

# **Guide for the Assessment of Imminent Threats and Environmental Damages**

## **Environmental Liability**

*Prepared by*

### **The Environmental Protection Agency of Portugal**

The Ministry of Agriculture, the Sea, the Environment and Territorial Planning

October 2011

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**Guide for the Assessment of Imminent Threats and Environmental Damages**

**Environmental Liability**

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## TABLE OF CONTENTS

<u>1.</u>	<b><u>Initial notes</u></b>	8
<u>2.</u>	<b><u>Introduction</u></b>	9
<u>3.</u>	<b><u>Scope of application</u></b>	11
3.1.	Initial considerations	11
3.2.	Strict and tort liability	11
3.3.	The concept of environmental damage and imminent threat of damage	11
3.4.	Applicability over time	12
3.5.	Exclusions	13
<u>4.</u>	<b><u>Baseline situation</u></b>	15
<u>5.</u>	<b><u>Obligations of the operators</u></b>	16
5.1.	Prevent, repair and report	16
5.2.	Setting of financial collateral	18
5.3.	Exemptions to the obligation to pay	19
<u>6.</u>	<b><u>Intervention of the relevant authorities</u></b>	21
<u>7.</u>	<b><u>Imminent threat and environmental damages</u></b>	22
7.1.	Initial considerations	22
7.2.	Protected species and natural habitats	22
7.2.1.	Scope and background information	22
7.2.2.	Covered species and habitats	22
7.2.3.	Conservation status of species and habitats	24
7.2.4.	Services of protected species and natural habitats	28
7.2.5.	Baseline situation	28
7.2.6.	Effects on species and habitats	31
7.2.6.1.	Intervention in the event of an incident	31
7.2.6.2.	A situation of imminent threat	32
7.2.6.3.	A situation of environmental damage	33

7.3.	Water resources	35
7.3.1.	Scope and background information	35
7.3.2.	Covered waters bodies	36
7.3.3.	Provided services	36
7.3.4.	Classification of the status of water bodies	37
7.3.4.1.	Surface waters	37
7.3.4.2.	Ground water	38
7.3.5.	Baseline situation	40
7.3.6.	Damages to water bodies	40
7.3.6.1.	Course of action in the event of an incident	41
7.3.6.2.	A situation of imminent threat	41
7.3.6.3.	A situation of environmental damage	44
7.3.6.4.	Specific statutes	46
7.4.	Soil	47
7.4.1.	Scope and background information	47
7.4.2.	Land utilization	47
7.4.3.	Soil contamination	48
7.4.4.	Baseline situation	49
7.4.5	Damages to the soil	49
7.4.5.1.	Intervention in the event of an incident	50
7.4.5.2.	A situation of imminent threat of environmental damage	51
7.4.5.3.	A situation of environmental damage – Assessment of risks to human health	52
7.4.5.4.	Specific statutes	57
8.	<b><u>Remediation measures</u></b>	58
8.1.	Initial considerations	58
8.2.	Remediation of damages to protected species, natural habitats and water resources	59
8.2.1.	Complementary and compensatory remediation	62

8.2.2.	Quantification of complementary and compensatory remediation measures	63
8.2.3.	Criteria for the choice of remediation measures	64
8.3.	Remediation of damages to the soil	64
9.	Acronyms	68
10.	Glossary	69
11.	Websites of interest	72
12.	References	72
	Annex I	79
	Annex II	90
	Annex III	93
	Annex IV	98
	Annex V	110
	Annex VI	111
	Annex VII	113

### List of Figures

Figure 1. Applicability of the EL statute over time (adapted from <i>Guidelines on</i>	13
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<i>Environmental Liability, Denmark)</i>	
Figure 2. Decision-making support flowchart for the applicability of the EL statute	14
Figure 3. Flowchart of general procedures in the framework of the EL statute (adapted from EPA 2010)	18
Figure 4. Decision-making flowchart for the applicability of the EL statute upon the occurrence of an incident	35
Figure 5. Course of action flowchart in the event of an affected water body	41
Figure 6. Operator's intervention flowchart in the event surface or ground water bodies are affected	44
Figure 7. Decision-making flowchart in the event of damage to a water resource	46
Figure 8. Risk analysis conceptual model	50
Figure 9. Conceptual model of the studied site (Source: FCT and GEOTA, 2008)	54
Figure 10. Flowchart for the assessment of damages to the soil	56
Figure 11. Natural regeneration of a damaged natural resource or service	60
Figure 12. Primary remediation	61
Figure 13. Complementary remediation	62
Figure 14. Compensatory remediation	63

### List of Tables

Table 1. Criteria for the definition of a favorable conservation status (adapted from <i>Assessment, monitoring and reporting under article 17 of the Habitats Directive – Explanatory Notes and Guidelines</i> , The European Commission)	26
Table 2. Elements for the characterization of the baseline situation	29
Table 3. Categories of water bodies covered by the Waters Act and the EL statute	36
Table 4. Main soil and ground water decontamination techniques	66

## 1. INITIAL NOTES

The publication of Executive Order No. 147/2008 of July 29 (the EL statute), as amended by Executive Order No. 245/2009 of September 22 and by Executive Order No. 29-A/2011 of March 1, introduced the environmental liability within the country's legislation as a tool for the prevention and remediation of environmental damages, defining specific obligations for the covered operators. Because of its novelty and the innovative concepts introduced by this statute, and given the issues identified along its application period, the Environmental Protection Agency of Portugal (APA), as the authority in this field, has drafted this Guide.

The purpose of this document is to provide all stakeholders (operators, relevant organizations and the general public) information on the application of the environmental liability statute (the EL statute), seeking to clarify some concepts, identify its scope, develop technical aspects involved in its enforcement and highlight the obligations of the relevant operators.

This Guide, which is not binding, is a document providing assistance to operators for them to check their compliance with the obligations arising from the application of this statute and, simultaneously, it is a decision-making support tool for the authority in charge of the application of the EL statute. Please note that the information contained in this document refers only to the application of this statute in continental Portugal. Regarding the Azores and Madeira autonomous regions, the application of this statute is to be made with the necessary adjustments, pursuant to article 36 thereof, and for that purpose the regional environmental protection authorities should be contacted.

It should be clarified that the methodology developed for the assessment of threats and damages was based on criteria already existing under the water resources and protected species and natural habitats legislation in effect. We considered that this was the only way to ensure compliance with the provisions of the EL statute and with the Directive behind its enactment. We also think that only this way we can have objective, equivalent and universal goals for all operators and Member States.

In order to guide the operators in obtaining relevant information and in addition to the content presented herein, additional information sources are indicated whenever appropriate. The elements provided in this document refer to the best information available to date, which can be updated as necessary by the relevant authorities.

This document also presents a Glossary in order to facilitate the understanding of this document and of the key concepts behind the subjects under analysis. Note that the terms defined in the glossary are shown as follows: **<glossary term>** where first mentioned in the text.

Finally, this Guide was elaborated by the Environmental Protection Agency of Portugal and the Institute of Welding and Quality (ISQ), with the technical support of ERENA – Ordenamento e Gestão de Recursos Naturais, SA, with consultations to the Standing Committee for the Monitoring of Environmental Responsibility (CPA-RA) and the Advisory Council for Environmental Responsibility (CC-RA), pursuant to Order No. 12778/2010 of August 3 (2<sup>nd</sup> Series).



## 2. INTRODUCTION

According to the European Commission (EC), the existence of contaminated sites at the European level with very significant risks to the health and of loss of **<biodiversity>** has widened along the last decades. The lack of intervention results in an increased potential for contamination and loss of biodiversity in the future. Such situations require specific measures in the framework of an environmental policy at the European Community level. Therefore, the environmental damage prevention and remediation tools contribute to the achievement of the objectives of such environmental policy.

The tools for the prevention and remediation of **<environmental damages>**, based on “the polluter pays” principle, in line with the principle of sustainable development, were included within Directive No. 2004/35/EC of the European Parliament and of the Council of April 21, 2004 (the EL Directive), as amended by Directive No. 2006/21/EC of the European Parliament and of the Council of March 15, and by Directive No. 2009/31/EC of the European Parliament and of the Council of April 23. This Directive provides for the financial accountability of any **<operator>** whose activities have caused environmental damages or an **<imminent threat>** of environmental damage, in order to encourage such operators to take measures and develop practices aimed to reduce the risks of environmental damage.

The EL Directive was legislated by Executive Order No. 147/2008 of July 29, as amended by Executive Order No. 245/2009 of September 22 and by Executive Order No. 29-A/2011 of March 1, which came into force on August 1, 2008.

This national statute establishes two distinct mechanisms of accountability, defined in its Chapters II and III, which deal with “civil liability” and “administrative liability for the prevention and remediation of environmental damages”, respectively.

Chapter II of that statute refers to the civil liability regimen, under which the operators (polluters) are required to compensate individuals harmed by **<damages>** suffered because of an environmental component.

Chapter III establishes an administrative liability framework before the entire community for the prevention and remediation of damages caused to the environment, not awarding any individual the right to compensation for the damages in question. The legal framework enacted by this Chapter does not deal with compensation for damages suffered by certain individuals, but with the prevention and remediation of environmental damages affecting the community only in an indirect manner.

Chapter III provides for the obligation to prevent and remediate any environmental damage, which constitutes the main goal of the EL statute, whereby an operator causing environmental damages or an imminent threat of environmental damage is legally and financially liable to remediate and/or prevent it (paragraph 1 of article 19 of the EL statute).

Chapter III also reinforces the Principle of Prevention, enshrined in the Basic Environmental Act (BEA)<sup>1</sup> through the concept of **<imminent threat of environmental damage>** and the mandatory adoption by the operator of measures prior to the occurrence of such environmental damage so as to eliminate the imminent threat and consequently prevent the damage.

The environmental damages covered by the EL statute are those caused to **<natural resources>**, i.e. protected species and natural habitats, water bodies and soil.

Note that with the publication of the EL statute, environmental damages should be understood as those that were previously (BEA) considered as ecological damages, according to the definition of subparagraphs i) to iii) of paragraph e) of article 11 of the EL statute.

Note that this Guide refers to the liability regimen established in Chapter III, which relevant application authority is APA (the EL authority).

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<sup>1</sup>Approved by Act 11/87 of April 7.

Note also that the environmental liability statute includes underlying concepts from already existing legal frameworks, in particular regarding the protected **<species>** and **<natural habitats>**, water resources and soil decontamination, as established by Executive Order No. 142/2008 of July 24 (Legal Statute for the Conservation of Nature and Biodiversity), Act No. 58/2005 of December 29 (the Waters Act) and Executive Order No. 178/2006 of September 5, as amended and reenacted by Executive Order No. 73/2011 of June 17 (the General Waste Management regimen), respectively. The EL statute, however, does not overlap with the mechanisms already provided and enacted under these specific statutes.

### 3. SCOPE OF APPLICATION

#### 3.1. Initial considerations

This chapter is intended to clarify the provisions of Chapter I (General Provisions) and Chapter III (Administrative liability for the prevention and remediation of environmental damages) of the EL statute through the elaboration of the points mentioned below. Therefore, when applying the environmental liability statute it is important to determine:

- What is the activity that caused the damage or the imminent threat, and how;
- Which are the affected natural resources and to what extent they were affected;
- When did the environmental damage or imminent threat of environmental damage occur;
- In what situations the EL statute is not applicable.

The answers to the questions above allow us to identify situations effectively covered by the EL statute, as specified in the following sections.

**Figure 2** shows a schematic decision-making support flowchart regarding the applicability of the EL statute.

#### 3.2. STRICT AND TORT LIABILITY

It is important to note that the Environmental Liability Statute applies to environmental damages and to imminent threats of environmental damage caused by the performance of any activity carried out in the framework of an economic enterprise, regardless of its public or private, for profit or not for profit nature. Such activities are referred to as **<business activities>**.

The liability for the prevention and remediation of environmental damages and threats of environmental damage is established under this statute at two different levels (see articles 12 and 13 thereof):

- **Strict liability**, applicable to an operator who, regardless of the existence of fault or negligence, causes environmental damages by performing any of the business activities listed in Annex III to the Statute, or an imminent threat of environmental damage as a result of such an activity;
- **Tort liability**, applicable to an operator who, intentionally or negligently, causes environmental damages by performing any of the business activities listed in Annex III to the Statute, or an imminent threat of environmental damage as a result of such an activity.

In this context, an **operator** is defined as “*any natural or legal person, public or private, performing, controlling, registering or notifying an activity which environmental liability is subject to this Executive Order, whenever it exercises or is able to exercise decisive powers on the technical and economic functioning of such activity, including the holder of a license or permit to do so*”.

#### 3.3. The concept of Environmental Damage and Imminent Threat of Damage

The EL statute does not apply to any damage caused to a **<natural resource>**, but only to damages considered to be measurable adverse changes caused to a natural resource or a measurable deterioration of a service provided by a certain resource, causing significant effects on water bodies, protected species and natural habitats and/or the soil (items d) and e) of paragraph 1 of article 11).

These include significant damages to the following environmental descriptors:

- **Damages to protected species and natural habitats:** “any damage with significant adverse effects on the continuation or maintenance of a favorable conservation status of such habitats or species, which assessment has to be based on the baseline situation under the criteria listed in Annex IV to the EL Statute, except for any previously identified adverse effects arising from the actions of an operator expressly authorized by the relevant authorities under applicable law.”
- **Damages to water bodies:** “any damage with significant adverse effects, in accordance with applicable law, on the ecological or chemical status of surface water bodies, on the ecological potential or chemical status of artificial or heavily modified water bodies, or on the quantitative or chemical status of ground water.”
- **Damages to the soil:** “any soil pollution creating a significant risk to human health due to the direct or indirect introduction, within or on the soil, of substances, preparations, organisms or micro-organisms.”

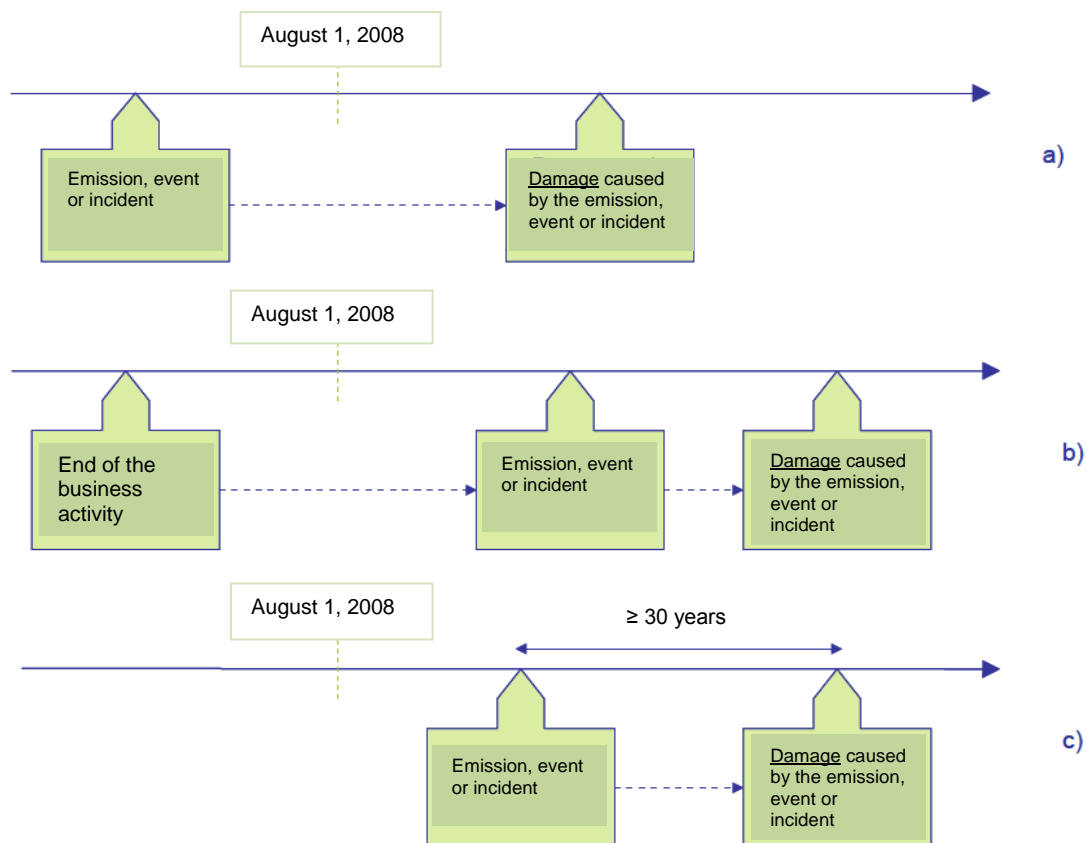
**Chapter 7** of this Guide presents criteria for the assessment of environmental damages. In addition to environmental damages, **imminent threats of environmental damage**, defined as a “sufficient probability of occurrence of environmental damages in the near future”, **are also covered by the EL statute**.

### 3.4. Applicability over time

An important aspect of the inclusion of a given damage under the EL statute relates to its applicability over time. Specifically, the provisions under this statute do not apply to damages:

- Caused by emissions, events or incidents that occurred before the coming into force of this Executive Order, i.e. August 1, 2008 (**Figure 1**, line a));
- Caused by emissions, events or incidents that occurred after August 1, 2008, but resulted from an activity carried out and completed before that date (**Figure 1**, line b)).

Any environmental damage occurring 30 years or more after the emission, event or incident that originated such damage is also prescribed (**Figure 1**, c)).



**Figure 1.** Applicability of the EL statute over time (adapted from *Guidelines on Environmental Liability*, Denmark)

### 3.5. Exclusions

Any environmental damage or imminent threat of environmental damage caused by any of the following actions and activities are excluded from the scope of this statute (line a) of paragraph 2 of article 2 of the EL Statute):

- Armed conflict, hostilities, civil war or insurrection;
- Completely unpredictable natural phenomena of an exceptional nature or that, even if predictable, are inevitable;
- Activities which main aim is to serve the national defense or international security;
- Activities which sole purpose is the protection against natural disasters;

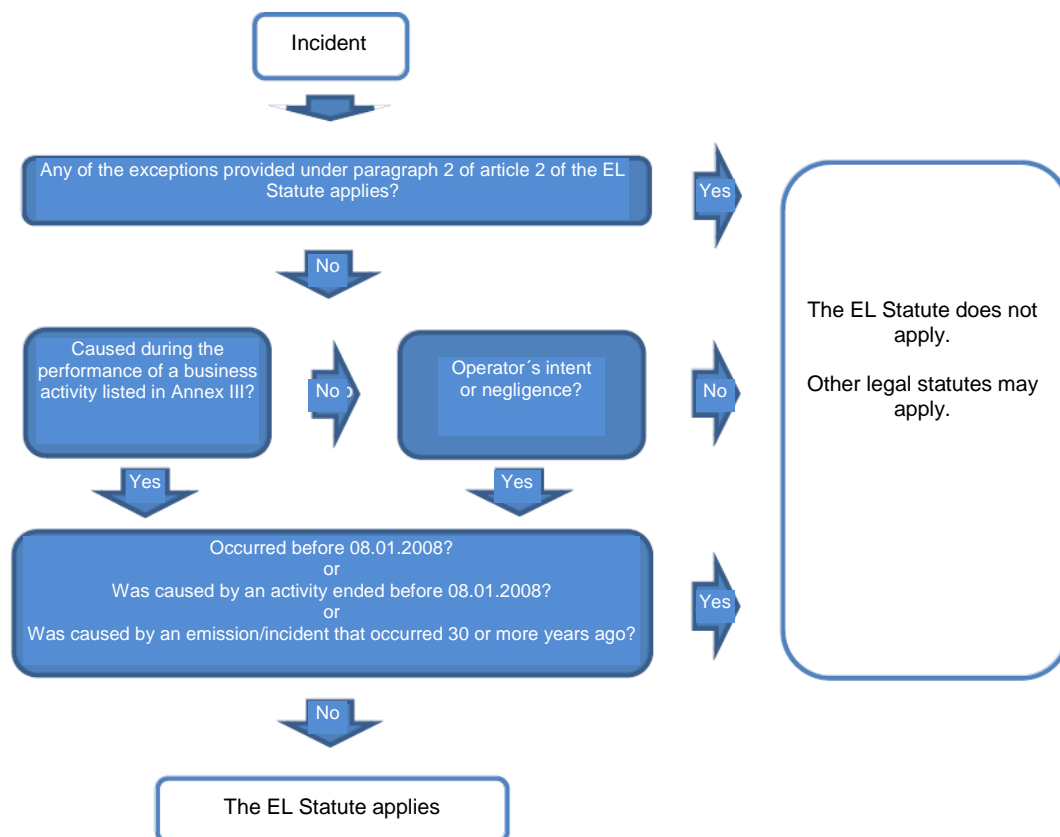
Furthermore, any environmental damage or imminent threat of environmental damage arising from incidents on which the liability falls within the scope of the following international conventions (line b, paragraph 2 of article 2 of the EL Statute) are also excluded from this statute:

- International Convention of November 27, 1992 on civil liability for oil pollution damages;
- International Convention of November 27, 1992 on the establishment of an international fund for compensation for oil pollution damages;
- International Convention of March 23, 2001 on civil liability for bunker oil pollution damages;
- International Convention of May 3, 1996 on liability and compensation for damages in connection with the carriage of hazardous and noxious substances by sea;

- Convention of October 10, 1989 on civil liability for damages caused during carriage of dangerous goods by road, rail and inland navigation vessels.

