

GUIDELINES FOR SPECIES LISTED AS INVASIVE IN TERMS OF SECTION 70 OF NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004) (NEMBA) AND AS REQUIRED BY SECTION 76 OF THIS ACT







Biosecurity
Department of Environment Affairs
Private Bag X4390, CAPE TOWN, 8000



# GUIDELINES FOR MONITORING, CONTROL AND ERADICATION PLANS AS REQUIRED BY SECTION 76 OF THE NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004) (NEMBA) FOR SPECIES LISTED AS INVASIVE IN TERMS OF SECTION 70 OF THIS ACT

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Biosecurity
Department of Environment Affairs
Private Bag X4390, CAPE TOWN, 8000

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## **Annexes to these Guidelines**

- **a.** Annex 1. Government Notice, Regulation No. 598 National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations, 2014 (Government Gazette No. 37885).
- b. Annex 2. Government Notice, No. 599 National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species List, 2014 (Government Gazette No. 37886)

These Guidelines are relevant regardless of the type of statutory body (including municipal authorities) that is responsible for the land parcel, the size of the land parcel, the ecosystems it includes, and the type of Listed Invasive Species) that are to be managed in the land parcel.

# 1. Executive Summary

Management Authorities of all Protected Areas and of Organs of State (e.g. municipalities) are obliged in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) and its Regulations (Alien and Invasive Species Regulations, 2014). Section 76 of the Act requires that all Protected Area Management Authorities and all other "Organs of State in all spheres of government", including all municipalities, draw up an "Invasive Species Monitoring, Control and Eradication Plan for land under their control," [Hereafter termed a Control Plan]. These plans have to cover all Listed Invasive Species in terms of Section 70(1) of this Act.

The Guidelines have been drawn up to follow the legal requirements of the Act. They have been kept as simple and straight-forward as possible with minimal use of specialized terminology and acronyms. Hypothetical examples have been inserted wherever this has been thought to be useful. The Guidelines are intended to be usable by any land manager: However, the identification of Listed Invasive Species and some of the more technical aspects, such as measuring the extent of invasive species infestations and formulating optimal control strategies, or choosing optimal control techniques, should preferably be done either by an expert trained in the management of invasive species or with the assistance and guidance of such an expert.

The Guidelines include a generalised Table of Contents of a Control Plan, as a template which Management Authorities may wish to follow. There might have to be deviations from this template to meet the particular requirements of the area for which the plan is being drawn up. The Department of Environmental Affairs will, in time, be loading up examples of Control Plans on its website, to give practical expression to these Guidelines.

## 2. The Legislative and Policy Background to these Guidelines

The Regulations on the management of Listed Alien and Invasive Species under the National Environmental Management: Biodiversity Act [hereafter termed "NEMBA"] were promulgated on 1 August 2014 as Regulation Gazette No. 10244 in Volume 590 of the South African Government Gazette (Publication No. 37885). These regulations came into effect on 1 October 2014. (They are annexed to this report as Annex 1.)

In Chapter 4, "National Framework Documents", Section 8, entitled "Invasive Species Monitoring, Control and Eradication Plans", states *inter alia* that "The Minister must - (a) within one year of the date on which these regulations come into effect, develop guidelines for the development of Invasive Species Monitoring, Control and Eradication Plans for Listed Invasive Species as contemplated in section 76 of the Act".

The Listed Invasive Species were also published on 1 August 2014 as Government Notice No. 599 National Environmental Management: Biodiversity Act (10/2004): "Alien and Invasive Species List, 2014" also in Volume 590 of the South African Government Gazette (Publication No. 37886). In terms of the Act's Section 70 (1), 559 species /groups of species were listed (they are annexed to this report as Annex 2). It is the management of these species [hereafter termed "Listed Invasive Species"] that is covered by this Framework Guidelines Document. These Lists also came into effect on 1 October 2014. However, the Lists will be regularly updated, in order to correct nomenclature, and addressing other changes to the Listed Invasive Species. The first amended Lists are about to be published in the Government Gazette. Further updates will occur, and will be able to be found on the website after publication.

