeological artefact
- b. palaeontological and rare geological specimens;
- c. meteorites; or
- d. other objects referred to in section 3 (NHRA).

palaeontological means any fossilised remains or fossil traces of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use and any site which contains such fossilised remains or traces (NHRA)

pest means any species, strain or biotype of plant, animal or pathogenic agent injurious to plants and plant products, materials or environments and includes vectors of parasites or pathogens of human and animal disease and animals causing public health nuisance (Source: FAO International Code of Conduct on Pesticide Management).

pesticide means any substance, or mixture of substances of chemical or biological ingredients intended for repelling, destroying, or controlling any pest, or regulating plant growth. The term pesticide includes all of the following: herbicides, insecticides (which may include insect growth regulators, termiticides, etc.) nematocides, molluscicides, piscicides, avicides, rodenticides, bactericides, insect repellents, animal repellents, antimicrobials and fungicides

plantation means a group of trees cultivated for exploitation of the wood, bark, leaves or essential oils in the trees (NFA)

protected area means an area set aside by the Minister as a protected area in one of the categories referred to in section 8(1)

(Note: these categories include a State forest, a forest nature reserve, a forest wilderness area, or any other type of protected area which is recognised in international law or practice) (NFA)

protected tree means a tree declared to be protected, or belonging to a group of trees or woodland or species declared to be protected, under section 12(1) or 14(2) (NFA)

protection, in relation to a water resource means –

- a. maintenance of the quality of the water resource to the extent that the water resource may be used in an ecologically sustainable way
- b. prevention of the degradation of the water resource
- c. the rehabilitation of the water resource (NWA).

reserve means the quantity and quality of water required –

- a. to satisfy basic human needs by securing a basic water supply, as prescribed under the Water Services Act, 1997 (Act 108 of 1997), for people who are now or who will, in the reasonable near future, be –
 - i. relying upon
 - ii. taking water from; or
 - iii. being supplied from the relevant water resource; and
- b. to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource (NWA).

resource quality means the quality of all the aspects of a water resource including –

- a. the quantity, pattern, timing, water level and assurance on instream flows
- b. the water quality, including the physical, chemical and biological characteristics of the water
- c. the character and condition of the instream and riparian habitat; and
- d. the characteristics, condition and distribution of the aquatic biota (NWA).

restricted activity –

- a. applies to threatened or protected species
- b. in relation to a specimen of an alien species or listed invasive species, means –
 - i. importing into the Republic, including introduction from the sea, or air any specimen of an alien or listed invasive species;
 - ii. having in possession or exercising physical control over any specimen of an alien or listed invasive species;
 - iii. growing, breeding or in any other way propagating any specimen of an alien or listed invasive species, or causing it to multiply;
 - iv. conveying, moving or otherwise translocating any specimen of an alien or listed invasive species;
- c. selling or otherwise trading in, buying, receiving, giving, donating or accepting as a gift, or in any way acquiring or disposing of any specimen of an alien or listed invasive species;
- d. any other prescribed activity which involves a specimen of an alien or listed invasive species.

riparian habitat includes the physical structure and associated vegetation of the area associated with a water course which are commonly characterised by alluvial soils and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas (NWA)

species means any kind of animal, plant or other organism that does not normally interbreed with individuals of another kind and includes any sub-species, cultivar, variety, geographic race, strain, hybrid or geographically separate population

specified activity, when used in Chapter 5 (in NEMA), means an activity as specified within a listed geographical area in terms of section 24(2)(b) and (c) (NEMA)

specimen means –

- a. any living or dead animal, plant or other organism;
- b. a seed, egg, gamete or propagule or part of an animal, plant or other organism capable of propagation or reproduction or in any way transferring genetic traits;
- c. any derivative of any animal, plant or other organism;
- d. any goods which –
 - i. contain a derivative of an animal, plant or other organism
 - ii. from an accompanying document, from the packaging or mark or label, or from any other indications, appear to be or to contain a derivative of an animal, plant or other organism.

site means any area of land, including land covered with water and including any structure or objects thereon (NHRA)

structure means any building, works, device or other facility made by people and which is fixed to land and includes any fixture, fittings and equipment associated therewith. (NEMA)

tier means a method used for determining greenhouse gas emissions as defined by the “IPCC Guidelines for National Greenhouse Gas Inventories (2006)” and include:

- a. Tier 1 method: A method using readily available statistical data on the intensity of processes (activity data) and IPCC emission factors (specified in the Technical Guidelines for Monitoring, Reporting and Verification of Greenhouse Gas Emissions by Industry or available in from 2006 IPCC);
- b. Tier 2 method: similar to Tier 1 but uses country-specific emission factors;
- c. Tier 3 method: Tier 3 is any methodology more detailed than Tier 2 and might include, amongst others, process models and direct measurements as specified in the 2006 IPCC guidelines.

timber means –

- a. logs or
- b. wood that has been sawn or otherwise mechanically harvested (NFA)

tCO₂e means tons of carbon dioxide equivalent

transformation means a marked change in nature, form or appearance (COD)

tree includes any tree seedling, sapling, transplant or coppice shoot of any age and any root, branch, or other part of it (NFA)

untransformed land means land that has not been altered from its natural state, or land that has been used for natural grazing and including land that has been used for natural grazing and including land in its natural state that has been degraded by factors such as soil erosion, over-grazing, over-burning, flood, invasive species and bush encroachment (NEMBA AIS Regulations 2020)

victims of conflict mean –

- a. certain persons who died in any area now included in the Republic as a direct result of any war of conflict as specified in the regulations but excluding victims of conflict covered by the Commonwealth War Graves Act, 1992 (Act No. 8 of 1992)
- b. members of the forces of Great Britain and the former British Empire who died in active service in any area now included in the Republic prior to 4 August 1914

- c. persons who, during the Anglo-Boer War (1899-1902) were removed as prisoners of war from any place now included in the Republic to any place outside South Africa and who died there
- d. certain categories of persons who died in the “liberation struggle” as defined in the regulations and in areas included in the Republic as well as outside the Republic; (xxxviii).

virgin soil means land which, in the opinion of the executive officer, has at no time during the preceding ten years been cultivated (CARA)

watercourse means –

- a. a river or spring
- b. a natural channel in which water flows intermittently
- c. a wetland, lake or dam into which, or from which, water flows
- d. any collection of water which the Minister may, by notice in the Gazette, declare a watercourse and a reference to a watercourse includes, where relevant, its bed and banks (NWA).

water management area is an area established as a management unit in the national water resource strategy within which a catchment management agency will conduct the protection, use, development, conservation, management and control of water resources (NWA)

water resource includes a water course, surface water, estuary or aquifer (NWA)

wetland means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water and which land in normal circumstances supports or would support vegetation typically adapted to life on saturated soil (NWA)

wild vertebrate animal means a terrestrial vertebrate animal that is living and reproducing in natural conditions with no or limited human intervention

woodland means a group of indigenous trees which are not a natural forest but whose crowns cover more than 5% of the area bounded by the trees forming the perimeter of the group (NFA)

Additional Guidelines

In a publication such as this it is not the intention to include information contained in other guidelines. For those wanting more detailed information the following guidelines/publications/handbooks are recommended.

Anon. 2004. A guide to the use of herbicides. 18th ed. Department of Agriculture, Directorate: Food Safety and Quality Control

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