Moreover, imminent threats of environmental damage arising from nuclear risks or activities covered by the Treaty Establishing the European Atomic Energy Community, or incidents or activities for which the liability or compensation falls under any of the following international instruments, are also excluded from this statute (line c of paragraph 2 of article 2 of the EL Statute):

- Paris Convention of July 29, 1960 on third party liability in the field of nuclear energy, and the Brussels Supplementary Convention of January 31, 1963;
- Vienna Convention of May 21, 1963 on civil liability for nuclear damage;
- Convention of September 12, 1997 on supplementary compensation for nuclear damage;
- Joint Protocol of September 21, 1988 relating to the application of the Vienna Convention and the Paris Convention;
- Brussels Convention of December 17, 1971 relating to civil liability in the maritime carriage of nuclear material.



**Figure 2.** Decision-making support flowchart for the applicability of the EL statute

#### 4. BASELINE SITUATION

Knowledge of the **<baseline situation>** of the natural resources covered by the EL Statute is essential to assess the magnitude and extent of the damage after the occurrence of an incident. The measurement of the extent of the damage is done by comparing the state of the resources after the occurrence of the damage to their baseline situation.

The baseline situation is defined as “*the situation of the natural resources and services that would have existed if the damage to the environment had not occurred, estimated based on the best information available*” (article 11 of the EL statute).

Given the above, it is important to have information about the baseline situation of the natural resources potentially affected at the time of occurrence of an incident.

We should highlight that, when it comes to the characterization of the resources, it may be important to collect or update the available information in the event of any of the following situations:

- Whenever starting a new activity;
- Whenever there is a significant change in the operating conditions of an activity;
- Whenever there is a significant evolution in the conditions of the surrounding environment.

Chapter 7 of this Guide provides guidelines on relevant information regarding the baseline situation of natural resources, i.e. “protected species and natural habitats”, “water bodies” and “soil”.

## 5. OPERATOR'S OBLIGATIONS

### 5.1. Prevent, remediate and report

The statute establishes a set of responsibilities and obligations for an operator whenever there is an imminent threat or an environmental damage caused by the performance of its business activity. The procedures to be conducted, including the actions to be undertaken so as to determine the preventive and remediation measures, are outlined in Articles 14, 15 and 16 of the EL Statute.

A fundamental principle of this statute is that the operator must act immediately in order to control, contain, manage or eliminate polluting elements or damaging factors so as to limit or prevent the occurrence of environmental damages or the imminent threat of environmental damages.

It is also the responsibility of the operator to notify relevant situations in the context of this statute to APA and other relevant organizations in matters related to water resources, species, habitats and soil.

The immediate containment measures and the notification of such situations to the relevant authorities both contribute to minimize the magnitude and extent of the effects on the natural resources. Despite the adoption of these procedures, however, we may still see situations of imminent threat or environmental damage.

Accordingly, the statute provides that an operator detecting an imminent threat of environmental damage for which it is responsible has to carry out the following actions:

- Immediately and without the need of any prior notice, application or administrative procedure, take all **<preventive measures>** necessary and appropriate to prevent the occurrence of environmental damages, in compliance with paragraph 1 of article 14;
- Inform APA about all aspects related to the existence of an imminent threat of environmental damage, in particular with regard to the measures already taken and their success, as provided by paragraph 4 of article 14;
- Adapt such preventive measures and provide additional information whenever so expressly required by the relevant authority, pursuant to paragraph 5 of article 14.

The determination of appropriate preventive measures must take into account the specific characteristics of the affected site and of the event in question, that is, the nature and dimensions of the incident. Preventive measures should be taken according to the criteria provided by lines a) to f) of paragraph 1.3.1 of Annex V to the EL Statute, namely:

- a) The effects of each option on public health and safety;
- b) The cost of implementing the option;
- c) The probability of success of each option;
- d) The extent to which each option prevents future damage and avoids collateral damages resulting from its implementation;
- e) The extent to which each option benefits each component of the natural resource and/or service;
- f) The extent to which each option takes into account the social, economic and cultural concerns and other relevant factors specific to the region.

The statute also provides for the operator's obligation to take action whenever there is an **environmental damage**. Finding out if the incident represents an environmental damage can happen at two different times:

- First, in the case of an incident which adverse and significant consequences for a natural resource are evident;



- At a later stage, after the adoption of preventive and **<containment measures>**, through the **<monitoring>** results that allow the assessment of the magnitude and extent of the impact on the baseline situation of the resource. Chapter 7 presents more detailed guidelines to the operator on this topic.

Given the above, in the event of environmental damages the operator must necessarily carry out the following (as required by articles 15 and 16):

- Report to APA within 24 hours all relevant facts regarding the incident and keep all provided information duly updated;
- Immediately implement all viable measures to control, contain, eliminate or manage the polluting elements and any other damaging factors without the need of any prior notice or administrative action, so as to limit or prevent the occurrence of the following situations:
  - New environmental damages;
  - Adverse effects on human health;
  - New damages to **<service(s)>** provided by the affected **natural resource(s)>**.
- Adapt the abovementioned measures and provide additional information about the damage whenever so expressly requested by the relevant authority;
- Propose **<remediation measures>** that meet the requirements of Annex V to the EL statute and submit them to APA within 10 days for consideration;
- Implement such remediation measures in accordance with the previous point. The adoption of remediation measures is mandatory even if the prevention obligations were not met.

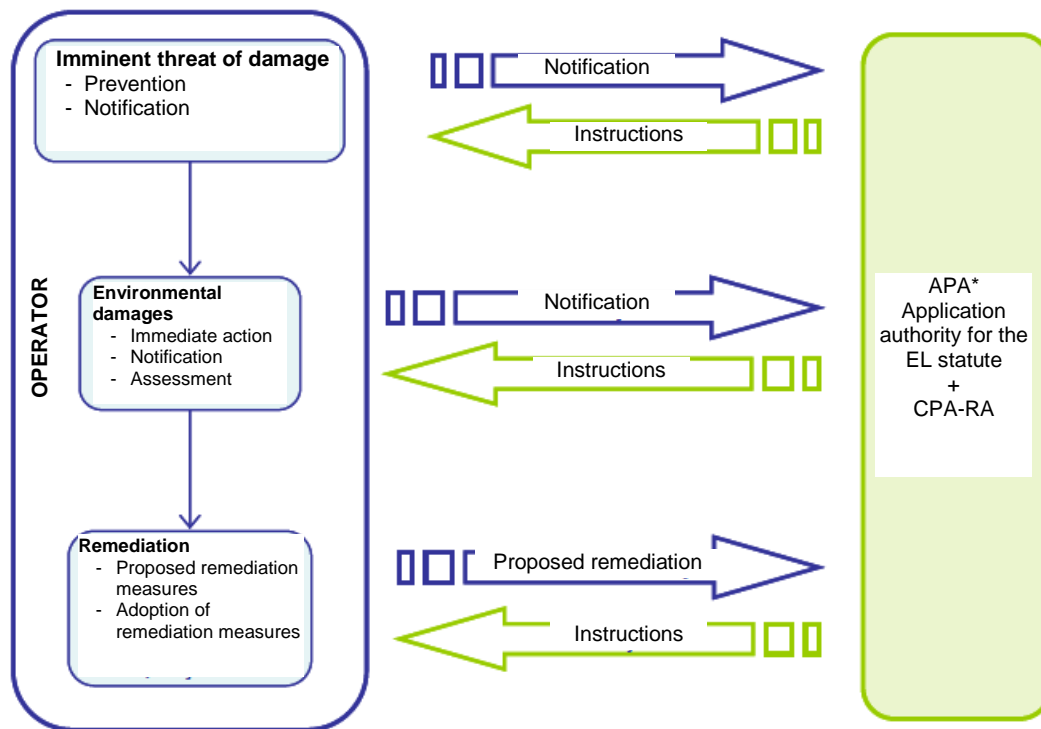
The reporting of situations of imminent threat of environmental damage or of actual environmental damage must be made by filling the Imminent Threat Report and the Environmental Damage forms, available at the APA website (APA>Instrumentos>Responsabilidade Ambiental>Obrigações dos operadores>Reporte de situações de ameaça iminente ou de dano ambiental). A *Guide for the Filling of the Reporting Form* is available on the same website.

The reporting form contains several fields to be completed by the operator, including:

- Identification of the operator and its business activity;
- Identification and description of the affected site;
- Containment measures taken;
- Indication of potentially affected natural resources;
- Organizations contacted.

The completed form should be e-mailed to: **bd\_ra@apambiente.pt**

The following figure shows a flowchart summarizing the provisions of the EL Statute referred to in this chapter.



**Figure 3.** Flowchart of general procedures in the framework of the EL statute (adapted from EPA, 2010)

## 5.2. Setting of financial collateral

In addition to the obligations referred to in the previous section, an operator carrying out any of the business activities listed in Annex III of the Statute shall set one or more autonomous financial collaterals (FC), alternative or complementary to each other, so as to cover for the environmental liability inherent to its activities (paragraph 1 of article 22). Different FC modalities are allowed, such as:

- Underwriting of insurance policies;
- Bank guarantees;
- Participation in environmental funds;
- Participation in its own capital funds reserved for that purpose.

Such collateral must obey the principle of exclusivity and cannot be diverted to another end.

The financial collateral is aimed to ensure the operator's capacity to bear the costs arising from its obligations under the statute, as mentioned in the previous section.

We should note that notwithstanding the need to establish one or more FC's, the operator must also focus its efforts on the development of actions aimed to limit, reduce or eliminate the environmental risks of its activity, thus preventing the occurrence of such situations.

An important element in risk reduction and prevention of threats or incidents leading to environmental damages is to ensure compliance with the environmental legislation related to the business activity or to the protection of environmental assets. There are as well voluntary environmental management mechanisms, which standards can be used as a way to attain a better environmental performance of such business activities and ensure

compliance with current regulations, including the European Eco-Management and Audit Scheme (EMAS) and the ISO 14001 standard.

The management, registration and reduction of risks associated with a given activity may follow an approach similar to that adopted in environmental management systems under the ISO 14001 standard, in accordance with the PDCA (*Plan-Do-Check-Act*) management model.

The environmental risk management of a given facility is a tool to control and reduce the risks of such facility, reducing the frequency of incidents and the extent of their respective consequences.

Since the main purpose of the EL statute is for all costs associated with the prevention and remediation of environmental damages to be borne by the operator, this statute provides a strong incentive for the operators to assess and manage the environmental risks inherent to their respective activities, aiming to prevent the occurrence of environmental damages as much as possible.

Even though risk management is not a statutory requirement, this proactive approach can help the operator to reduce the financial burden associated with the liability arising from this legal framework, particularly by reducing the actual remediation costs of eventual environmental damages and the value of the financial collateral.

A *Methodological Guide for the Setting of Financial Collateral* is being elaborated by APA and is intended to serve as a technical support for the Resolution to be issued as provided by paragraph 4 of article 22 of the EL statute.

### 5.3. Exemptions to the obligation to pay

According to paragraph 1 of article 19 of the EL statute, the costs of any remediation and **<preventive measures>** adopted within the scope of the EL statute are to be borne by the operator. However, the statute provides for the possible exclusion of the obligation to pay for any such preventive and remediation measures taken by the operator in the situations specified in paragraphs 1 and 3 of article 20 of the EL statute.

In other words, the operator is not required to pay the costs of the measures taken when it proves that the environmental damage or the imminent threat of environmental damage:

- i. Was caused by a third party and occurred despite adequate safety measures were taken (line a) of paragraph 1 of article 20); **or**
- ii. Resulted from the operator's compliance with an order or instruction issued by a public authority. However, such order or instruction cannot be the result of an emission or incident caused by the activity of the operator (line b), paragraph 1 of article 20).

Nonetheless, the operator is required to take and implement measures for the prevention and remediation of environmental damages while keeping the right to file for remedies, as appropriate, against any liable third party or against the administrative entity that issued such order or instruction.

The operator shall not be required to pay the costs of the taken preventive or remediation measures provided it cumulatively proves that there was no fault or negligence on its part **and** the damage was caused by:

- ii.1. An emission or fact expressly permitted under any of the authorizing actions defined under Annex III to the EL statute, provided it has followed the conditions established for that purpose under such authorizing action and under the legal statute applicable at the time of occurrence of such damaging emission or fact; **or**

ii.2. An emission, activity or any form of utilization of a product in the course of an activity that are not considered to be susceptible of causing environmental damages in accordance with current scientific and technical knowledge at the time in which such emission or activity took place.

## 6. INTERVENTION OF THE RELEVANT AUTHORITY

In cases of environmental damage or imminent threat of environmental damage, the relevant authority intervenes in order to ensure that the operator implements the preventive and remediation measures required to control, contain, eliminate or manage the polluting elements and damaging factors, in the terms of paragraph 3 of article 15 and paragraphs 5 and 6 of article 14 of the EL statute.

In these situations, APA may:

- Require information from the operator;
- Require additional measures to be taken by the operator;
- Change and revoke the measures already taken.

As a last resort, APA may alternatively take prevention and remediation measures at the expense of the operator responsible, under line d) of paragraph 5 of article 14 and line f) of paragraph 3 of article 15, as well as in the situations defined under article 17.

Whenever there is a situation of imminent threat of environmental damage that may affect the public health, the relevant authority shall inform the regional or national health authority about the fact.

Once an environmental damage is confirmed, under paragraph 4 of article 16 of the EL statute APA will define, possibly with the involvement of other public entities with responsibilities in the environmental area or in other relevant areas, the remediation measures to be taken and will notify its decision to all stakeholders.

Whenever several environmental damages occur simultaneously and provided it is impossible to ensure that the necessary remediation measures are taken simultaneously, APA will determine the priorities that must be followed. In such a case, the measures aimed to the elimination of risks to human health will be prioritized.

Intervention applications filed by any stakeholder pursuant to article 18 will be analyzed in order to assess their feasibility. In any awarded intervention application, the relevant authority will decide the measures to be taken by the operator responsible after having heard the operator and, whenever the public health is concerned, the local health authority.

Therefore, the aforementioned CPA-RA was created in order to implement the provisions mentioned above, particularly with regard to the close coordination between the different entities of the Ministry of Agriculture, the Sea, the Environment and Territorial Planning, and in order to achieve a coordinated, swift and pinpointed action.

The coordination between APA/CPA-RA and the operator is illustrated in **Figure 3**.

## 7. IMMINENT THREAT AND ENVIRONMENTAL DAMAGE

### 7.1. Initial considerations

This chapter aims to guide the operator in the determination of the occurrence of environmental damages or an imminent threat of environmental damage under the EL statute. It is also intended to clarify any doubts the stakeholders (the public administration, operators, individuals) may have, aiming to an efficient implementation of the statute and to the optimization of resources.

Given that not all situations affecting natural resources can be included within the framework of the EL statute, and considering that the assessment made after an occurrence must be conducted efficiently, it is relevant to provide systematic criteria for the inclusion of such events within the framework of this statute, as well as the definition of concepts such as “*extent of damage*”.

As mentioned above, the clarification and guidelines presented in this Guide, and particularly in this chapter, are not binding. They are only intended to guide the operator and the relevant authorities in their assessment and actions in situations of environmental damages or imminent threat of environmental damage.

In order to make these issues easier to understand, the following sections present an individual approach to each of the covered environmental issues.

### 7.2. Protected species and natural habitats

#### 7.2.1. Scope and background information

The EL statute refers to environmental damages and imminent threats of environmental damage to natural habitats and species of the flora and fauna (hereinafter referred to as “*species and habitats*”), statutorily protected by Executive Order No. 140/99 of April 24, with the new wording given by Executive Order No. 49/2005 of February 24, which incorporated into the national legislation the provisions of Directives No. 79/409/EEC of April 2 (the Birds Directive) and No. 92/43/EEC of May 21 (the Habitats Directive).

The covered species and habitats are detailed in **Section 7.2.2** of this Guide.

The statute applies to damages caused to species and habitats whenever there are significant and adverse effects for the continuation or maintenance of a favorable **<conservation>** status of such habitats or species, in accordance with point i) of line e) of paragraph 1 of article 11.

This section presents the procedures to be followed by the operators to assess incidents resulting or that may result in damages to species and habitats. It also deals with the relevant information about the baseline situation of such species and habitats, used as a baseline reference for the purposes of risk management and further assessment of the extent of the damage, if any.

#### 7.2.2. Covered species and habitats

Only those species and habitats protected under the law must be considered. The EL statute applies therefore to:

- Species of the flora and fauna listed in Annexes BII, BIV and BV of Executive Order No. 140/99 of April 24, republished by Executive Order No. 49/2005 of February 24 (ANNEX I);
- All bird species naturally occurring in the wild within the national territory, including migratory species (ANNEX I);

- Natural and semi-natural habitats listed in Annex B-I of Executive Order No. 140/99 of April 24, republished by Executive Order No. 49/2005 of February 24, with a proven occurrence in Portugal (ANNEX II);
- **<Habitats of species>** listed in annexes A-I, B-II and B-IV of Executive Order No. 140/99 of April 24, with the new wording given by Executive Order No. 49/2005 of February 24, which are relevant to those species (to be identified on a case by case basis. ICNB or experts may be consulted for this purpose).

Among the aforementioned areas, the following should be given special attention due to their significant concentration of protected species and habitats:

- Areas within the National System of Classified Areas (SNAC, see Box 1) established by Executive Order No. 142/2008 of July 24, designated as such because of the occurrence of habitats and species with a protected status (ANNEX III);
- Other areas that are not covered by any protection status but host significant populations of protected species or are deemed relevant to the breeding and resting of such species.

#### Box 1

The areas covered by the National System of Classified Areas (SNAC) are:

- Protected Areas within the National Network of Protected Areas (RNAP);
- **<Classified areas>** within the Natura 2000 network, i.e. the sites included within the National List of Special Protection Sites and Areas (see Box 2);
- Other areas so classified under international commitments signed by the State of Portugal, including RAMSAR sites.

#### Box 2

The Natura 2000 Network is an EU-wide ecological network comprising areas classified as **<Special Areas of Conservation (SACs)>** and areas defined as **<Special Protection Areas (SPAs)>** (article 4 of Executive Order No. 140/99 of April 24, as amended by Executive Order No. 49/2005 of February 24).