NEMBA Sections 75 and 76 are very specific in terms of who must develop these Invasive Species Monitoring, Control and Eradication Plans, what the plans must include and how they should be implemented, *i.e.*:

## "Control and eradication of listed invasive species

- 75. (1) Control and eradication of a listed invasive species must be carried out by means of methods that are appropriate for the species concerned and the environment in which it occurs.
- (2) Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.
- (3) The methods employed to control and eradicate a listed invasive species must also be directed at the offspring, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.
- (4) The Minister must ensure the coordination and implementation of programmes for the prevention, control or eradication of invasive species.
- (5) The Minister may establish an entity consisting of public servants to coordinate and implement programmes for the prevention, control or eradication of invasive species.

- **76.** (1) The management authority of a protected area preparing a management plan for the area in terms of the Protected Areas Act must incorporate into the management plan an invasive species control and eradication strategy.
- (2) (a) All organs of state in all spheres of government must prepare an invasive species monitoring, control and eradication plan for land under their control, as part of their environmental plans in accordance with section 11 of the National Environmental Management Act."
  - (b) The invasive species monitoring, control and eradication plans of municipalities must be part of their integrated development plans.
- (3) The Minister may request the Institute to assist municipalities in performing their duties in terms of subsection (2).
- (4) An invasive species monitoring, control and eradication plan must include -
  - (a) a detailed list and description of any listed invasive species occurring on the relevant land;
  - (b) a description of the parts of that land that are infested with such listed invasive species;
  - (c) an assessment of the extent of such infestation;
  - (d) a status report on the efficacy of previous control and eradication measures
  - (e) the current measures to monitor, control and eradicate such invasive species; and
  - (f) measurable indicators of progress and success, and indications of when the Control Plan is to be completed."

In preparing its guidelines for Control Plans by Protected Area Management Authorities and Organs of State, the Department of Environmental Affairs has taken into cognizance all other pertinent international and national legal requirements. These include international treaties, national laws, provincial ordinances and municipal bylaws and other relevant legislation. These are summarized in **Addendum B** 

The Control Plans for every Protected Area and every other relevant land area managed by an Organ of State (including municipalities) have to be compiled and a copy of the plan submitted to SANBI within a year of these Framework Guidelines having been posted on the Department of Environmental Affairs' website on 30 September 2015.

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<sup>&</sup>lt;sup>1</sup> "The Institute" in terms of NEMBA is the South African National Biodiversity Institute (hereafter referred to as SANBI).

### 3. The Framework Guidelines

## 3.1 Map the parcels of land under the control of the Organ of State or Protected Area Management Authority, in management unit compartments

A Protected Area Management Authority must map the Protected Area, and break it into logical management unit compartments. These compartments should be of a size and structure that allows for coherent management interventions. An example might be a quinary catchment area, or a riparian area, or a geographically coherent part of the Protected Area. All parts of the Protected Area should be mapped, and the Listed Invasive Species known to be in the compartment will be indicated in the accompanying table (see 3.2).

An Organ of State Management Authority should similarly map the land parcels under their control (i.e. those for whose management they are responsible), and break these into logical management unit compartments. They too should be of a size and structure that allows for coherent management interventions. Here an example might be a suburb in a municipality, or a riparian area.

## 3.2 Compiling the List of Invasive Species for each management unit compartment

The Managing Authorities must compile a comprehensive list of the Listed Invasive Species under Section 70(1) of NEMBA that occur on the relevant land area (see Annex 2 for the full list). These should follow the sequence of the Lists, and the authorities should indicate the (a) scientific name, (b) common name(s), (c) Category (i.e. 1a, 1b, 2, 3), (d) average density, (e) prioritization of each species, and (f) risk of potential invasion, in that management unit compartment. The Department of Environmental Affairs will provide a general description of each Listed Invasive Species on its website.

In terms if the average densities, the Department of Environmental Affairs recommends that the Management Authorities ascertain the extent of cover by each of the Listed Invasive Plant Species in a management unit, in terms of the percentage of land that is invaded by the species. For larger tree species, it is recommended that an estimate be given for the percentage canopy cover by each species on the land under their control in the management unit compartments. For herbaceous species, an estimate should merely be made of the percentage of land invaded by each species on the land under their control in the management unit compartments.