SACs are subject to conservation measures applied to the natural habitats listed in Annex B-I (**<natural habitats of Community interest>**) which conservation requires the designation of special areas of conservation - and to the species listed in Annex B-II (**<Animal and plant species of Community interest>**) which conservation requires the designation of special areas of conservation.

SPAs are areas that contain the most suitable territories, in number and size, for the protection of the bird species listed in Annex I, as well as migratory bird species with a regular occurrence in the national territory not included in that Annex.

The National Network of Protected Areas (RNAP) is composed of the Protected Areas (PA) indicated under Executive Order No. 142/2008 of July 24. They were subjected to such classification due to their biodiversity or because of the scientific, ecological, social or landscape rarity or value of its natural features that demand special and specific conservation and management measures. They can be divided into the following types: National Park, Natural Park, Natural Reserve, Protected Landscape and Natural Heritage site. SACs and SPAs often overlap with these areas, either fully or partially.

To check the localization of an operational activity with regard to SNAC areas (RNAP, Natura 2000 and RAMSAR sites), please visit the ICNB website at <http://portal.icnb.pt/ICNPportal/vPT2007/Valores+Naturais/Informação+Geográfica/>

The confirmation of the existence of protected species and habitats under the Birds and Habitats Directives or under the national legislation can be made according to the procedure suggested in Subsection 7.2.5. **ANNEXES I to III** of this document present the natural habitats and species listed in Annexes A-I, B-II, B-IV and B-V of the Birds and Habitats Directives, as well as a list of the national PAs, SACs and SPAs.

### 7.2.3. Conservation Status of Species and Habitats

Environmental damages caused to protected species and natural habitats are defined by the EL statute as any damage with significant adverse effects on the continuation or maintenance of the favorable **<conservation status>** of these habitats or species (see Box 3).

The concept of conservation status of species and habitats, as well as the provisions rating it as a “favorable status”, are set out in Executive Order No. 140/99 of April 24, as modified and amended by Executive Order No. 49/2005 of September 22.

The issues considered by the authorities in order to identify the favorable conservation status of habitats and species (Subsection 7.2.3) were based on the following sources: *Relatório Nacional de Implementação da Directiva Habitats (2001-2006)* (ICNB et al. 2008), and *Assessment, monitoring and reporting under article 17 of the Habitats Directive - Explanatory Notes and Guidelines*, The European Commission. More technically detailed information on the favorable conservation status can be obtained from **Table 1**. Some information regarding the parameters shown in that Table, as well as the classification of the conservation status of certain species, can be found at <http://www.icn.pt/reldhabitats/> on the fauna and flora fields.

The Habitats Directive implementation report provides information on the conservation status of vegetal species and habitats. For bird species please refer to *Livro Vermelho dos Vertebrados de Portugal* (Cabral et al., 2005) and *Atlas das Aves Nidificantes* (Equipa Atlas, 2008).

According to Executive Order No. 140/99 of April 24, the criteria for defining a favorable conservation status are the following:

Habitats:

- The area and natural distribution of the habitat are stable (contraction and expansion of an area in equilibrium) or increasing;
- The structure and functioning of the habitat necessary for its long-term maintenance are in place and their long-term viability is assured;
- The typical species of the habitat are present and have a favorable conservation status, as defined below.

Species:

- The species distribution is stable (contraction and expansion of an area in equilibrium) or increasing;
- The population dynamics indicates that the species is able to maintain itself in the long term;
- The habitat area for the species is large enough (and stable or increasing) and the quality of the habitat is suitable for the survival of the species in the long term;
- The most important pressures and threats do not endanger the species in the long term.

The detailed application of these criteria is detailed in **Table 1**.



**Box 3**

The collected information about the conservation status of species and habitats is relevant as part of the characterization of the initial or baseline situation (as discussed in Subsection 7.2.5), considering that in the case of environmental damages within the EL framework the operator is responsible for the remediation of such damages and for the restoration of the natural resources to their baseline situation.

We should note that the conservation status of species and habitats is understood as their conservation status at the national level, as identified for habitats and species in some of the bibliographic sources cited above. These bibliographic sources may be updated and the best, most recent available information should always be used.

**Table 1.** Criteria for the definition of a favorable conservation status (adapted from *Assessment, monitoring and reporting under article 17 of the Habitats Directive - Explanatory Notes and Guidelines*, The European Commission)

Criterion	Description	Parameters to be considered
Area occupied by the species or habitat	Area for which all significant ecological variations of the species/habitat are included within a defined biogeographic region that is sufficiently large to allow the long-term maintenance of the species/habitat.	<p>The following parameters are to be considered in order to characterize the area occupied by the species or habitat:</p> <ul style="list-style-type: none"> <li>- Currently occupied area;</li> <li>- Potential distribution considering the ecological and physical conditions (i.e. climate, geology, soil, altitude)</li> <li>- Historical distribution and causes of the changes;</li> <li>- Area necessary for the viability of the species/habitat, including aspects such as migration and connectivity.</li> </ul>
<Population> of a species	Population of a given biogeographic region considered as the minimum necessary to ensure the long term viability of the species.	<p>The following parameters are to be considered in order to characterize the population size of a given species:</p> <ul style="list-style-type: none"> <li>- Historical distribution and abundance and causes of the changes;</li> <li>- Potential size;</li> <li>- Biological and ecological conditions;</li> <li>- Migration and dispersal routes;</li> <li>- Genetic variation or flow;</li> <li>- Size necessary to allow natural fluctuations and allow the persistence of a healthy populational structure.</li> </ul>

Criterion	Description	Parameters to be considered
Area occupied by a habitat	Total area in a given biogeographic region considered as the minimum necessary to ensure the long-term viability of a <b>&lt;habitat type&gt;</b> ; it should include the area necessary for the recovery or rebuilding of that type of habitat in the case the current area cannot ensure its long term viability.	The following parameters are to be considered in order to characterize the area occupied by a habitat: - Historical distribution and causes of the changes; - Potential natural vegetation; - Current distribution and variations; - Dynamics of the habitat type; - Natural variations (subtypes, types, ecological variants, etc.) - The distribution pattern should allow the genetic exchange/flow of its typical species.
Habitat adequate for the species	(no description)	In order to maintain the favorable conservation status of a species, a favorable or suitable habitat must ensure: - That the habitat area is sufficiently large, stable and/or expanding; - That the quality of the habitat is suitable for the long term survival of the species.
Habitat structure and function	(no description)	The structure and function of a habitat may be highly variable depending on the habitat in question, but the different ecological processes essential for the habitat must be in place and functioning so that the habitat can be considered to be in good conservation conditions.
Future perspectives for the species or habitat	(no description)	If the main pressures and threats identified for a species or habitat are not significant, then that species/habitat will remain viable in the long term. In this context, the following classification is to be considered: - Positive outlook: The survival and prosperity of the species/habitat is to be expected; - Moderate outlook: It is expected that the species/habitat will face a threatening situation unless the conditions change; - Negative outlook: The long-term viability is at risk; the species/habitat may become extinct.

#### 7.2.4. Services of the protected species and natural habitats

The services of species and habitats, even though they are not legally defined, are part of the **<ecosystem services>** and for the purposes of the EL statute are considered an ecosystem component (see Box 4).

The services provided by the ecosystems are covered by Executive Order No. 142/2008 of July 24, which establishes the legal framework for the conservation of nature and biodiversity. This Executive Order establishes that those services are “the benefits people obtain directly or indirectly from the ecosystems and that are classified as:

- i. Production services, defined as goods produced or provided by ecosystems, including food, fresh water, wood, fiber, biochemical and genetic resources, among others;
- ii. Regulatory services, defined as the benefits obtained from the regulation of ecosystem processes, including the regulation of the climate, diseases, floods or detoxification, among others;
- iii. Cultural services, defined as immaterial benefits obtained from ecosystems, especially those of spiritual, recreational, aesthetic or educational value, among others;
- iv. Support services, defined as services necessary for the production of all other services, such as soil formation, nutrient cycling or primary productivity, among others.”

#### Box 4

Like the protected habitats and species, the characterization of the services in terms of their baseline situation is also relevant (as discussed in Subsection 7.2.5), since they are to be considered in the application of preventive or remediation measures that may become necessary in the event of an imminent threat of environmental damage or actual environmental damages.

#### 7.2.5. Baseline situation

The baseline situation, as defined in paragraph 1 of Article 11 of the EL statute, is the situation to which comparisons are to be made after an incident so as to determine:

- The existence and extent of damage. The quantification of the alterations considered significant and adverse when compared to the baseline situation is closely linked to the concept of a **favorable conservation status**, which definition includes several criteria (see subsection 7.2.3, Table 1).
- The status the resource and/or service must attain after the application of the remediation measures. This information is necessary in order to determine and quantify the type of remediation to be applied in case of environmental damages.
- The relevant data for the characterization of the baseline situation of the protected species and habitats are summarized in **Table 2** (in accordance with Annex IV to the EL statute).

It is convenient for the operators carrying out a business activity to gather information about the baseline situation of the protected species and habitats that may be affected in the course of their activities.

**Table 2.** Elements for the characterization of the baseline situation<sup>1</sup>

<b>Natural resource</b>	<b>Indicator</b>
Species <sup>1</sup>	Number of specimens or density or occupied area. Natural propagation capacity; viability.
Species and habitats	Rarity (assessed at the local, regional or higher levels, including at a Community level) / threat status (when assigned). The role of the individuals or area with regard to the conservation of the species or habitat. Ability to recover in the event of damages, with a mere enhancement of the protective measures and in the short term, up to a situation at least equal to the baseline situation. Services provided.
Habitats	Occupied area Natural regeneration capacity

<sup>1</sup>All protected species that may use the area, including all phenological categories, must be considered

### **Box 5**

The periodic updating of the baseline situation would be advisable so that any alterations in the diversity of species or habitats, their size and state of preservation can be reliably associated with any environmental damage and to the respective operators, excluding any other external causes.

These updates can be justified due to the occurrence of alterations (occurring either naturally or by the action of man), such as the number of species and their abundance, or the availability of new data on species and habitats (including new publications).

The characterization of the baseline situation lets us know the protected types of habitats and species in the area where the operator carries out its activities or in areas likely to be affected by such activities. It is through a comparison with the baseline situation that the occurrence of environmental damages can be identified.

This Guide contains information about the existing sources of information on the data reported in **Table 2**.

In addition to the information available at the national level, the operator carrying out a business activity may consider to increase the current knowledge about the baseline situation of such resource and conduct studies on the area surrounding its activity. For that purpose, this document describes procedures for field surveys which, although not mandatory, may assist in a more detailed characterization of the baseline situation.

In order to know the baseline situation it is important to consider the area where the activity will be installed, as well as its **surroundings** (see Box 6). The information and knowledge that allow the characterization of the activity's deployment area and its surroundings (taking into account the elements identified in **Table 1**) can be obtained:

- Through ICNB, provided it is an activity established within or liable to affect a Classified Area;
- Through ICNB, in order to confirm the possible relevance of the area as a breeding or resting area for protected species;

To obtain additional information, the operator may consider performing:

- A bibliographic query of studies or reports conducted by universities and other institutions or entities, distribution atlases (see Box 7) or scientific articles. Because of their territorial importance, we must highlight studies on nature conservation conducted as part of Territorial Planning surveys. Territorial classifications lacking a legal framework but providing information concerning data like the concentration of protected species, such as the IBA (Important Bird Areas) classification in Portugal (Costa et al. 2003, available at <http://lifeibasmarinhas.spea.pt/pt/y-book/ibasmarinhas/>), may be of help;
- Field surveys to supplement existing data;
- Consultations to experts.

Information on the conservation status of species and habitats can also be obtained using the bibliographic sources cited above (Cabral et al, 2005; Equipa Atlas, 2008; ICNB et al. 2008).

### Box 6 - Surrounding area

**Surrounding area** - For environmental liability purposes, the surrounding area is a subjective concept that varies according to several factors, the most important being the probable or actual nature and extent of the threats, the type of habitats and species involved, the climate and the topography of the area.

### Box 7 - Distribution atlases

Distribution atlases are very useful sources of information, especially when there is a lack of more specific data. As an example we can mention *Atlas de Aves Nidificantes de Portugal* (1999-2005) (Equipa Atlas, 2008) and the *Atlas de Anfíbios e Répteis de Portugal* (Loureiro et al., 2008). We should note however that such publications are periodically updated and the latest available editions must be used.

One possible procedure for characterizing the baseline situation is described step by step in Box 8. The goal of this approach is to provide general guidelines for the operators to become aware or deepen the information about their surroundings and the protected species and natural habitats. Its use should be tailored to the characteristics of the business activity, considering among other subjects the routes of contamination, weather conditions, topography and the causative agents of the imminent threat of environmental damage or of the actual environmental damage.

### Box 8 - Suggested procedure for the characterization of the baseline situation

- 1 - Use a Gaussian grid (10x10 km) to locate the business activity. Check if this grid overlaps an SNAC area or if in the event of an incident an SNAC area is likely to be affected. If yes, go to point 2. If no, go to point 3 (note that most of the bibliographic data about the distribution and abundance of species and habitats is available at a 10x10 km scale. This justifies at first sight the adoption of such scale).
- 2 - The necessary information (see **Table 2**) may be obtained from ICNB. Studies or reports developed by universities and other institutions or entities can be used as complementary sources of information, as well as distribution atlases, scientific articles or the opinion of experts. Now proceed to point 4 below.
- 3 - The necessary information (**Table 2**) may be obtained from ICNB. Studies or reports developed by universities and other institutions or entities can be used as complementary

sources of information, as well as distribution atlases, scientific articles or the opinion of experts. A land utilization cartographic analysis (LOM - Land Occupation Map, or CLC - Corine Land Cover, for instance) is to be conducted so as to investigate the possible presence of protected habitats. This analysis should be preferably made by an expert.

4 - If the available sources of information lack any reference to protected species or habitats in that grid and if the cartographic analysis did not retrieve any protected habitats, proceed to point 5. If protected habitats were indeed detected, proceed to point 6.

5 - If no protected species or habitats were identified, there is no need to collect additional information. In these cases, the procedure for setting the baseline situation ends at this point. Periodic information updates may be considered.

6 - If the available information sources make reference to protected species or habitats, the respective distribution areas should be mapped based on the obtained information (see points 2 and 3 of this box), if necessary through additional field surveys.

7 - If there is available and updated information for all the parameters listed in **Table 2** (for the study area defined in point 6), there is no need to conduct field surveys. We should note that information on the conservation status of species and habitats (see Subsection 7.2.3) and the services provided by the species and habitats (see Subsection 7.2.4) are important.

8 - If there is no current and/or available information on the parameters listed in **Table 2**, the operator may consider conducting the field surveys necessary to obtain them.

9 - A periodic update of the information on the baseline situation must be considered - see Box 5.

#### 7.2.6. Effects on species and habitats

Sometimes certain incidents cause short-term or reduced impacts, causing for example negative alterations that are milder than the natural fluctuations considered normal for the concerned species or habitat. Therefore, not all effects represent an adverse environmental damage under the EL statute and therefore the significance of such damage must be assessed in order to include such an incident within the framework of the EL statute.

This subsection presents the actions to be undertaken by the operator upon the occurrence of an incident, in particular regarding the procedures for immediate action when species and habitats are being affected and the subsequent assessment of the significance of the consequences of such damage, in order to consider the eventual inclusion of the situation within the scope of the EL statute.

The operator's obligations under this statute are dealt with as well, in particular the adoption of appropriate preventive and remediation measures for the situation in question. The specific legal statutes dealing with biodiversity, resulting from the application of Executive Order No. 140/99 of April 24, as amended by Executive Order No. 49/2005 of February 24, apply to any situation not covered by the EL statute.

**Figure 4** graphically shows the action stages whenever protected species or habitats are affected, as described in the following sections.

##### 7.2.6.1. Intervention in the event of an incident

Following an incident with potential adverse effects on protected “species and habitats”, the operators must immediately activate the emergency response mechanisms, including the adoption of **<containment measures>** already defined in their respective Internal Emergency Plans (IEP) elaborated under the licensing procedure for their activities, under

the environmental management policy (EMS, EMAS<sup>2</sup>), or in other documents/procedures/statutes providing relevant measures for this context. Containment measures should be adopted without delay, regardless of the underlying legal framework of the incident (the EL statute or other applicable legislation), so as to ensure the containment of the adverse effects of the incident in space and time. If the implemented containment measures have proved sufficient to completely eliminate the effects of the incident, no further action is needed. If appropriate and in the framework of the emergency, the operator will immediately notify the occurrence through the emergency telephone numbers to the forces and services necessary for immediate intervention and to the local civil defense service. The need for reporting to other relevant authorities under specific legal frameworks, such as licensing authorities, must also be taken into account. In the event that another natural resource is affected (soil and/or water), the chapters concerning “damages to water bodies” and “damages to the soil” in the context of the application of the EL statute to situations of damages to “water bodies” and “soil”, respectively, must also be consulted.

#### **7.2.6.2. A situation of imminent threat**

##### **7.2.6.2.1. Assessment of the effects**

This section presents the procedures to be followed by an operator suspecting that an incident may pose an imminent threat of damage to protected species or natural habitats, as well as the procedures to be carried out in order to keep such threat from becoming a reality.

After the containment measures mentioned in the previous subsection were taken, the operator must assess their effectiveness, especially with regard to the persistence of the effects of the incident on the environment, and check if an SNAC area was or could be affected.

Even if the facility is not located within an SNAC area, the possible effects on protected species and habitats (if there are any in its surroundings) should be assessed. In this context, a monitoring plan should be elaborated, which must include the collection of the information mentioned in **Table 2**, as well as the data listed below, if applicable:

- Identification of the species and number of affected specimens;
- Identification of affected habitats and the extent of the damage;
- Identification of the main habitat functions that were negatively affected and that species are dependent upon (feeding, resting, etc.).

In order to obtain this information it may be necessary to resort to a specialized expert. If an imminent threat of environmental damage is discovered in this assessment, it must be reported by the operator in accordance with the following Subsection. If the implemented containment measures have proved sufficient to completely eliminate the effects of the incident, no further action is needed.

##### **7.2.6.2.2. Reporting**

In the event of an incident with effects on an SNAC area, an imminent threat of environmental damage is assumed. Therefore, under these conditions the operator must immediately report such fact to APA. Such reporting must be done as well in the following situations:

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<sup>2</sup> Environmental Management System, and Community Eco-Management and Auditing Scheme, respectively.



- When the containment measures taken prove being insufficient to eliminate the damage to species and habitats;
- When an SNAC area may be affected, even though the facility is not located within an SNAC area;
- When following the assessment referred to in Subsection 7.2.6.2.1, the operator identifies a situation of imminent threat of environmental damage.

The reporting of such cases shall be conducted as provided by paragraph 4 of article 14 of the EL statute, which establishes the obligation to immediately inform the relevant authority responsible for all aspects related to an imminent threat of environmental damage, particularly with regard to the measures already taken and their success. Such reporting must be done as specified in Section 5.1 of this document.

#### 7.2.6.2.3. Preventive measures

The reporting of the situation does not relieve the operator from the need to maintain the measures already taken or others deemed essential, or from the need to collect information to evaluate the magnitude and extent of the damages caused to species and habitats.

Following the reporting of the situation mentioned above, APA, as the relevant authority for the application of the EL statute and together with public environmental authorities within the CPA-RA framework, shall assess the situation so as to decide on the eventual declaration of an imminent threat of environmental damage to species and habitats, under the provisions of the statute.

APA may request from the operator information about the possible imminent threat and the adoption of additional preventive measures, as provided in line c) of paragraph 4 of article 14 of the EL statute.

Note that the fast adoption of efficient preventive measures may significantly reduce the damages caused to species or habitats and will therefore reduce the costs of the remediation measures.

### 7.2.6.3. A situation of environmental damage

#### 7.2.6.3.1. The concept of “*extent of damage*”

Following an adverse effect on species or habitats, it is important to assess whether such effect is to be considered an environmental damage under the EL statute. This Subsection presents guidelines for this assessment process.

An environmental damage to species or habitats occurs when the adverse effects of an incident are significant enough to cause a change in their conservation status.

Therefore, for the purpose of including such events within the framework of the EL statute, i.e. in the definition of environmental damage caused to species or habitats, it is necessary to assess the consequences of this damage compared to the baseline situation of the affected natural resource (see Subsection 7.2.5 and **Table 1**).

This assessment should be done through a monitoring plan, which might be already in place in the framework of an assessment of an imminent threat of environmental damage. For more details on the subject see Subsection 7.2.6.2.1.

The monitoring plan may be altered at any stage as required by the relevant authorities. Any effect on species or habitats that pose a significant risk to human health, regardless of the eventual deterioration of the status of such species or habitats, is to be also considered an “environmental damage”.

#### 7.2.6.3.2. Assessment of the extent of the effects

In most incidents, the acknowledgment of these situations as an actual environmental damage will not be evident or immediate and the assessment of the effects of the incident may involve the use of several tools. Therefore, the operator may use the following tools for a detailed evaluation of the effects of an incident, conducting an analysis on a case by case basis:

- **Modeling** of the pollutant patch dispersion for a simulation period of more than one year, using appropriate software, in order to provide information relevant to the assessment of the possible deterioration of the favorable conservation status of species and habitats;
- **A monitoring plan** to monitor the effects of the damage for a minimum period of time to be validated in each particular case by the relevant authorities, in order to provide information relevant to the evaluation of the possible deterioration of the conservation status of species and habitats. After the damage is classified, a monitoring plan already initiated or even completed may suffer methodological alterations or repetitions.
- **Quantitative Environmental Risk Analysis** for the determination of the risks to human health following possible damages to the services provided by species and habitats for the public benefit at the time of occurrence of the incident.

Adverse effects to species or habitats are established by comparing the current status to the baseline situation, by obtaining/analyzing the parameters defined in **Table 2** and determining if there are any alterations to its conservation status (**Table 1**).

It should be noted, however, that there are situations where changes may occur to the baseline situation that should not be considered significant damages (see Annex IV to the EL statute). These should be characterized when defining the baseline situation, namely:

- Negative alterations smaller than the natural fluctuations regarded as normal for the species or habitat in question;
- Negative alterations due to natural causes or resulting from interventions related to the normal management of sites, as defined in habitat records or goal-setting documents, or as they were previously done by owners or operators;
- Damages to species or habitats while it is known that they will recover and reach their baseline situation in the short-term and without intervention, or a situation that by the mere dynamics of the species or habitat will be deemed equivalent or superior to the baseline situation.

For the purpose of assessing the extent of the damage, APA may determine, together with the relevant environmental authorities (particularly ICNB and CCNR), the need for the operator to conduct studies additionally or complementary to the existing ones.

If the results of the detailed evaluation of the effects on species and habitats reveal the existence of an “unacceptable” risk to human health and/or the deterioration of at least one of the criteria required to define a favorable conservation status (**Table 1**), the effects shall be deemed as an **environmental damage** and the operator will have to comply with the obligations under the EL statute, as shown in the following subsection.

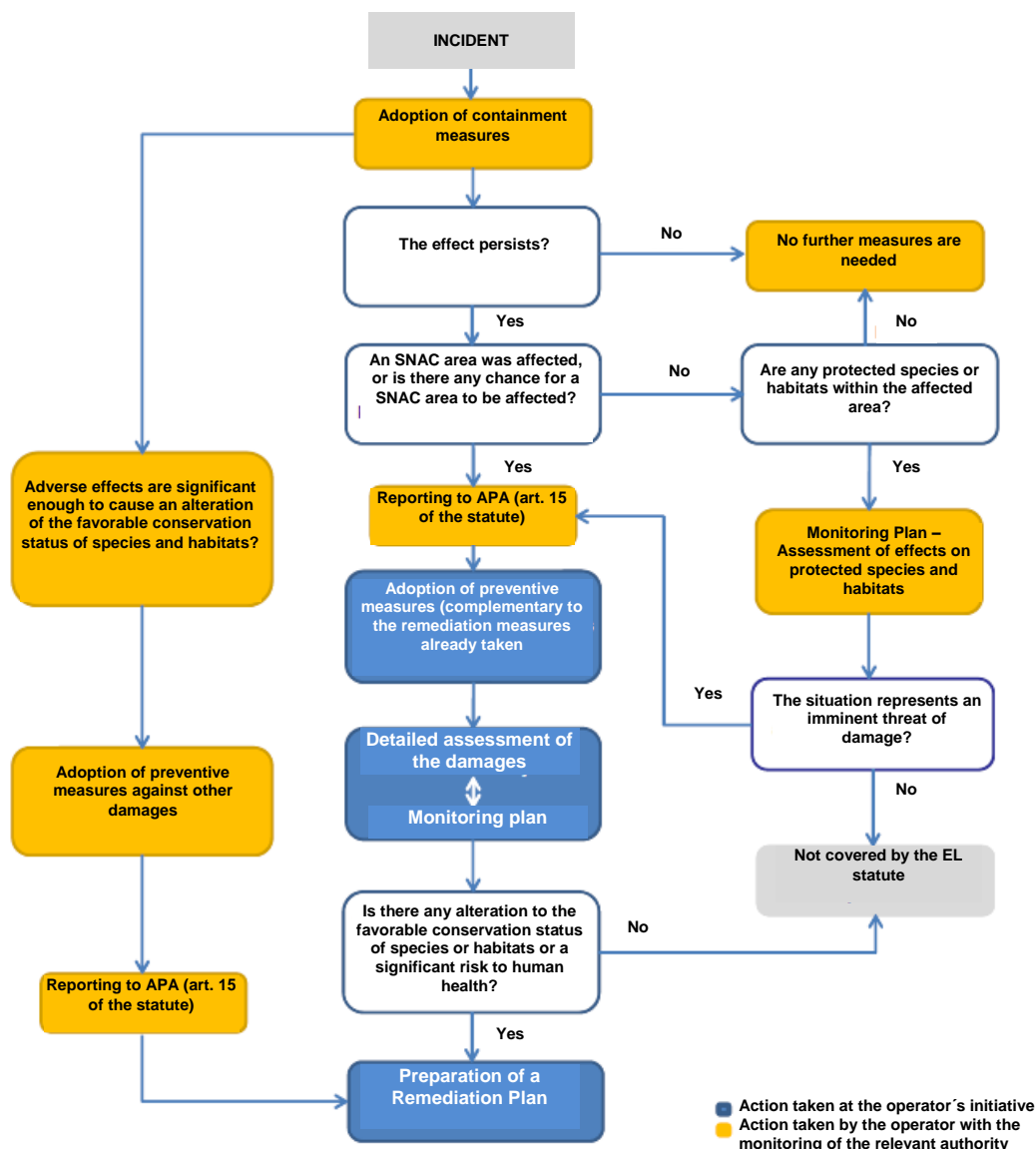
If the conservation status of a species or habitat remains unaltered or if there is no significant risk to human health, the EL statute cannot be applied to the situation.

In both cases, the interpretation and analysis of the obtained results must be assessed by APA as the relevant authority for the implementation of the EL statute.

The remediation of damages to species or habitats is achieved through the restoration of the environment to its baseline situation by way of primary, complementary and compensatory remediation measures. The concepts inherent to these remediation measures are presented in Subsection 7.4.5.1 of this document (see Section 8.2 as well). Furthermore, in addition to the proposed remediation measures, a monitoring plan should be provided, aiming to monitor the progress of the effects of such environmental damages

so as to verify the effectiveness of the taken measures. Under this plan, measurable data must be collected according to **Table 2**, aiming to verify the effectiveness of the taken measures on the restoration of the natural resources, i.e. the protected habitats and species, to their baseline situation.

For a better understanding of the overall analysis procedure presently described, the flowchart shown in **Figure 4** should be consulted.



**Figure 4.** Decision-making flowchart for the applicability of the EL statute upon the occurrence of an incident

### 7.3. Water resources

#### 7.3.1. Scope and background information

The EL statute refers to environmental damages and to any imminent threat of such **environmental damage to water bodies**, provided such water bodies are covered by

**Act 58/2005** of December 29 (**The Waters Act**), in particular with regard to the scope and environmental objectives defined for them.

Therefore, the damages caused to water bodies are covered by the statute, i.e. *“any damage that significantly and adversely affects, in accordance with applicable law, the ecological or chemical status of surface waters, the ecological potential or chemical status of artificial or heavily modified water bodies, or the quantitative or chemical status of ground water bodies”* (item ii) of line e) of paragraph 1 of article 11).

As it is not possible to exhaustively specify all the situations falling within this legal framework, Section 7.3 of this Guide establishes guidelines for the operator and for the authorities to efficiently implement the concept of “imminent threat of damage to water bodies” and “environmental damages to water bodies”, for them to act in conformity with the provisions of the EL statute.

Moreover, the procedures to be followed by the operator for the assessment of incidents that result or may result in damages to surface waters or ground water are also presented, including methodologies and criteria to take into account in the assessment of any such damages.

The relevant information to be considered by the operator in defining the baseline situation of water bodies is presented as well, i.e. the starting point for any risk management and further assessment of the extent of the damage caused to such water bodies.

### 7.3.2. Covered water bodies

The water bodies covered by the EL statute include all water bodies covered by the Waters Act, as shown in the following table:

**Table 3.** Categories of water bodies covered by the Waters Act and the EL statute

Categories		Definition (article 4 of the Waters Act)
Surface water bodies	Surface inland waters	
	Lotic (e.g. rivers)	<u>River</u> : Inland water mass running most of its course on the surface yet might run underground on part of it.
	Lentic (e.g. lakes)	<u>Lake or lagoon</u> : An inland, lentic water resource
	Transition waters	Surface waters in the vicinity of river mouths, partially salty as a result of the proximity of coastal waters, yet also substantially influenced by freshwater flows (e.g. estuaries).
	Coastal waters	Surface waters lying between the land and a line running at a distance of 1 nautical mile on the seaward side from the nearest point of the baseline <sup>3</sup> from which the territorial waters are measured, extending, where applicable, up to the outer limit of such territorial waters.
	Artificial water bodies	A surface water body created by man (e.g., canals)
	Heavily modified water bodies	A surface water body which characteristics were considerably modified by physical changes resulting from human activity, which acquired a substantially different nature and are designated as such by the law (e.g., a reservoir)
	Territorial waters (regarding their chemical status)	Maritime waters between the baseline and a line running 12 nautical miles away from such baseline.
Ground water		All water below the soil surface, in the saturated zone and in direct contact with the soil or subsoil.

### 7.3.3. Provided services

<sup>3</sup> The line representing the inner boundary of coastal waters, territorial waters and of the exclusive economic zone, and the outer boundary of interior sea waters (article 4 of the Waters Act).

With regard to “water” as a natural resource, the EL statute does not apply exclusively to the protection of its status and ecological functions, but also covers the services it provides.

**<Services of a natural resource>** means “*the functions performed by a natural resource for the benefit of another natural resource or the public.*”

In the case of “water”, the services considered relevant are those associated to regions defined as **protected areas** under the Waters Act (paragraph jji) Article 4), especially the following:

- Areas designated by their own regulatory statute for **the uptake of water intended for human consumption** or for the protection of aquatic species of economic interest;
- Bodies of water designated as **recreational waters**, including those designated as **bathing areas**<sup>4</sup>.
- Areas designated for the **protection of habitats** and wild fauna and flora and for the **conservation of wild birds**, including relevant sites belonging to the Natura 2000 Network, where the maintenance or improvement of the water status is an important factor for their conservation.

The registry of areas protected because of their surface and ground water bodies or the conservation of water-dependent habitats and species is conducted by the Regional Hydrographic Administrations with territorial jurisdiction on such areas under the Waters Act. This registry includes maps showing the location of protected areas and a description of the legislation under which they have been created. The classification of bathing waters is available for consultation on the website of the Water Institute (INAG) and of the ARH with territorial jurisdiction on each particular area (see Chapter 11).

#### 7.3.4. Classification of the status of water bodies

An environmental damage to a water body occurs when there is a significant effect on the status of such water body, i.e. when an alteration of such water body leads to a reclassification of its status to a lower class under the Waters Act.

The knowledge of the status classification of the water bodies is essential in order to:

- Characterize the baseline situation of a water body;
- Assess the extent of the damage caused to a water body.

The water status refers to the general situation of a water body, considering ecological chemical and quantitative parameters that are monitored and analyzed in order to define such status.

The status classification of water bodies is determined by the Regional Hydrographic Administrations (under paragraph 6 of article 9 and paragraph 1 of article 29 of the Waters Act) in the framework of their basin management plans (BMP) currently underway. The information concerning such classifications can be found on the BMPs published on the website of these authorities.

In this context, the information on the status of water bodies and monitoring networks can be found on the websites of the Regional Hydrographic Administration with territorial jurisdiction on the area of interest and on the website of INAG (see **Chapter 11**).

This section summarizes the basic criteria used by the relevant authorities to determine the status of water bodies (surface and ground water), in accordance with the Waters Act.

##### 7.3.4.1. Surface waters

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<sup>4</sup> Executive Order No. 135/2009 of June 3.

The **status of a surface water body** is defined by the poorer of two characterizing situations - the **Ecological Status** (the Ecological Potential in case of artificial or heavily modified water bodies) and the **Chemical Status**. This leads to the final classification of its status as “Good” or “Less than Good” (Part I of Annex V of Executive Order No. 77/2006 of March 30).

The **Ecological Status** is defined considering the following qualitative elements:

- Biological quality elements;
- Chemical and physicochemical elements supporting the biological elements:
  - General physicochemical elements with defined maximum thresholds. Compliance with such thresholds leads to the classification of the water body status as “Good”;
  - Specific pollutants for which environmental quality standards (EQS) were established. For the definition of a “Good Ecological Status”, the annual average concentrations should not exceed the regulatory thresholds.
- Hydromorphological quality elements.

The Ecological Status is classified as follows: “Excellent”, “Good”, “Reasonable” “Poor” or “Bad”, according to the worst class of the assessed element.

For the determination of the ecological quality of **artificial or heavily modified water bodies** (a canal or reservoir, for example), the concept of **Ecological Potential** is applied, which represents the deviation of the aquatic ecosystem’s quality from the maximum it can attain (highest ecological potential) after the implementation of all mitigation measures that have no significant adverse effects on the specific uses or on the environment in general.

The ecological potential is classified as one of four classes: “Good or better”, “Reasonable”, “Poor” or “Bad”.

With regard to the assessment of the chemical status of a surface water body, the quality elements to be considered are:

- Priority substances for which EQS have been established at the national level under Executive Order No. 103/2010 of September 24<sup>5</sup>;
- Other pollutants for which EQS have been established under Executive Order No. 103/2010 of September 24<sup>6</sup>.

The Chemical Status of a surface water body is classified as one of two classes: Good or Insufficient. The “Good” status is awarded after compliance with all EQS.

Point I.1 of **Annex IV** to this document (**Tables A.1 to A.6**) presents detailed information on the status classification criteria of surface water bodies.

In order to assess the extent of the damage to a surface water body as a result of an incident, the alterations caused to the above-mentioned qualitative elements and their contribution to the negative shift of the ecological or chemical status are to be analyzed.

#### 7.3.4.2. Ground water

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<sup>5</sup> Priority substances are listed in Annex I of Executive Order No. 103/2010 of September 24, and the EQS on Part A of Annex III of the same Order.

<sup>6</sup> The other pollutants are listed in Annex II of Executive Order No. 103/2010 of September 24, and the EQS on Part B of Annex III of the same Order.

The general classification of the status of a ground water body is determined by taking into account its **Quantitative Status** and its **Chemical Status**. It is classified as “Good” if the ground water body in question simultaneously has a good chemical status and a good quantitative status.

The status of a ground water body, as well as its quantitative and chemical statuses, is classified as “Good” or “Poor”.

The quantitative status of a ground water body is an expression of the degree such water body is affected by direct and indirect water uptakes.

The conditions and values required for the definition of a good quantitative status is defined by Resolution No. 1115/2009 of September 29.

By definition, a **good quantitative status** of a ground water body implies meeting the following conditions:

- The water table is such that the available ground water resources are not depleted by the average rate of water uptake in the long term, which should be lower than 90% of the average annual recharge of the same water body in the long term;
- The water table levels are not subject to anthropogenic alterations that may:
  - prevent the achievement of the environmental objectives established for surface waters associated to it;
  - significantly deteriorate the status of these waters;
  - cause significant damage to terrestrial ecosystems directly dependant on the aquifer.
- The changes in ground water flow direction that may occur as a result of level variations:
  - are transient or occur on an ongoing basis and in limited areas; and
  - do not lead to saline intrusions, or other intrusions, that reveal a sustained and clearly identified anthropogenically-induced trend that is likely to result in such intrusions.

A **good chemical status** of a ground water body exists when the concentrations of pollutants:

- do not show significant saline or other intrusions (checked by testing the water’s conductivity);
- comply with environmental quality standards under the specific legislation (Annex I of Executive Order No. 208/2008 of October 28);
- do not prevent the achievement of the specific environmental objectives established for the associated surface waters nor significantly reduce the chemical or ecological quality of those water bodies;
- do not cause significant damage to terrestrial ecosystems directly dependant on the ground water body.

Section I.2 of **Annex IV** to this document (**Tables A.7 to A.9**) presents information concerning the criteria for the classification of the quantitative and chemical statuses of ground water bodies.

In order to assess the extent of the damage to a ground water body as a result of an incident, the alterations caused to the above-mentioned criteria and their contribution to the negative shift of its chemical or quantitative statuses are to be analyzed.

### 7.3.5. Baseline situation

Knowing the baseline situation of a water body is essential to evaluate the existence and extent of the effects an incident has produced on it.

Regarding the information currently available, the websites of INAG and of the relevant Regional Hydrographic Authorities may provide data on hydrological resources, obtained through the monitoring of their biological, hydrological, weather, physicochemical and sediment variables, as well as information on the status classification of water bodies assigned in the framework of the Waters Act.

Notwithstanding the information already in possession of the relevant authorities, it is convenient for the operators carrying out a business activity to have their own information on the baseline situation of a water body that may be affected in the course of their business.

The information to be considered may include the following items, among others:

- Information about the type of water bodies potentially affected and the services provided by them;
- Chemical, hydrological, ecological and other types of data sampled at the site;
- Data from upstream sites with similar characteristics;
- Information collected by studies conducted at the site, such as Environmental Impact Studies, scientific studies conducted by universities, etc.

### 7.3.6. Damages to water bodies

Adverse, transient and short-term effects on water bodies, from which they can recover without the adoption of remediation measures, **are not considered significant enough** to cause a deterioration of the status of such water bodies, as indicated in the European Commission's "*Guidance document on exemptions to the environmental objectives*" (2009).