In terms of Listed Invasive Animal and Microbial Species, it is recommended that the Management Authorities indicate presence or absence in the management unit compartments, and (where possible) the estimated numbers..

In terms of the risk of invasion, it is recommended that Management Authorities indicate those Listed Invasive Species that are not currently known to be invading in a management unit compartment, but which have the potential to invade in the area (to aid early detection and rapid response).

For the major category of Listed Invasive Species, namely Terrestrial and Freshwater Plants (currently 379 species or groups of species out of the total of 559 listed over all groups of organisms), the Managing Authority should utilise the readily available distributional data included in the Southern African Plant Invaders Atlas<sup>2</sup> to create a list of known or likely Invasive Species for their particular area. For some of the more important woody plant invaders, a national mapping exercise has been done using remote sensing<sup>3</sup>.

## 3.3 Describing the prioritization of the land parcels in the management unit compartments

The Managing Authority should describe the parts of the relevant land area that are infested with the various Listed Invasive Species in a manner which aids the prioritization of their monitoring and control. This may relate to areas of high biodiversity importance, water security, risk of wild fires, erosion, siltation and flooding, and other similar indicators for prioritization. Management Authorities are referred to the indications of biodiversity and environmental assets within municipalities and protected areas, on the SANBI website.

## 3.4 Assessing the extent of infestations

The Managing Authority should estimate the extents of the infestations of each of the Listed Invasive Species that are known to be present in the relevant area. The estimates of extent are best expressed in quantitative terms such as "Square-kilometres infested" or "Hectares infested" or "Number of individuals" or "Square metres of plant cover". It is normally impossible to measure the extent of an infestation perfectly so that even the best measure will still be an approximation. It is always important to quantify the extent in such a way that different people will be able to repeat the quantification in the future and generate comparable measures such that they can see whether the infestation is expanding or contracting. The measurement of extent is also crucial to the calculation of (a) the severity of the impacts of the invasive species on the invaded area, and of (b) how much effort will be required to control the infestation.

In particular, the Managing Authority must indicate where clearing has taken place, and track the necessary follow-up clearing work that must be detailed and planned for.

# 3.5 Reporting on the efficacy of previous control or eradication measures

The Managing Authority must compile a section of the Control Plan in which a brief history of past efforts at controlling the Listed Invasive Species within the relevant land area for the management unit compartments is presented. This historical account should be based on the best available information (if there is no such information available the Management Authority must simply state this to be the case). The purpose of this section of the Control Plan is to ensure that lessons that have been learned in past control efforts are not simply lost, but instead are built upon to provide the best possible prospects of the success in the implementation of the current plan. The Department of Environmental Affairs will make available information on clearing work through its Working for Water programme, where appropriate.

<sup>&</sup>lt;sup>2</sup> See http://www.arc.agric.za/arc-ppri/Pages/Weeds%20Research/Geographical-distribution-of-IAPs-in-southern-Africa-(SAPIA)-.aspx - To learn more about SAPIA see its newsletters at http://www.invasives.org.za/resources/sapia-news.html#2006

<sup>&</sup>lt;sup>3</sup> Kotzé, J.D.F., et al. (2010). National Invasive Alien Plant Survey. Report Number: GW/A/2010/21. Agricultural Research Council: Institute for Soil, Climate and Water, Pretoria.

## 3.6 The current measures to monitor, control or eradicate Listed Invasive Species

The most important section of the Control Plan is this section which details what is actually being done to limit the undesirable impacts of the Listed Invasive Species and what is being planned to be done in the near future in the relevant area. The Control Plan should be both as an annual plan of operation and for a minimum of five years.