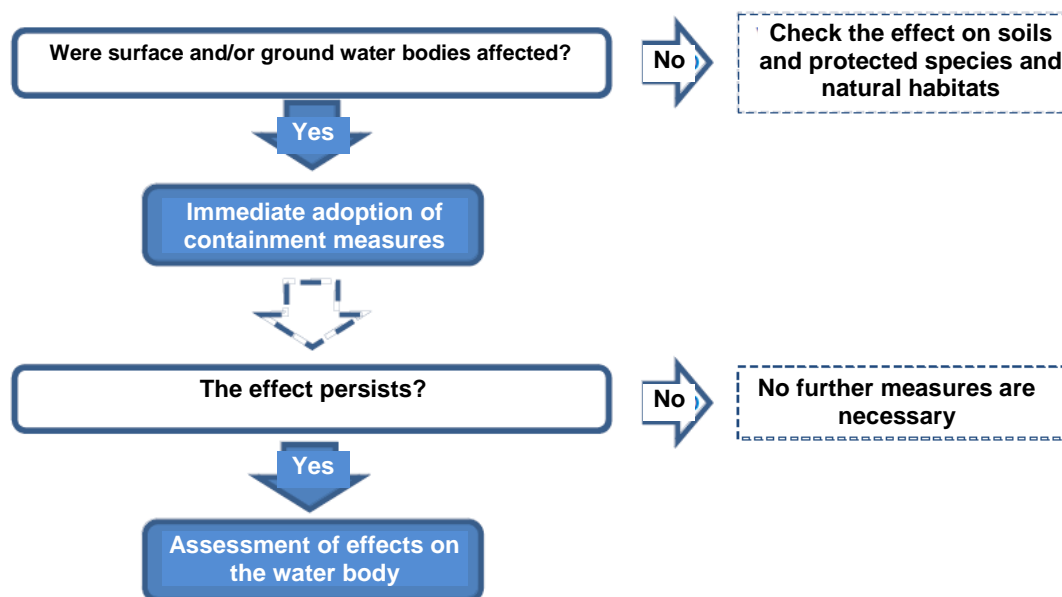
The occurrence of incidents sometimes result in short-term damages of reduced impact, for example due to the dilution effect of the medium, so not all adverse effects on a water body are environmental damages as defined under the EL statute. The extent of such damage has to be assessed in order to decide for the applicability of the EL statute.

This subsection presents the actions to be taken by the operator upon the occurrence of an incident, in particular the procedures for immediate action in situations of damages to a water body and the subsequent assessment of the extent of such damages in order to decide for the eventual applicability of the EL statute.

This Section also covers the operator's obligations under the EL statute, in particular the adoption of preventive and remediation measures appropriate to the situation in question. Situations not covered by the EL statute shall be governed by **specific legal frameworks** relating to water resources resulting from the application of the Waters Act (see Subsection 7.3.6.4).

**Figure 5** graphically presents the stages of action after the occurrence of damages to a water body, as described in the following sections.





**Figure 5.** Course of action flowchart in the event of an affected water body.

### 7.3.6.1. Course of action in the event of an incident

Following an incident with adverse effects on a water body, the operator must immediately activate the emergency response mechanisms involving water resources, including the adoption of **containment measures** planned under the Internal Emergency Plan (IEP) required under the various licensing regimes (environmental license, permit for the utilization of water resources, etc.), of the environmental management policy (EMS, EMAS<sup>7</sup>) or other existing documents/statutes with procedures relevant to this context. Such containment measures should be taken by the operator without delay and regardless of the legal framework the incident may be dealt with (the EL statute, the Waters Act) so as to ensure the limitation of the adverse effects of the incident in space and time.

Under certain circumstances and in the framework of the emergency the operator has to immediately communicate the occurrence via the emergency phone numbers to the forces and services necessary for an immediate intervention, as well as to the local civil defense service.

It should also report the fact to the relevant authorities under the specific legal frameworks it is subjected to, such as licensing agencies.

In the event that another natural resource is affected (soil and/or protected species and natural habitats), the relevant chapters should be consulted.

### 7.3.6.2. A Situation of Imminent Threat

#### 7.3.6.2.1. Assessment of damages

This section presents the procedures to be adopted by the operator if it suspects that an incident may pose a threat of imminent damage.

<sup>7</sup> Environmental Management System; Community Eco-management and Audit System, respectively.

After the adoption of the containment measures mentioned in the previous section, the operator must assess the effectiveness of these measures and the possible persistence of the effects of the damage to the water body.

This assessment should take into consideration the type of water body affected, the services it provides for the benefit of the public or of another natural resource, and its baseline situation. From such assessment the operator must decide if he is before a situation of imminent damage or not.

Generally speaking, the following situations are to be particularly analyzed after the adoption of containment measures:

- Persistence of adverse effects on the affected water body (continuing damage);
- Damages to a recreational/bathing water body or a water body used for the uptake of water for human consumption for over 50 individuals or in quantities over 10 m<sup>3</sup>/day (particularly water sources serving more populous human settlements), or located within a relevant Natura 2000 site.

In order to assess the persistence of adverse effects on a water body, the variation of the polluting agent should be studied, comparing the typical values of the baseline situation to those detected after having taken the containment measures.

The aspects listed below may be examined as well, among others that may be deemed relevant:

- Extension (volume, area) of the water body and the respective affected fraction;
- Natural dilution/regeneration capacity of the medium (flow rate, drainage velocity, category of the water body in accordance with **Table 3**);
- Hazardous features of the pollutant introduced into the water body (toxicological and ecotoxicological properties, environmental persistence) and its physicochemical properties.
- Quantity of the pollutant introduced into the water body.

When the operator confirms the persistence of the effects of the incident upon the water body, and if such water body is not a recreational/bathing site, and if it is not used for the uptake of water intended for human consumption or a relevant Natura 2000 site, such situation should be properly monitored and evaluated in the context of the specific water resources regulations under the Waters Act.

If the implemented containment measures have proved sufficient to completely eliminate the effects of the incident on the water body, no further action is necessary.

#### 7.3.6.2.2. Reporting

Whenever an operator finds that there is an imminent threat of damage, it should report such fact to APA and adopt preventive measures complementary to the containment measures already taken.

Any situation in which the containment measures taken are not sufficient to eliminate the effect on the water body should be immediately reported by the operator to APA, provided such water body is classified as:

- A recreational/bathing water body;
- An area for the uptake of water intended for human consumption for over 50 people or in quantities over 10 m<sup>3</sup>/day (particularly water sources serving more populous human settlements);
- A water body located within a relevant Natura 2000 site.

The reporting of such cases will be done as required by paragraph 4 of article 14 of the EL statute, which establishes the obligation to immediately inform the relevant authority about all aspects related to the existence of an imminent threat of environmental damage, particularly with regard to the measures already taken and their success. This reporting must be done as specified in Section 5.1 of this document.

#### 7.3.6.2.3. Preventive measures

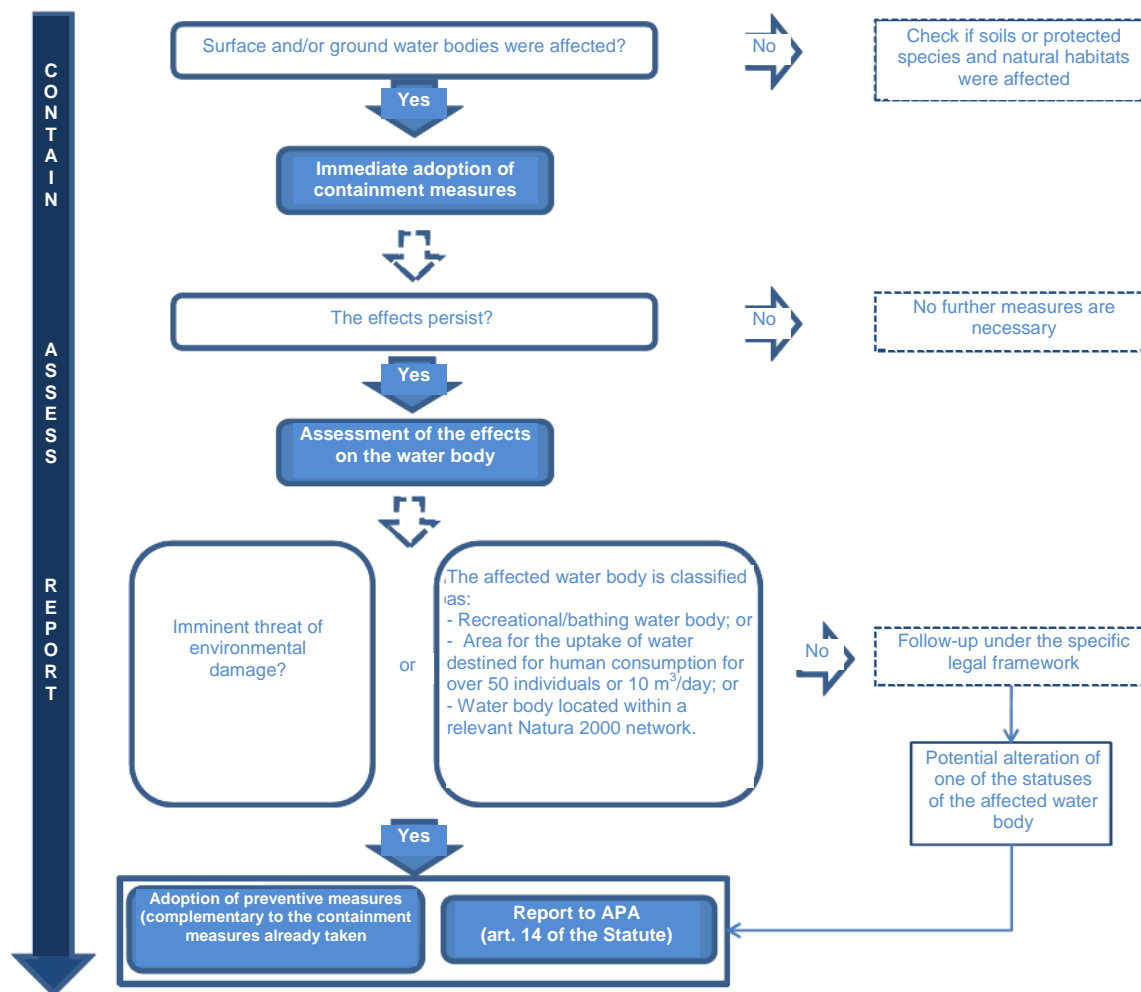
The reporting of the situation does not relieve the operator from the need to maintain the measures already taken or other deemed essential, or from the need to collect information to evaluate the magnitude and extent of the damages caused to the water body.

Following the reporting of the situation mentioned above, APA, as the relevant authority for the application of the EL statute, shall assess the situation so as to decide on the eventual declaration of an imminent threat of environmental damage to a water resource, considering the aspects referred to in Subsection 7.3.6.2.1. or any other relevant to the situation at hand.

APA may request from the operator additional information about the possible imminent threat and the adoption of additional **preventive measures**, as provided in line c) of paragraph 4 of article 14 of the EL statute.

Note that the fast adoption of efficient preventive measures may significantly reduce the damages caused to a water resource and therefore reduce the costs of the remediation measures.

The procedures presently described are shown in **Figure 6** with a schematic flowchart for the inclusion of the incident within the framework of the EL statute.



**Figure 6.** Operator's intervention flowchart in the event surface or ground water bodies are affected

### 7.3.6.3. A situation of environmental damage

#### 7.3.6.3.1. Concept of extent of damage

Following an adverse effect on a water body, it is important to assess if such effect represents an environmental damage under the EL statute. This section presents guidelines for such assessment process.

An environmental damage to a water resource occurs when the adverse effects of an incident are significant enough to cause a change on the water body's status.

Therefore, in order to fall within the framework of the EL statute, i.e. within the definition of environmental damage to a water resource, it is necessary to assess the consequences of such effect compared to the baseline situation of that particular water body.

Pursuant to the definition of "environmental damage to water resources", any damage leading to the following alterations are considered to be within the framework of the EL statute, namely:

- Deterioration of the quantitative or chemical status of a **ground water body** as a result of a variation in the respective classifications;
- Deterioration of the ecological or chemical status of a **surface water body** as a result of a variation in the respective classifications;

- Deterioration of the chemical status or ecological potential of an **artificial or heavily modified water body** as a result of a variation in the respective classifications.

Any effect on a water body resulting in a significant risk to human health shall be also considered an “environmental damage”, regardless of any deterioration of such water body.

#### 7.3.6.3.2. Assessment of the extent of damage

Even though under certain situations an accident, due to its dimensions (its nature, severity or extent), immediately configures an environmental damage, in most cases the confirmation of an environmental damage will not be evident or immediate. Therefore, the assessment of the effects of an incident is a complex issue and may involve the use of several tools. As a result, the operator may use the following tools for a detailed assessment of the effects of an incident, conducting an analysis on a case by case basis:

- **Modeling** of the pollutant patch dispersion on the water body for a simulation period of more than one year, using appropriate software, in order to provide information relevant to the assessment of the possible deterioration of the statuses of the affected water body;
- **A monitoring plan** to monitor the effects of the damage for a minimum period of time of one year, in order to provide information relevant to the assessment of the possible deterioration of the conservation statuses of the water body.  
The monitoring plan must be complementary to the existing information collected in the framework of the water quality monitoring network of the hydrographic region.
- **Quantitative Environmental Risk Analysis** for the determination of the risks to human health following possible damages to the services provided by the water body for the public benefit. Information on the risk analysis methodologies can be obtained from the “*Methodological guide for the setting of financial collateral*”, elaborated by APA.

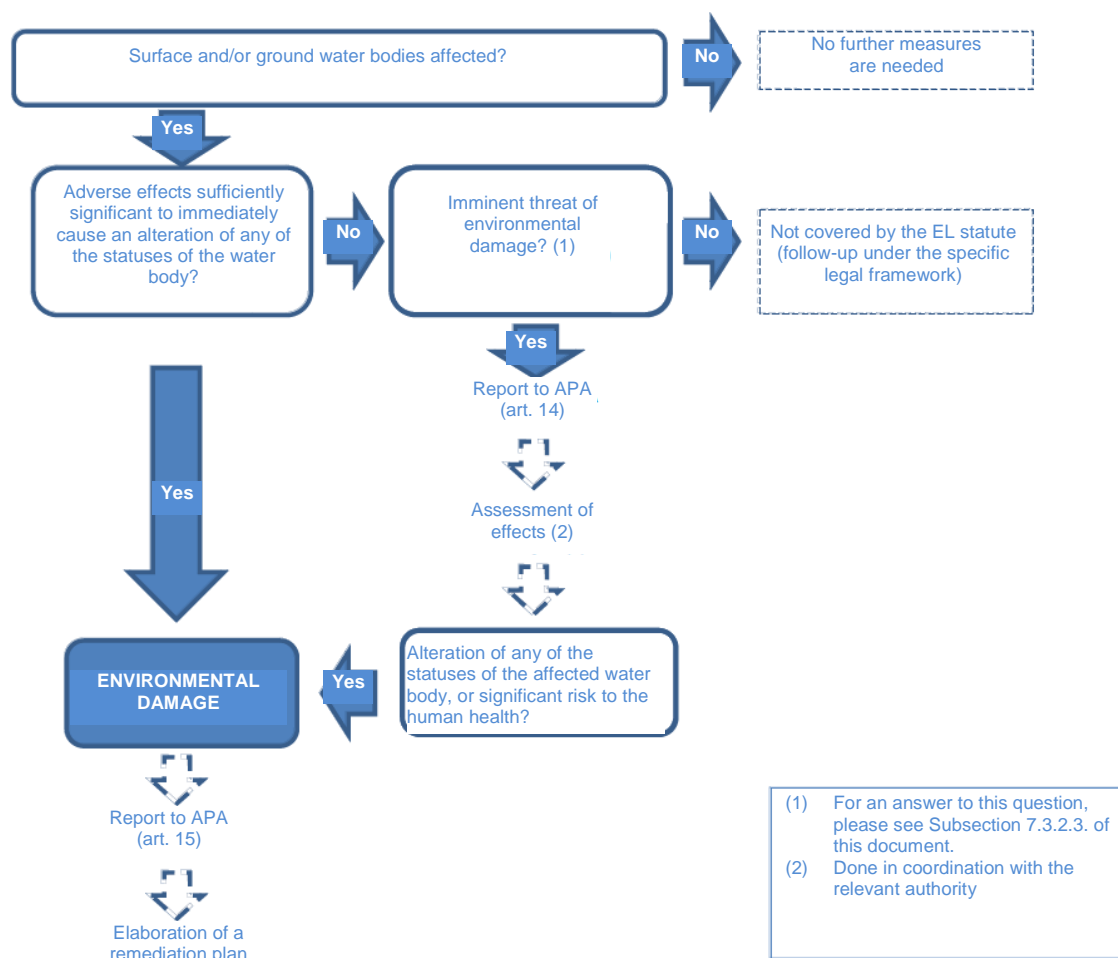
For the purpose of assessing the extent of the damage, APA may determine, together with the relevant environmental authorities (particularly INAG and the Regional Hydrographic Authorities), the need for the operator to conduct studies additionally or complementary to the existing ones.

If the results of the detailed evaluation of the effects on the water body reveal the deterioration of at least one of the statuses characterizing the water body (ecological and chemical, ecological potential and chemical, or quantitative and chemical statuses, as applicable) and/or the existence of an “unacceptable” risk to human health, the effects shall be deemed as an **environmental damage** and the operator must comply with the obligations under the EL statute, as shown in the following subsection.

The analysis and interpretation of the obtained results are assessed by APA as the relevant authority for the application of the EL statute.

If there is no sufficient chance for the effect to cause a deterioration of any of the water body’s statuses or a significant risk to human health, the situation shall not be included within the framework of the EL statute and should be monitored in the context of the specific applicable regulations (the Waters Act) - see Subsection 7.3.6.4.

**Figure 7** presents a flowchart of the procedure described above.



**Figure 7.** Decision-making flowchart in the event of damage to a water resource

The remediation of damages to water resources is achieved through the restoration of the environment to its baseline situation through primary, complementary and compensatory measures to be applied at the appropriate times in order to maximize their preventive and/or remediating effect. The concepts inherent to these remediation measures are presented in Subsection 7.4.5.1 of this document (see Section 8.2 as well). Additionally, the operator must implement a monitoring plan to monitor the evolution of the effects of such environmental damage in order to verify the effectiveness of the measures taken.

#### 7.3.6.4. Specific legal frameworks

Following an incident which adversely affects a water body and regardless of the legal framework subsequently applied to the situation, the specific legal statutes applicable to water resources under the Waters Act must be immediately applied.

The monitoring of situations not covered by the EL statute is carried out by the agencies empowered by the Waters Act (INAG and the Regional Hydrographic Authorities), particularly with regard to the determination of containment measures to be taken by the operator and the monitoring plans to be elaborated.

Based on the developments after the adoption of appropriate containment measures, and provided that there are **persistent effects** justifying the status alteration of the affected water body, the situation shall be duly included within the framework of the EL statute following the procedures described in the previous subsections.

In cases where the damaging effects do not fall within the framework of the EL statute, the operator must take the necessary measures for the recovery of the affected water body under the applicable specific regulations.

## 7.4. Soil

### 7.4.1. Scope and Background Information

This section presents an analysis of a type of **environmental damages** covered by the EL statute, i.e. **damages and imminent threats of damage to the soil**, understood as *“any soil contamination that creates a significant risk to human health due to the direct or indirect introduction into the soil or its surface of substances, preparations, organisms or microorganisms”* (item iii of subparagraph e) of paragraph 1 of article 11).

Under the EL statute, only soil contaminations resulting in a situation of significant risk to human health are classified as environmental damages to the soil, excluding all other cases of contamination of this natural resource.

As it is not possible to exhaustively list all the situations falling within this legal framework, it was decided to establish in this Section the guidelines for the operators and the authorities to efficiently implement the concept of “imminent threat of damage to the soil” and “environmental damage to the soil”, for them to act in conformity with the provisions of the EL statute.

Moreover, the procedures to be followed by the operator for the assessment of incidents that result or may result in damages to the soil are also presented, including methodologies and criteria to be taken into account in the assessment of the damages. The relevant information to be considered by the operator in defining the contamination status of the soil is presented as well, i.e. the starting point for the detection of a threat of environmental damage or of an actual environmental damage and the further adoption of measures.

### 7.4.2. Land Utilization

The territorial legal regulation, established by Executive Order No. 380/99 of September 22, defines, among other things, the **general land utilization regimen**, which is in turn defined by the municipal land regulation plans (municipal master plans - MMP, urbanization plans and detailed plans).

According to that statute, the **classification** of the soil determines the basic destination of the land, distinguishing between urban and rural lands, namely:

- Rural lands: Lands destined for agricultural, livestock, forestry or mining activities, as well as protected or recreational natural areas, or lands occupied by infrastructures that do not confer them an urban status.

The **classification** of rural lands is done according to the following categories:

- ❖ Agricultural and forestry areas allocated to production or conservation;
- ❖ Mining areas;
- ❖ Areas allocated to industrial activities directly linked to the uses listed in the preceding points;
- ❖ Natural areas;
- ❖ Areas destined for infrastructures or other types of human occupation not involving their classification as urban lands, allowing multiple activities compatible with agricultural, forestry or natural areas:

- Urban lands: Lands destined for urbanization and edification, including urbanized areas or areas which urbanization is already planned, representing the urban perimeter.

The **classification** of urban lands is done according to the following categories:

- ❖ Urbanized land;
- ❖ Lands which urbanization is planned;
- ❖ Lands allocated to the ecological structure necessary for a balanced urban system.

Regarding agricultural lands, the legal regimen of the National Agricultural Reserve - NAR (approved by Executive Order No. 73/2009 of March 31) provides for the classification of the lands according to their suitability for agricultural use (according to the methodology recommended by the United Nations Food and Agriculture Organization - FAO) and the classification of soils according to their utilization capacity (according to the methodology defined by the former National Center of Agrarian Recognition and Regulation - CNROA), in areas of the country where the aforementioned land classification was not made. The classes associated with each of these classifications can be found in **Annex V** to this document.

The representation of the spatial structure model of the national territory at the municipal level, according to the classification of soils described above, can be found in the respective MMPs' web pages available on the websites of the respective Municipal Councils or of the Directorate General of Territorial Planning and Urban Development (DGOTDU), particularly in the National Territorial Information System ([www.dgotdu.pt/>SNIT](http://www.dgotdu.pt/>SNIT)).

The knowledge of the utilization of the land within the area in question is not only essential for the characterization of the baseline situation of this natural resource (see subsection 7.4.4) but also for the definition of its level of contamination, if any (see Subsection 7.4.3).

#### 7.4.3. Soil contamination

A contaminated soil is characterized by the presence of substances, organisms or microorganisms which normally do not occur at all or do occur in low concentrations or quantities, while the presence of these substances, organisms or microorganisms have or may have harmful effects on the environment and human health.

Within the framework of the EL statute, the following elements should be taken into account in the assessment of soil contamination leading to a significant risk for human health:

- The type and concentrations of the substances or preparations or the quantity of (micro)organisms;
- Their possible dispersion;
- The possible exposure of people, i.e. the size of the affected area, the number of individuals who may be affected and their time of exposure to the contamination;
- If the contamination is permanent or if there is a capacity for natural regeneration in the short term;
- The current or future utilization of the land.

According to the definition of “**environmental damage to the soil**” provided by the EL statute, the assessment above is triggered by a risk assessment methodology to be developed on a case by case basis, in accordance with paragraph 2 of Annex V, aiming to eliminate, contain or reduce the contaminants so as the contaminated soil no longer poses a significant risk to human health.

Regarding the legal framework for the soil decontamination operations, Executive Order No. 178/2006 of September 5, as amended and republished by Executive Order No.



73/2011 of June 17 (The Waste Statute), is to be applied. This statute establishes the general waste management regimen. Pursuant to paragraph 2 of article 23 of such Order, the decontamination of soils is subject to licensing, with the necessary adaptations and notwithstanding the specific legislation on the subject. Article 20 of the Executive Order in question states that standards may be established for that purpose and that these standards should be enforced through an Ordinance.

Until the publication of such technical standards or special legislation, it is recommended to consult the Canadian Standards (*Canadian Environmental Quality Criteria for Contaminated Sites*), the *Guidelines for Use at Contaminated Sites in Ontario* and its review<sup>8</sup> (hereinafter referred to as the **Ontario standards**), or the Dutch standards (*Target Values and Intervention Values for Soil Remediation*) as the soil contamination assessment criteria, depending on the respective uses of the studied soils.

The CCDRs, as the regional waste authorities (RWA), are the soil decontamination licensing agencies.

Regarding the Ontario standards applied at the national level, the criteria associated to the so-called “generic approach” are to be used. Under this approach, the assessment of a contaminated site takes into account criteria that are based on the effects of the pollutants on human health and/or the environment. The document “*Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (2009)*” presents the **generic assessment and recovery criteria** (hereinafter referred to as the “**Ontario generic criteria**”) for the soil (according to the utilization of such soil (see previous subsection)), ground water (either potable or not), and surface water sediments. This information can be found in **Tables 2 to 9** of this document.

Since it does not take into account the particular conditions of the site under study, this approach is adequate to perform a preliminary soil contamination analysis and must be supplemented by specific approaches focused on the site in question, as outlined in the following subsections.

#### **7.4.4. Baseline situation**

Given that under the EL statute an environmental damage to the soil is verified through the existence of a significant risk to human health, the goal of remediating such damage is the elimination of that risk, as provided by paragraph 2 of Annex V of the EL statute (remediation of damages to the soil), taking into account the current or future use of the land as approved at the time the damage occurred.

The characterization of the baseline situation of the soil can be based on available historical data and by the collection of soil samples within the perimeter of the site in question and possibly in its surroundings. The parameters to be analyzed should match the specifics of the concerned activity.

The definition of the baseline situation of the soil also allows the identification of its historical contamination, particularly in the area surrounding the facility where the activity potentially causing the environmental damage is performed.

Knowing the current and future utilization of the land may also be important for the characterization of the baseline situation within and without the perimeter of the facility, i.e. the classification and categorization of the soil, as outlined in Subsection 7.4.2.

#### **7.4.5. Damages to the soil**

Upon occurrence of an incident, understood as a sudden, unforeseen and potentially harmful event, it is necessary to assess its consequences and if it can be defined as an

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<sup>8</sup> Last review of the document “*Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*”, Ontario Ministry of the Environment, July 27, 2009 (in short, “*Soil, Ground Water and Sediment Standards, 2009*”)

environmental damage or as an imminent threat of environmental damage to the soil under the EL statute.

The applicability of the statute, with the consequent determination of the preventive and remediation measures to be taken, implies a precise knowledge of the caused environmental damages. For that purpose it is essential to assess and classify such damages according to the methodology presented below.

It must be understood that an incident may not necessarily lead to an environmental damage and that the adverse effects may not be sufficiently significant for the incident to be considered an “environmental damage” under the EL statute. Therefore, first of all it is essential to carry out a preliminary analysis of the incident and of its effects.

This subsection presents the actions to be undertaken by the operator following an incident, particularly the immediate procedures to be followed after situations affecting the soil, and the subsequent assessment of the extent of the damage in order to decide for the eventual applicability of the EL statute to that particular situation.

It also covers the operator's obligations under the EL statute, in particular the adoption of preventive and remediation measures appropriate to the situation at hand.

Situations not covered by the EL statute should be dealt with under the **specific soil decontamination legal framework** resulting from the application of the general waste management regimen (see Subsection 7.4.5.1).

#### 7.4.5.1. Intervention in the event of an incident

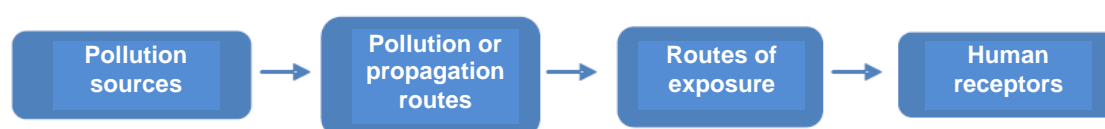
Following an incident with potential adverse effects on the soil, the **operator** must immediately activate the emergency response mechanisms, including the adoption of **containment measures** already defined in its respective Internal Emergency Plan (IEP) elaborated under the different licensing statutes (environmental license, permit to use hydrological resources, etc.), under the environmental management policy (EMS, EMAS<sup>9</sup>), or in other existing documents/statutes providing relevant measures for this context. Containment measures should be taken by the operator without delay, regardless of the underlying legal framework of the incident (the EL statute or the general waste management statute), so as to ensure the containment of the adverse effects of the incident in space and time.

Under certain circumstances and in the framework of the emergency intervention, the operator will immediately notify the occurrence through the emergency telephone numbers to the forces and services necessary for an immediate intervention and to the local civil defense service.

The need for reporting to the relevant authorities within specific legal frameworks, such as the licensing authorities, must also be taken into account.

In the event that another natural resource is affected (protected species and habitats and/or water resources), the relevant Sections must also be consulted.

After the containment phase has ended, bearing in mind that only soil contaminations leading to a significant risk to human health are considered an environmental damage to the soil, it is important to find out any route of exposure of human receptors (**Figure 8**). In other words, there are four fundamental risk analysis elements in the context of soil contamination:



**Figure 8.** Risk analysis conceptual model

<sup>9</sup> Environmental Management System, and Community Eco-Management and Auditing Scheme, respectively.

In a situation of contamination, each of these elements may exist in isolation. However, there is a risk only when there is a connection between them, i.e. when there is a possibility of damage to a human receptor by a particular pollutant through a route of exposure.

The risk to human health depends on the existence of at least one of the following possible routes of exposure (through direct or indirect contact with a contaminated medium):

- Inhalation of volatile fumes/gases and contaminated particles, either indoors or outdoors, as a result of surface soil contamination or gaseous migration to the surface from the subsoil layers. It should be taken into consideration that the migration of contaminants may occur through certain contamination routes to locations distant from the source;
- Ingestion of contaminated soil or contaminated crops;
- Skin contact.

The lack of a route of possible contact (“contamination source – receptor”) determines the lack of risk to human health and therefore the situation **does not represent an occurrence under the EL statute**.

The existence of exposure routes is assessed in each particular situation and, wherever such a route exists, an exploratory investigation must be conducted in order to quantitatively assess the degree of soil contamination, as outlined in the following Subsection.

If no such exposure routes are found, the situation should be monitored under the applicable legal frameworks (see Subsection 7.4.5.1). However, the possibility of future ground water contamination and/or the possibility of an alteration of the current routes of exposure is to be considered.

#### **7.4.5.2. A situation of imminent threat of environmental damage**

##### **7.4.5.2.1. Exploratory investigation**

If contamination routes are found, this determines the need for a quantitative assessment of the soil status through a sampling campaign conducted in order to confirm the presence, concentration and distribution of the pollutant in the soil.

The sampling plan to be implemented should be elaborated on a case by case basis and must ensure the collection of representative data about the pollutant’s concentration and distribution in the investigated area. **Annex VII** presents guidelines for the preparation of such sampling plans.

The test results obtained from these samples must be compared with specific standards, such as the **Ontario generic criteria** or reference threshold values indicating the potential risk to human health, as listed in Tables 2 to 9 of the document “*Soil, Ground Water and Sediment Standards, 2009*”. The reference values that better fit each particular situation should be used.

The Ontario general criteria consider the following specific characteristics of an affected site:

- Type of utilization of the affected soil (agricultural, residential/park, industrial/commercial);
- Depth of soil affected (top or deeper than 1.5 meters - topsoil and subsoil, respectively);
- Quality of the affected ground water (potable, non-potable);
- Texture of the affected soil.

The detailed conditions for the application of the **Ontario generic criteria**, contained in Tables 2 to 9 of the *Soil, Ground Water and Sediment Standards, 2009*, are presented in **Annex VI**.

Pollutant soil concentrations above those provided by the **Ontario generic criteria** determine the existence of an **imminent threat of environmental damage** and therefore the reporting and prevention procedures must be activated.

Pollutant soil concentrations not exceeding those provided by the **Ontario generic criteria** do not require any further testing or monitoring of the situation.

**Figure 10** schematically presents the procedures and applicable legal framework after the occurrence of an incident affecting the soil.

#### 7.4.5.2.2. Reporting and preventive measures

After a threat of environmental damage to the soil has been detected, the operator must inform APA, in the terms of Article 14 of the EL statute and as provided by Section 5.1. of this document, and immediately take preventive measures appropriate to the situation in question.

The reporting of the situation does not relieve the operator from the need to maintain the measures already taken or other deemed essential, or from the need to collect information to evaluate the magnitude and extent of the damage caused to the soil.

APA may request from the operator additional information about the reported imminent threat and the adoption of additional **preventive measures**, as provided by line c) of paragraph 4 of article 14 of the EL statute.

The prevention of the occurrence of damages to the soil involves the prevention of risks to the human health. Therefore, under these circumstances action must be taken in order to eliminate the contamination route(s) of exposure.

Note that the fast adoption of efficient preventive measures may significantly reduce the damages caused to the soil and therefore lower the costs of the remediation measures. After the preventive measures have been taken, an analysis should be conducted so as to determine the extent of the risk to human health and hence the existence or not of damages to the soil under the EL statute. This risk analysis is further developed in the following subsection.

#### 7.4.5.3. A situation of environmental damage – Assessment of risks to human health

At this stage, a **Risk Assessment** process must be elaborated in order to look for any significant risk to human health and, if any, determine the affected soil decontamination objectives so as to eliminate the detected risks.

In accordance with paragraph 2 of Annex V of the EL statute, the existence of risks to human health should be assessed through a *“risk assessment process that takes into account the characteristics and functions of the soil, the type and concentration of the dangerous substances, preparations, organisms or microorganisms, their risks and their possible dispersion”*.

For the purpose of this analysis, the document *“Methodological Guide for the Setting of Financial Collateral”*, prepared by APA, should be consulted in addition to the procedures presented below.

Given the results obtained in the previously conducted exploratory investigation (Subsection 7.4.5.2), a risk assessment should be conducted for substances which concentrations detected in the collected soil samples exceed the **Ontario generic criteria** (substances of interest). This investigation should focus on the area where the contamination was detected and its surroundings, whether or not such area is out of the perimeter of the facility where the damaging activity is carried out.

The following terms must be defined in order to conduct a human health risk assessment, namely:

- **Substances/agents of interest** are those involved in the damage to the soil. It is essential to know their spatial distribution, concentrations, behavior in the physicochemical medium and their toxicological characteristics, among other factors.
- **Area of Interest** is that including the sites where substances of interest have been identified. The size of this area should be estimated;
- **Exposure**: contact of an individual with the contaminant, defining the exposed population, frequency, duration and routes of exposure (describing the route taken by the contaminant from the source to the receptor).

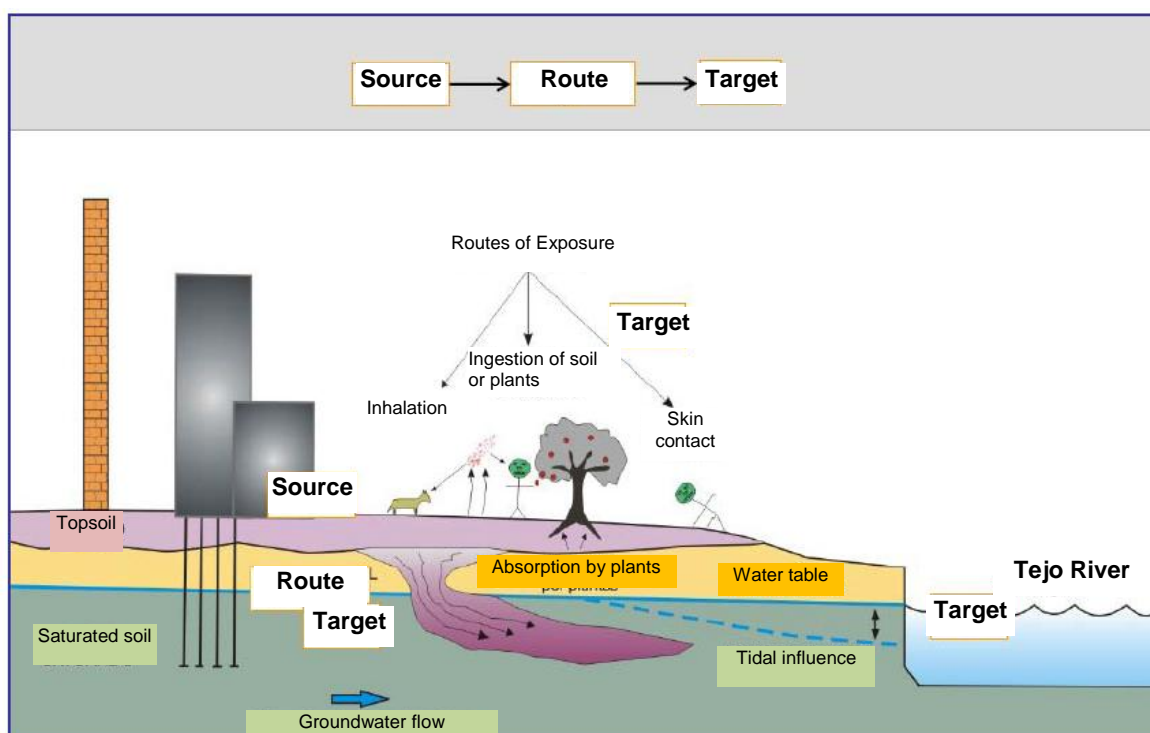
A complete understanding of the route of exposure to the contaminant demands knowing the following factors:

- Contamination **source** and mechanism;
- **Contamination route** (air, soil, surface water or ground water);
- **Route of exposure**/absorption of the substance (inhalation, ingestion, skin contact);
- **Human receptor**.

Since such quantitative risk assessment is specific for each site under analysis and since such assessment is based on the interactions observed between the contamination source, the route of contamination and the receptors (source - route - receptor), it is essential to define one or various **conceptual models (Figure 9)**, showing a “picture” of the initial conditions of the site and identifying the various exposure scenarios which, in turn, allow to run simulation models.

Therefore, the different sources of information available (characterization of the baseline situation, distribution of contamination foci, lithological and hydrogeological data, available maps, etc.) allow the elaboration of a conceptual model that should consider the following aspects:

- Identification of the characteristics of the contaminants;
- Localization of the contaminated sites;
- Leak/spill mechanisms;
- Routes of exposure (inhalation, ingestion, skin contact);
- Mechanism of migration/mobilization in the medium (leaching, volatilization, dilution, etc.).
- Existing potential receptors;
- Lithological/geological profiles;
- Hydrological and hydrogeological characterization (quality, flow, water table, drainage speed, flow direction);
- Topographic survey (soil and subsoil);
- Climatological characterization (wind speed and direction, temperature, humidity, etc.).



**Figure 9.** Conceptual model of a studied site (Source: FCT and GEOTA, 2009)

In the framework of a human health risk assessment study, the risk associated to chemical contaminants is calculated through the following ratio:

$$\text{Risk} = \text{Toxicity} \times \text{Exposure}$$

Regarding the assessment of soil contamination by microorganisms or organisms, the risk assessment methodology should use the best techniques available for that purpose. The methodology for the quantitative risk assessment for each defined scenario involves the following stages:

- i. **Characterization of the site** in question, involving the definition of the conceptual model;
- ii. **Modeling of the contaminant transport/dispersion** in the affected medium and definition of the contaminant patch, using proprietary software (transport models in one medium or transference between different media) and the results obtained from the sampling plan as input data. The “*Methodological Guide for the Setting of Financial Collateral*” has a list of contaminant dispersion modeling software programs attached;
- iii. **Toxicity assessment** of the contaminants, using bibliographic databases (an illustrative list is attached to the “*Methodological Guide for the Setting of Financial Collateral*”);
- iv. **Exposure assessment**, where the routes of exposure, potential receptors and the respective exposure factors are considered (hours/day, hours/bath, depending on the use of the affected medium);
- v. **Risk characterization**, using a specific software application (a list is attached to the “*Methodological Guide for the Setting of Financial Collateral*”). The information obtained in stages i. to iv. above represents the input data for the used model.
- vi. Determination of the **remediation objectives**, taking into account the evaluation of acceptability of the detected risk.