Based on the size of the relevant area, the number of species of Listed Invasive Species present in the area, the characteristics of these species (including the severity of their known or predicted impacts and the ease with which they can be controlled) as well as the extent of their infestations, the first decisions that need to be made are (a) which of the Listed Invasive Species to prioritise for management and (b) what the objective of this management should be. In particular, one has to decide whether the Listed Invasive Species is still capable of being totally eradicated from the relevant area (this local eradication is termed "extirpation") and will be used in these Guidelines from here on) or whether the species is so well-established or so numerous in the relevant area (or in the relevant area's immediate vicinity such that reinvasion of the relevant area is extremely likely) that such extirpation is not feasible. In this latter case, which is generally the case for the majority of Listed Invasive Species (except for Category 1a species) in the majority of areas in which they are found, very important decisions have to be made as to (c) what quantifiable level of infestation of the relevant area by the Listed Invasive Species will be the target level for the control actions that are to be undertaken and (d) over how many years will it be planned to reach this target level.

Regardless of whether it is extirpation or control to below a specified level of infestation that is the agreed objective of the Control Plan, it is extremely important that a monitoring system be put in place. This monitoring should allow the Managing Authority to know (a) how the extent of the targeted Listed Invasive Species infestation is changing over time and (b) how well the management techniques being employed are working to kill or reduce the vigour of the targeted species. Ideally the monitoring system should also enable the Managing Authority to say how the desirable benefits (e.g. to the relevant area's biodiversity assets or to its ecosystem services, such as streamflow) are increasing in response to the control of the Listed Invasive Species.

Two crucial components of any effective Monitoring Programme are (a) the data storage system to ensure that the data generated by the monitoring activities are not lost and are readily accessible, and (b) the evaluation system that ensures that these monitoring data are analysed and then used to adapt the Control Plan in the light of the insights gained through this analysis if any such adaptation is necessary.

## 3.7 The measurable indicators of progress and success, and indications of when the Control Plan is to be completed

This section of the Control Plan must tabulate for each of the Listed Invasive Species or groups of species that is to be managed in the relevant area the indicators that are to be used to evaluate the success of the control programme.

In order for the progress of the plan to be accurately assessed, it is important that a timeline be created for the achievement of predetermined levels of each of these measurable indicators. For example, one might decide that by the end of Year 1 of the Listed Invasive Species Control Plan the canopy cover of Listed Invasive Plant Species in the relevant area will be reduced by 25% of its initial value, by 50% of this initial value by the end of Year 2, by 70% by the end of Year 3, and by 90% by the end of Year 4. One could also say that the

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final target level for this canopy cover reduction would be 95% and that this would be achieved by the end of Year 5. The achievement of this level would be considered to be indicative of a successful 5-year control programme, following which the relevant area would be considered "Cleared" and would be subjected only to low-level maintenance clearing for the indefinite future.

It is essential to include an indication of budget allocated and budget spent on Listed Invasive Species in each financial year, and an indication of the source(s) of the funding.

# Addendum A

# A Generalised Table of Contents for a Monitoring, Control and Eradication Plan

The Control Plan should have a Table of Contents that will in general look something like the following (there will have to be local adaptations to cater for particular unique aspects of the land parcel and/or the type of Listed Invasive Species being managed):

## 1. Executive Summary

An overview of the key points in the Control Plan of the Protected Area or Organ of State;

#### 2. Introduction

The land parcel under the control of the Protected Area or Organ of State; key vulnerabilities to invasion (e.g. water, fire, biodiversity); risks of invasions; regulation of invasives on adjacent private land; management history; and, current management objectives<sup>4</sup>.

# 3. Maps of the Management Unit Compartments in land under the control of the Protected Area or Organ of State

Each management unit compartment that makes up the land under the control of a Protected Area or Organ of State, must be depicted in a map, A legend must indicate the scale of the map, and other information that makes specific management options possible (e.g. erf numbers; the size of the land in hectares).

## 3. A Table of Listed Invasive Species in each Management Unit Compartment

The table of Listed Invasive Species for each management unit compartment should indicate the (a) scientific name, (b) common name(s), (c) Category (i.e. 1a, 1b, 2, 3), (d) level of invasion (i.e. estimated percentage cover) for plants, or estimated numbers of animals, or presence of microbes), (e) prioritization of each species, and (f) risk of potential invasion, in that management unit compartment. An example is given in the table below.

<sup>&</sup>lt;sup>4</sup> The appropriate IAS Management Strategy and hence IAS Management Plan will depend to a large extent on the land parcel's overall management objectives, e.g. a National Park will have a very different IAS strategy and IAS management plan to those of a road reserve or of a military training ground.