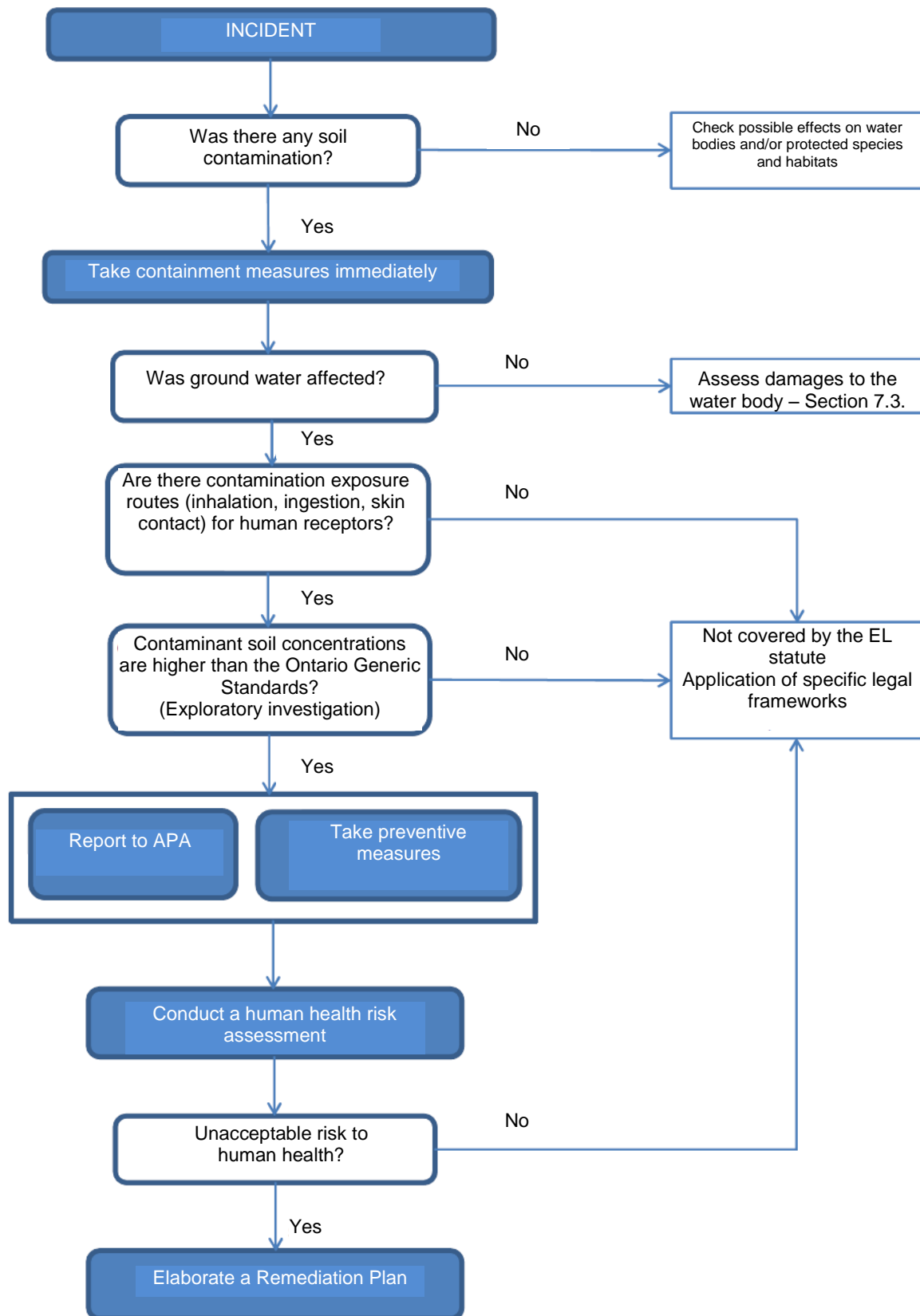
As noted above, the contamination plume modeling software for the characterization of the risks to human health is a fundamental risk assessment tool. The choice of the software used to implement the analysis of the risks to human health must take into account the reference values used by such software for the assessment of the risks associated to the contaminated soils. Preferably, software programs applying the **Ontario criteria** should be used.

An “**unacceptable**” risk to the human health obtained from the risk analysis represents a situation of damage **to the soil**. Under these circumstances, the procedures outlined in the following subsection – *Elaboration of the Remediation Plan* - must be immediately applied.

At this stage of the methodology, if the results of the risk analysis indicate the likelihood of damages to a water body as a result of the contamination of the soil (whether an unacceptable risk to human health was detected or not), an assessment of the damage to the water body in question must be conducted within the framework of the EL statute. If the resulting risk is rated as “**acceptable**”, the **specific legal frameworks** should be activated (see Subsection 7.4.5.1), as applicable to the situation defined by the risk assessment study.

The definition of the remediation plan, to be prepared on a case by case basis, has as its starting point the contributions of the risk analysis conducted in the previous stage. The goals of such remediation plan should match the decontamination objectives defined by such risk analysis.

Subsection 7.4.5.1 of this document, and particularly Section 8.3, present in detail the aspects to be considered in the elaboration of the soil remediation proposals. Additionally, the operator must implement a monitoring plan in order to monitor the evolution of the environmental damages in order to ascertain the effectiveness of the taken measures. The flowchart presented in **Figure 10** may be consulted for a better understanding of the global analysis presented herein.



**Figure 10.** Flowchart for the assessment of damages to the soil



#### **7.4.5.1. Specific legal frameworks**

According to the damage assessment methodology described above, following an incident affecting the soil and provided the EL statute is not applicable, the specific soil decontamination mechanisms arising from the application of the general waste management statute must be activated. If applicable, and if there is a possibility of future contamination of ground water, the legal statute applicable to water resources must be activated as well.

Whenever the damage does not fall within the framework of the EL statute, all necessary measures for the recovery and monitoring of the affected soil are to be taken under the specific legal frameworks. As the situation progresses, and if there is a significant, unfavorable change of the situation (in particular with regard to the existence of routes of exposure), the inclusion of the event within the framework of the EL statute can be reassessed and the measures provided therein may be adopted.

## 8. REMEDIATION MEASURES

### 8.1. Initial considerations

The main purpose of the EL statute is to ensure that any environmental damage is duly remediated through remediation measures that, in the event of damages caused to protected species and natural habitats or water resources, promote the recovery of these elements to their baseline situation and, in the event of damages to the soil, eliminate any significant risk to the human health.

The implementation of these measures is the responsibility of the operator who caused the environmental damage. Moreover, such operator will bear the costs of such damages and of the implemented measures.

The operator has to submit a proposal for remediation measures to the relevant authority, as provided by Annex V of the EL statute, considering the information collected about the severity of the incident and the duration and extent of the damage.

Under this statute, “remediation measures” are understood as *“any action or set of actions, including interim measures, aimed to remediate, rehabilitate or replace the damaged natural resources and services or provide an equivalent alternative to such resources or services”*. (line n) of article 11).

The determination by the operator of the measures to be taken requires the collection of information about the damage, which is obtained through the monitoring of the affected resources and the analysis of the data obtained by such monitoring and those available on the baseline situation of these resources. The representativeness of the data collected during the monitoring must be assured and is achieved through:

- the selection of representative sampling sites;
- the use of sampling techniques in accordance with current regulations;
- certified laboratory testing techniques.

The Remediation Plan depends on the type and characteristics of the damage in question, possibly including one or more remediation options, duly justified so as to enable an informed decision by the relevant authority about its or their application.

The following is a list of the minimum elements the remediation plan must include. We must highlight that this list is not comprehensive and is just a guideline to the operators:

- Description of the incident (the information to be included is outlined in the reporting form);
- Information about the baseline situation of the affected natural resources;
- Relevant data for the determination of the nature, severity and extent of the damage (collected during the monitoring operations);
- Description of the remediation options, including:
  - Remediation goals and associated intervention level;
  - Measures to be taken, including temporary ones, and their location;
  - Technical specifications of the methodologies to be applied;
  - Expected results and timeframes;
  - Estimated cost of each remediation option.
- Monitoring plan to be conducted during and after the implementation of the remediation measures;
- Identification of the technical team responsible for the plan.

The validation of the remediation plan proposed by the operator is done by APA after having heard the operator and the stakeholders and taking into account a common

framework for finding the most appropriate measures to ensure the remediation of the damages, as outlined in Annex V.

The assessment of the measures proposed by the operator and the analysis of the available information on the damage to species and habitats, water bodies and/or soil, is carried out within the framework of the CPA-RA and considering the technical opinion of the relevant authority in charge of the affected resources.

The decision about the measures to be taken is notified by the relevant authority to all stakeholders, as outlined in Chapter 6.

As mentioned elsewhere, the common framework that the operator must follow when choosing the most appropriate remediation measures is established in Annex V. Such framework varies depending on whether the damages are caused to protected species and natural habitats and/or to water resources or to the soil.

The following points present in detail the aspects referred to in Annex V and include guidelines to be taken into account in the preparation of proposals for the remediation of environmental damages caused to natural resources. These guidelines are not meant to be exhaustive, so the operator may need to resort to specialized technical support and consult the REMEDE - *Resource Equivalency Methods for Assessing Environmental Damage in the EU*, an European Project that has developed a draft tool known as “*Toolkit for Performing Resource Equivalency Analysis to Assess and Scale Environmental Damage in the European Union*” (July 2008). This document provides a resource equivalency approach, in the context of the EL statute, aimed to estimate and assess environmental damages in order to determine the complementary and compensatory remediation measures. It is available at <http://www.envliability.eu>.

## 8.2. Remediation of damages to protected species and habitats and water resources

In order to remediate environmental damages caused to protected species and natural habitats or water resources, the operator may have to take different types of remediation measures in order to restore such resources to their baseline situation, as provided by paragraph 1 of Annex V of the EL statute. These are known as primary, complementary and compensatory remediation measures.

**Primary Remediation** is defined as any remediation measure that restores the affected natural resources or services to their baseline situation or close to that state.

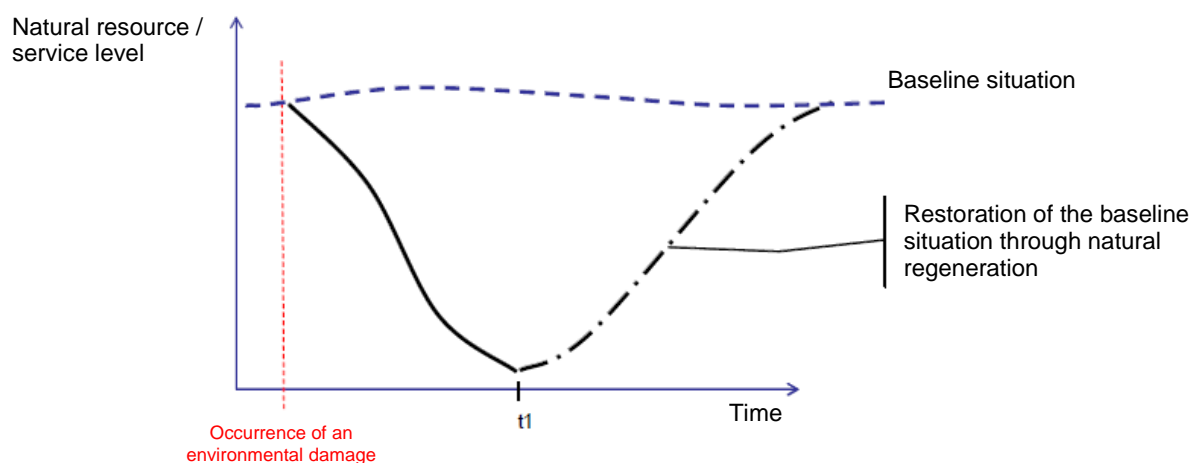
This type of remediation includes a set of measures that act locally or produce local effects, i.e. restoring the water resources and/or the protected species and natural habitats to their baseline situation. These measures rely heavily on the characteristics of the accident or incident in question (type of contaminant, location of the occurrence, features of the surrounding environment, etc.).

The main objective of the primary remediation is the elimination or partial or complete removal of the primary stressors (the contaminants causing the damage). Whenever possible, remediation measures that prioritize or accelerate the natural regeneration of the natural resource should be considered. This approach may involve the decision not to intervene, allowing the resource to reach or come close to its baseline situation through natural regeneration.

Note that the natural regeneration option does not mean the operator has to remain idle. It must check and ensure that this option will effectively restore the status of the natural resource to its baseline situation and demonstrate the effectiveness of such regeneration through its monitoring.

**Figure 11** presents the evolution in time of a natural resource or service if no environmental damage occurs (blue dotted line = baseline situation) and the same evolution after the occurrence of an environmental damage at a given time (continuous black line). For the latter, the figure also presents the temporal evolution of the damaged

natural resource or service considering the natural regeneration as the only primary remediation measure, starting in  $t_1$ .



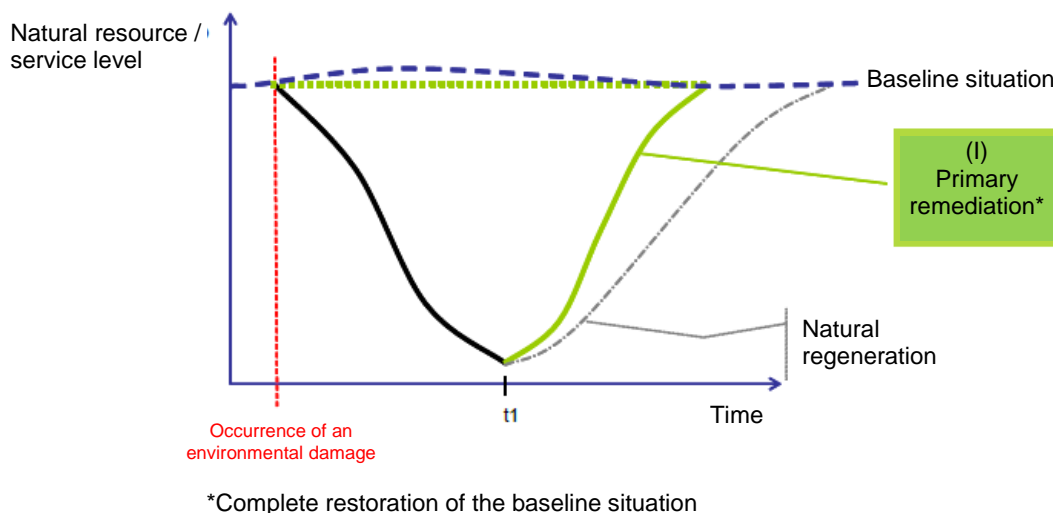
**Figure 11.** Natural regeneration of a damaged natural resource or service

It should be also noted that the choice of primary measures influences the selection and possible need of complementary and compensatory remediation measures. According to the guidelines developed by REMEDE, primary remediation measures, whenever possible, should include options aimed to minimize the need for the future adoption of complementary and compensatory remediation measures, including:

- Acceleration of the regeneration of the natural resource to its baseline situation (alternatively to only reducing the risks to human health and ecosystems), which can be done by:
  - Restoring the qualitative and quantitative values of the surface water body existing prior to the incident;
  - Replenishing the qualitative and quantitative parameters (restoring nutrient cycling, nutrient availability, water storage capacity);
  - Recovery of the vegetal composition and structure;
  - Ensure the recovery of the food chain and of the habitats supporting wildlife;
- Restore previously existing accesses to recreational areas;
- Accelerate the recovery of the services provided by the natural resource.

Whenever possible, primary remediation should restore the damaged natural resources or services to their baseline situation in a short period of time, as shown in **Figure 12**. In the depicted situation, it was possible to restore the baseline situation of the resource or service with primary remediation measures.

Note that the primary measures illustrated in this example are aimed to a faster remediation than that obtained by natural regeneration.



**Figure 12. Primary remediation**

We must have in mind that under certain situations the implementation of primary remediation measures may not be favorable to the resource or service, especially if their application is likely to cause collateral damage or when the benefits resulting from such measures are not significant.

Regarding the primary remediation of water resources, many measures involve the physical containment of the contaminants, the mitigation of their adverse effects, the removal of the contaminant and the treatment of contaminants in situ. The remediation techniques used on surface and ground water may differ given the specificities of these two different environments.

For illustrative purposes, **Table 4** describes some techniques used in the implementation of ground water and soil remediation measures.

Regarding the measures to be taken on surface water bodies, these may involve the containment, removal and neutralization of the introduced contaminants through the construction of physical barriers (levees or dams), placement of nets and increased water turnover in the affected environment, among others.

Regarding the species and natural habitats, the primary remediation measures for the restoration of the baseline situation and services of the affected environment may be:

- The reposition of native species;
- The establishment of vegetation in the affected area;
- The restoration of the food chain of the affected species;
- The promotion of the accessibility and services provided by the affected region;
- Interventions involving the removal of contaminated soil or the elimination of the pollution source.

It should be noted that, in some cases, the unique characteristics of the affected site may make the implementation of certain techniques unfeasible; these techniques may even be counterproductive, such as the introduction of species or specimens, albeit indigenous, in habitats that have been severely degraded.

When it is expected that the results obtained with the primary remediation measures will not let the natural resource to rapidly and completely regain its baseline situation, it is necessary to take compensatory and/or complementary measures, especially in the following situations:

- When the primary remediation does not allow the full regeneration of the resource to its baseline situation;
- When the estimated time for the full recovery of the resource to its baseline situation is excessive;
- When the primary remediation methodologies cannot be implemented immediately, even though they allow a complete recovery.

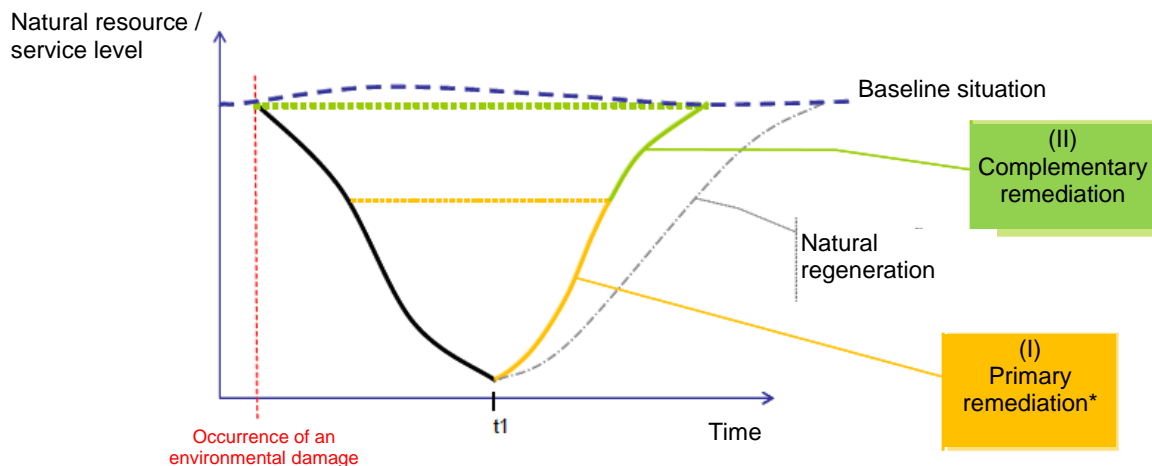
The following subsection presents the concepts related to the complementary and compensatory remediation measures.

### 8.2.1. Complementary and compensatory remediation

The temporary or permanent loss of resources or services as a result of an environmental damage is remediated through complementary and compensatory measures.

Within the framework of this statute, **<complementary remediation>** is understood as any remediation measure taken in relation to damaged natural resources or services so as to compensate for the fact that the primary remediation measures did not result in the complete recovery of such resources or services.

The complementary remediation is applied after the adoption of and as a complement to the primary remediation measures whenever the latter failed to restore the medium to its baseline situation, as shown in **Figure 13** (yellow line). In this situation, complementary remediation measures will be necessary (green line) for the complete restoration of the resource or service.