Table 3.1	The Listed	Invasive Specie	s in Manac	iement I Init	Compartment X:
Table J. I.	THE LISTER	IIIVasive Opecie	o ili ivialiay		Compartment A.

Group	Species name	Common name	NEMBA Category	Estimated % cover	Prioritization (/10)	Risk of Invasion
Plants	Acacia mearnsii	Black wattle	2 but 1(b) here	30%	High (8)	n/a
	Chromolaena odorata	Triffid Weed	1(b)	0%	Low (0)	High
Birds	Anas platyrhynchos	Mallard Duck	2 but 1(b) here	Up to 40 specimens <sup>5</sup>	Medium (4)	n/a
etc.						

The Managing Authority must indicate where clearing has taken place, and track the necessary follow-up clearing work that must be detailed and planned for.

It is also important to bear in mind that some of the listed species are not regulated in specific circumstances. For example, large specimens of listed gums trees do not need to be cleared in certain urban circumstances. This should be clear from the Lists in **Addendum B**.

# 4. Describing the prioritization of the land parcels in the Management Unit Compartments

The Managing Authority must describe the parts of the relevant land area that are infested with the various Listed Invasive Species in a manner which aids the prioritization of their monitoring and control. This may relate to areas of high biodiversity importance, water security, risk of wild fires, erosion, siltation and flooding, and other similar indicators for prioritization. Management Authorities are referred to the indications of biodiversity and environmental assets within municipalities and protected areas, on the SANBI website.

## 5. Reporting on the efficacy of previous control or eradication measures

The Managing Authority must compile a section in the Control Plan in which a brief history of past efforts at controlling the Listed Invasive Species within the management unit compartments of the relevant land area is presented. This historical account should be based on the best available information (if there is no such information available the Management Authority must simply state this to be the case). The purpose of this section of the Control Plan is to ensure that lessons that have been learned in past control efforts are not simply lost, but instead are built upon to provide the best possible prospects of the success in the implementation of the current plan. The Department of Environmental Affairs will make available information on clearing work through its Working for Water programme, where appropriate.

Table 5.1: History of past control of Listed Invasive Species in the Land Parcel

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Group	Species name	Common name	Past Control Efforts	Nature of records			
Plants	Acacia mearnsii	Black wattle	Controlled since 2002 – infestation halved since then	Data from files of Working for Water Project carried out in the Land			
			now mostly regeneration from seedbank	Parcel			
	Chromolaena odorata	Triffid Weed	Unknown	Not yet definitely recorded – only suspected ex SAPIA			
Birds	Anas platyrhynchos	Mallard Duck	Not controlled yet in the Land Parcel	Personal Communication from Municipal Manager			
etc.							

<sup>&</sup>lt;sup>5</sup> The Biennial Coordinated Waterbird Counts administered by the Animal Demography Unit of the University of Cape Town (see http://cwac.adu.org.za/).

# 7. Targets and timelines for the Control Plan

It is vital that clear objectives are set for Control Plans, and that this is done from the outset. These will need to be modified on an ongoing basis, owing to the propensity of invasive species to spread and grow, as well as the biosecurity risk of new invasive species coming into the area. It is also likely that climate change will alter the invasiveness of species already in the area. Moreover, certain invasive species have a "lag time" (sometimes called, "long fuse, big bang"), staying non-invasive for a long period before exploding as new invasives in an area.

A Control Plan should ideally begin with a goal or goals. Moreover, the goals should be "SMART", management will be guided by goals that are SMART – i.e.

Specific (the nature and level of the performance required must be clearly identified);

Measureable (the indicators chosen must be meaningful, easily understood and measurable);

Assignable (who will carry out the actions?);

Realistic (what can realistically be achieved, given the available resources?); and,

Time-bound (the timeframe for the achievement of goals must be clear)."

Table 7.1 SMART goals for the control of Listed Invasive Species in the Management Unit Compartment:

Group	Species name	Common name	Specific Goal	Measurable Goal	Assignable Goal	Realistic Goal	Time-bound Goal
Plants	Acacia meamsii	Black wattle	Reduce total area infested to less than 100 ha,	Area systematically cleared to less than 100 ha.	Work to be done through EPWP Wage Incentive, managed by the Parks & Gardens Branch.	Budget secured to ensure that approximately 100 ha of invading black wattles can be cleared per year by the EPWP team.	Infestation down to 400 ha by end of Year 1; 300ha by end of Year 2; 200 ha by end of Year 3; to less than 100 ha by end of Year 4.
	Chromolaena odorata	Triffid Weed	Local extirpation within first season of its arrival	Early detection surveys of the entire land parcel at least once a year and the immediate removal of all establishing plants before the species can flower	Managed by Early Detection capacity through EPWP.	Major communication drive to ensure land-owners help with the early detection of the species in the area.	Annual assessments and reports on findings. Immediate treatment of any incursions of triffid weed,
Birds	Anas platyrhynchos	Mallard Duck	Local extirpation of existing population	Entire population to be captured within first six months of the programme and removed. Annual surveillance and immediate removal of any new arrivals thereafter.	Work to be undertaken by Parks & Gardens staff.	Careful engagement with public to gain understanding of need for this action. Staff capacity and training to do the work.	Removal in first six months. Annual surveys thereafter.
etc.							

It is important to set time-bound goals over the medium-term. A Control Plan should firstly be an annual plan of operation. This is because of the strong likelihood of the spread and growth of invasives in parts of the area that cannot be cleared; the possible introduction of new invasive species; the modification of the problems posed by invasive species through a wild fire, or through flooding that impacts on riparian areas; climate change influences, and other uncontrolled variables.

As practical as it is to work within the challenges of an annual plan of operation, there must be medium- and long-term planning, capacity building, advocacy, research, budgeting and other planned interventions.

## 8. Responsibilities and reporting requirements of the Control Plan

Linked to the SMART goals should be an outline of the staff capacity for the Control Plan; the reporting lines and the reporting frequency (e.g. what is required in terms of monthly reports, annual reports, five-yearly assessments, etc.). Without this being well (and clearly) established at the outset of the control programme, there can be no accountability for the success (or failure) of the programme.

## 9. The Methods to be employed in the Control Plan

In section 7.4 of the template, control methods are to be described. A range of different management practices should be strategically combined to achieve the goals of management. The strategic combination of all available and appropriate methods may optimise the prospect of achieving stated goals. Guidance with respect to best control methods will be provided through the Working for Water Programme, on the Department of Environmental Affairs' website<sup>6</sup>.

Table 9.1: Methods to be employed for the control of Listed Invasive Species in the Land Parcel

Group	Species name	Common name	Control Methods	Source for Control methodology
Plants	Acacia mearnsii	Black wattle	Chainsaw removal of large trees with immediate arboricide treatment of cut stumps. Knapsack spraying of coppice and seedling regeneration.	Working for Water Programme's approved methods for the control of <i>Acacia meamsii</i> .
	Chromolaena odorata	Triffid Weed	Manual removal of all young plants found, ensuring all roots are removed.	Working for Water Programme's approved methods for the control of <i>Chromolaena odorata</i> .
Birds	Anas platyrhynchos	Mallard Duck	Walk-in/Swim-in duck traps followed by euthanasia of all captured birds.	Provincial Conservation Agency to provide traps and expertise.  Removal to be in accordance with humane standards.
etc.				

Note that the control methods may include biological control, fire, suppression by indigenous or other vegetation, predation, chemical control, mechanical control, labour-intensive clearing, and the use of heavy machinery.

<sup>&</sup>lt;sup>6</sup> See also Wittenberg, R & Cock, MJW (2001). Invasive alien species: A toolkit of best prevention and management practices. CAB International, Wallingford, UK.

# 10. Monitoring and Evaluation of the Control Plan

This section should detail what is to be recorded about the Listed Invasive Species and about the implementation of the Control Plan in the land parcel; how and how frequently these data are to be collected; how the data are to be stored, and how they are to be analysed. The frequency of the analyses and their evaluation and feedback to the Managing Authority should also be recorded.

## 11. References

To be compiled, as relevant.

## 12. List of Annexes

To be compiled, as relevant.