\*There is no complete restoration of the baseline situation

**Figure 13.** Complementary remediation

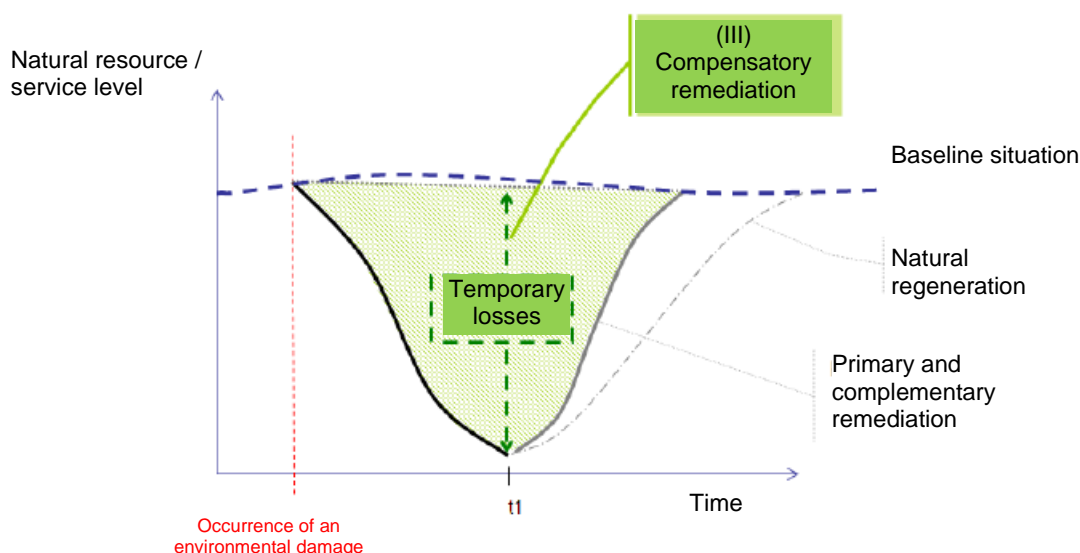
Complementary remediation measures can be applied on a damaged site or on an alternative site that should be, whenever possible, geographically connected to the damaged site, considering the interest of the natural resources and of their deteriorated services.

As an example of a complementary remediation measure we may mention the introduction of a fish population on a lake similar to the affected lake, provided it was not possible to restore the baseline situation through primary remediation measures. The number of specimens to be introduced at the alternate location is calculated by the difference between the original number of fish in the affected lake and the number of fish

replenished and maintained in that same lake after the application of the primary remediation measures.

During the time the primary and/or complementary measures fail to produce their effects, there are **<temporary losses>** associated to the fact that the natural resources and their services are unable to function.

Temporary losses (the green-shaded area in **Figure 14**) must be offset by **<compensatory remediation>** measures while we wait for the recovery of the natural resources and/or services. These measures cannot be a financial compensation to members of the general public.



**Figure 14.** Compensatory remediation

Thus, given that the restoration of damaged natural resources and/or services may take a considerable time, compensatory measures will be applied during the primary remediation stage in order to provide an equivalent alternative to the damaged resources or services. The compensatory remediation measures may be applied on the damaged site or on an alternate one.

The elimination of a given bird population, located within a dedicated bird-watching area, is an example of an environmental damage demanding the application of compensatory measures. These measures shall be applied so that the period of time the service provided by such birds cannot be offered is compensated, while such compensation cannot be of a monetary nature (for instance, through the construction of bird watching support structures). This time period is the time needed for the new population of birds, introduced to the site as a primary remediation measure, to grow to its original numbers.

### 8.2.2. Quantification of complementary and compensatory remediation measures

The approach defined in the EL statute for the quantification of complementary and compensatory remediation measures is based on the **<recourse equivalency methods>**<sup>10</sup> for the determination of the type and quantity of remediation measures required to completely compensate the losses related to an incident, taking into consideration the chemical, physical, biological and sometimes social and economic environmental damage and the remediation options.

<sup>10</sup> Adapted from REMEDE, July 2008.

In order to determine the scale of the complementary and compensatory remediation measures, according to point 1.2.2. of Annex V of the EL statute, the following equivalency approaches should be considered:

- “resource-to-resource” approach, mainly applied by the *Resource Equivalency Analysis – REA* method, by which the valuation of the damaged resources is done in terms of units of the affected natural resource, i.e., the number of fish or birds.
- “service-to-service” approach, mainly applied by the *Habitats Equivalency Analysis – HEA* method.

According to these methods, actions providing natural resources and/or services of the same type, quantity and quality than the damaged ones should be considered in the first place.

Detailed information about these methods can be obtained from REMEDE.

If the resource-to-resource or service-to-service equivalency approaches could not be used, alternative valuation techniques should be used instead, including the monetary valuation approaches known as “value-to-value” and “value-to-cost”.

Whatever the approach used, the basic principle is to choose a unit that allows the valuation/measurement of the loss of resources or services and of the gains to be obtained through the implementation of the complementary and compensatory remediation measures.

### **8.2.3. Criterion for the choice of remediation measures**

Reasonable remediation options should be evaluated using the best available techniques, whenever defined, based on the following criteria (paragraph 1.3.1 of Annex V of the EL statute):

- a) The effect of each option on public health and safety;
- b) The cost of implementation of the option;
- c) The probability of success of each option;
- d) The extent to which each option prevents future damage and avoids collateral damage resulting from its implementation;
- e) The extent to which each option benefits each component of the natural resource or service;
- f) The extent to which each option takes into account social, economic and cultural concerns and other relevant factors specific to the site;
- g) The time required for the environmental damage to be effectively remediated;
- h) The extent to which each option can recover the site that suffered the environmental damage;
- i) The geographical relationship to the damaged site.

### **8.3. Remediation of damages to the soil**

The remediation of environmental damages to the soil aims to eliminate significant risks of adverse effects on human health, according to the very definition of environmental damage involving this medium. Therefore, an approach different than those defined for the remediation of damages to species, natural habitats and water resources is needed (the latter were covered in the previous section).

As provided by paragraph 2 of Annex V of the EL statute, the necessary steps needed for the remediation of environmental damages caused to the soil must ensure that the involved contaminants are at least eliminated, controlled, contained or reduced, so that the contaminated soil no longer poses a significant risk to human health. For that purpose,



the current or future land utilization approved at the time the damage occurred should be taken into consideration.

The occurrence of environmental damages caused to the soil is confirmed by the assessment of risks to the human health, considering the characteristics of and the roles played by the soil, and the type, characteristics and concentrations of the contaminants in question. Through this risk assessment process the appropriate remediation plan to be implemented is established, consisting of decontamination measures applied on the affected soil.

**Table 4** lists the most common techniques used for soil remediation. These techniques are generally associated with the type of contaminant that is to be removed.

The remediation techniques applied to the soil are often also applied to ground water resources and therefore that table indicates which natural resource can be remediated by applying each particular technique.

In this context, when the remediation plan is being drafted the operator may consider a natural regeneration option for the affected soil, i.e. an option including no direct human intervention in the regeneration process. Section 7.4. of this guide presents more specific guidelines for the assessment of risks to the human health and the consequent definition of the affected soil remediation objectives.

**Table 4.** Main soil and ground water decontamination techniques

Type of remediation technique	Remediation technique	Application	Natural resource	Type of pollutant to be dealt with
Physicochemical decontamination	Extraction	In situ	Soil/Ground water	Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs), fuels, metals, PCB's, polycyclic aromatic hydrocarbons, chlorinated and halogenated solvents, etc.
	Flushing	Ex situ	Soil	SVOCs, petroleum hydrocarbons, cyanide and metals
	Flushing (soil flushing)	In situ	Soil/Ground water	All kinds of contaminants, especially inorganic
	Electrokinetic	In situ	Soil	Especially soluble or complex metals
	Corrective measures	In situ	Soil	Mainly salts and metals
	Active permeable barriers	In situ	Ground water	Biodegradable organic pollutants, metals, nitrates, sulfates
	Injection of compressed air	In situ	Soil	Chlorinated solvents, semi-volatile substances such as xylene, benzene, toluene, carbon tetrachloride, trichloroethane, methylene chloride, etc.
	Recirculation wells	In situ	Ground water	Trichloroethylene, petroleum derivatives, non-halogenated organic compounds, SVOCs, pesticides and inorganic compounds
	UV oxidation	Ex situ	Ground water	Wide range of organic and explosive contaminants (petroleum hydrocarbons, chlorinated hydrocarbons, volatile and semi-volatile organic compounds, alcohols, ketones, aldehydes, phenols, ethers, pesticides, dioxins, PCBs, TNT, RDX and HMX)
Biological decontamination	Assisted biodegradation	In situ	Soil	Wide range of biodegradable organic contaminants
	Biotransformation of metals	In situ	Soil	Metals
	Phytoremediation	In situ	Soil	Metals, pesticides, solvents, explosives, polycyclic aromatic hydrocarbons, unrefined
	Bioventing (aerobic degradation by oxygen injection)	In situ	Soil/Ground water	Medium molecular weight petroleum hydrocarbons, explosives (DDT, DNT)
	Land farming - ex-situ land treatment technique	Ex situ	Soil	Mainly medium molecular weight petroleum hydrocarbons
	Bio-batteries	Ex situ	Soil	Petroleum derivatives, halogenated and non-halogenated volatile

Type of remediation technique	Remediation technique	Application	Natural resource	Type of pollutant to be dealt with
				organic compounds, semi-volatile organic compounds and pesticides
	Composting	Ex situ	Soil	Explosives (TNT, RDX and HMX), polycyclic aromatic hydrocarbons, petroleum hydrocarbons, chlorophenols and pesticides
	Biological sludge	Ex situ	Ground water	Non-halogenated VOCs and SVOCs, explosives, petroleum hydrocarbons, petrochemicals, solvents and pesticides
Thermal decontamination	Incineration	Ex situ	Soil	Explosives, chlorinated hydrocarbons, PCBs and dioxins
	Thermal desorption	Ex situ	Soil	Non-halogenated VOCs, fuels, some SVOCs, polycyclic aromatic hydrocarbons, PCBs, pesticides and volatile metals
Hybrid decontamination	Multiphase extraction	In situ	Soil	VOCs, dissolved organic compounds in a free non-aqueous phase
	Natural attenuation (recovery of the environment without human intervention – only monitoring)	In situ	Ground water	BTEX compounds (benzene, toluene, ethylbenzene and xylene), chlorinated hydrocarbons, pesticides and inorganic compounds
Containment	Vertical barriers	In situ	Soil/Ground water	Organic and inorganic pollutants
	Horizontal barriers	In situ	Soil/Ground water	Organic and inorganic pollutants
	Dry soil barriers	In situ	Soil	Organic and inorganic pollutants
	Bottom kill	In situ	Soil	Organic and inorganic pollutants
	Hydraulic barriers	In situ	Soil	Organic and inorganic pollutants
Confinement	Physicochemical stabilization	Ex situ	Soil/Ground water	Mainly inorganic compounds such as heavy metals. Limited effectiveness with organic pollutants and pesticides
	Injection of solidifiers	In situ	Soil	Mainly inorganic compounds. Much lower efficiency with organic and semi-volatile compounds and pesticides
	Vitrification	Ex situ - In situ	Soil	Inorganic contaminants (mainly Hg, Pb, Cd, As, Ba, Cr and cyanide) and some organic contaminants

## **9. ACRONYMS**

AC - Relevant Authority

PA - Protected Areas

APA – Environmental Protection Agency of Portugal

ARH – Administration of the Hydrographic Region

CCDR - Coordination and Regional Development Committee

CC-RA - Advisory Council for Environmental Responsibility

EC - The European Commission

FC - Financial Collateral

CLC - Corine Land Cover

COS - Letter of Land Occupation

CPA-RA - Standing Monitoring Committee for Environmental Responsibility

ICNB - Institute for Nature Conservation and Biodiversity, IP

INAG – The Water Institute, I.P.

ISQ - Welding and Quality Institute

EQS - Environmental Quality Standards

NAR - National Agricultural Reserve

REMEDE - Resource Equivalency Methods for Assessing Environmental Damage in the  
EU

REN - National Ecological Reserve

SNAC - National System of Classified Areas

RNAP - National Network of Protected Areas

SAC - Special Areas of Conservation

SPA - Special Protection Areas

## 10. GLOSSARY

**Business activity** - any activity undertaken as part of an economic enterprise, whether public or private, for profit or not.

**Imminent threat of damage** – A sufficient probability of occurrence of an environmental damage in the near future.

**Classified areas**<sup>11</sup> - Areas cartographically defined and delimited within the national territory and waters under national jurisdiction which, because of their relevance to the conservation of nature and biodiversity, are subject to specific regulations.

**Biodiversity** - The variety of life forms and the processes that connect between them, including all living organisms, the genetic differences between them and the communities and ecosystems in which they occur.

**Conservation**<sup>12</sup> - All measures necessary to maintain or restore natural habitats and populations of wild animal and plant species to a favorable status.

**Damage** - Measurable adverse change in a natural resource or measurable deterioration of a service rendered by such resource, occurring either directly or indirectly.

### **Environmental damages:**

- i. **Damages to protected species and natural habitats** - any damage with significant adverse effects for the continuation or maintenance of the favorable conservation status of such habitats or species, which assessment has to be based on the baseline situation under the criteria listed in Annex IV of Executive Order No. 147/2008 of July 29, which are an integral part thereof, with the exception of the adverse effects previously identified that resulted from an action of an operator explicitly authorized by the relevant authorities in accordance with applicable law;
- ii. **Environmental damages to water resources** - any damage that adversely and significantly affects, in accordance with applicable law, the ecological or chemical status of surface waters, the ecological potential and the chemical and quantitative status of surface water or ground water bodies, including the ecological potential of artificial and heavily modified water bodies, with the exception of damages and adverse effects to water resources to which Act 58/2005 of 29 December and the respective complementary legislation apply;
- iii. **Environmental damages to the soil** - any soil contamination creating a significant risk to human health due to the direct or indirect introduction of substances, preparations, organisms or microorganisms into the soil or to its surface.

**Ecosystems** - dynamic complexes consisting of communities of plants, animals and microorganisms related to each other and with the surroundings, considered as a functional unit.

**Species** - the set of cross-breeding individuals with the same hereditary morphology and a common lifecycle, including any subspecies and geographically isolated populations.

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<sup>11</sup> Executive Order No. 142/2008 of July 24.

<sup>12</sup> Executive Order No. 140/99 of April 24, as amended and extended by Executive Order No. 49/2005 of February 24.

**Species of interest to the Community** - the species listed in Annexes A-I, B-II, B-IV and B-V, as well as the migratory bird species not listed in Annex A-I of Executive Order No. 140/99 of February 04, republished by Executive Order No. 49/2005 of April 24, that are considered of interest at the European level.

**Conservation status of a natural habitat** - the situation of a habitat as a result of the sum of the influences acting upon it and on the typical species living in it that may affect its long-term natural distribution, structure and functions, as well as the long term survival of its typical species.

**Conservation status of a species** - the status of a species as a result of all the influences acting upon it that may affect the long term distribution and abundance of its populations within the national territory.

**Baseline situation** - the situation that would have existed if the damage to the environment had not occurred, as assessed based on the best information available.

**Habitat of a species** - the medium defined by abiotic and biotic factors where the species occurs at any stage of its life cycle.

**Natural habitats** – natural or semi-natural areas of land or water distinguished by its abiotic, biotic and geographic features.

**Natural habitats of interest to the Community** - the habitat types listed in Annex B-I to Executive Order No. 140/99 of February 24, as republished by Executive Order No. 49/2005 of April 24.

**Containment measures** - any measures taken in response to an event or incident that is likely to cause adverse effects on protected species and/or habitats, aimed to avoid, prevent or minimize these effects as much as possible.

**Preventive measures** - any measures taken in response to an event, action or omission that has caused an imminent threat of environmental damage, aimed to prevent or minimize such damage as much as possible.

**Remediation measures**- any action or set of actions, including interim ones, aimed to remediate, rehabilitate or replace the damaged natural resources and services or provide an equivalent alternative to such resources or services, as set out in Annex V to Executive Order No. 147/2008 of July 29.

**Monitoring** - the process of collecting and processing information on one or more natural assets in order to follow its or their conservation status.

**Operator** - any natural or legal person, public or private, carrying out, controlling, registering or notifying an activity which environmental responsibility is governed by Executive Order No. 147/2008 of July 29, whenever it exercises or may exercise decisive powers on the technical and economic operation of that activity, including the holder of a license or authorization for that purpose.

**Population** – a group of individuals of the same species in a given area (Begon et al. 1996).

**Natural resources** - protected species and natural habitats, water bodies and soil.

**Ecosystem services** - the benefits that people obtain, either directly or indirectly, from ecosystems, namely: 1) Production services, understood as the goods produced or provided by ecosystems, including food, fresh water, wood, fiber, biochemical or genetic resources, among others; 2) Regulatory services, defined as the benefits obtained from the regulation exerted by ecosystem processes, including the regulation of the weather, of diseases, floods or detoxification, among others; 3) Cultural services, defined as immaterial benefits obtained from ecosystems, especially those of spiritual, recreational, aesthetic or educational nature, among others; 4) Support services, defined as services necessary for the provision of all other services, such as soil formation, nutrient cycling or primary productivity, among others.

**Services of natural resources** - functions performed by a natural resource for the benefit of another natural resource or the public.

**Site of importance to the Community** - a site within the Atlantic, Mediterranean or Macaronesian biogeographical regions that significantly contributes to maintain or restore a type of protected natural habitat or a protected species to a favorable conservation status, and that may also significantly contribute to the coherence of the Natura 2000 Network or to significantly maintain the biological diversity in any of these biogeographical regions.

**Priority natural habitat types** - types of endangered natural habitats existing in the country that are marked with an asterisk (\*) in Annex B-I to Executive Order No. 140/99, of February 24, as republished by Executive Order No. 49/2005 of April 24.

**Special Area of Conservation (SAC)** - a site of importance to the Community and located within the national territory where measures necessary for the maintenance or restoration of a favorable conservation status of natural habitats or populations of species for which the site has been designated are applied.

**Special Protection Area (SPA)** - an area of importance to the Community within the national territory where the measures necessary for the maintenance or restoration of the conservation status of wild bird species listed in the legislation, and of their habitats, are applied.

## 11. WEBSITES OF INTEREST

- APA – [www.apambiente.pt](http://www.apambiente.pt)
- ARH North - [www.arhnorte.pt](http://www.arhnorte.pt)
- ARH Central – [www.arhcentro.pt](http://www.arhcentro.pt)
- ARH Tejo – [www.arhtejo.pt](http://www.arhtejo.pt)
- ARH Alentejo - [www.arhalentejo.pt](http://www.arhalentejo.pt)
- ARH Algarve - [www.arhalgarve.pt](http://www.arhalgarve.pt)
- CCDR North – [www.ccdr-n.pt](http://www.ccdr-n.pt)
- CCDR Central – [www.ccdrc.pt](http://www.ccdrc.pt)
- CCDR LVT – [www.ccdr-lvt.pt](http://www.ccdr-lvt.pt)
- CCDR Alentejo – [www.ccdr-a.pt](http://www.ccdr-a.pt)
- CCDR Algarve – [www.ccdr-alg.pt](http://www.ccdr-alg.pt)
- EEA – [www.eea.europa.pt](http://www.eea.europa.pt)
- ICNB – [www.icnb.pt](http://www.icnb.pt)
- INAG - [www.inag.pt](http://www.inag.pt)
- REMEDE – [www.envliability.eu](http://www.envliability.eu)

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- Executive Order No. 152/97 of June 19, dealing with the treatment of urban wastewater.
- Executive Order No. 235/97 of September 3, dealing with the protection of water resources against pollution caused by nitrates of agricultural origin (vulnerable areas).
- Executive Order No. 236/98, of August 1, which establishes quality rules, criteria and goals aimed to protect the aquatic medium and improve water quality according to its main uses.
- Executive Order No. 348/98 of November 9, which amends Executive Order No. 152/97, of June 19, enacting European Commission Directive No. 98/15/CE of February 21.
- Executive Order No. 68/99 of March 11, which amends Executive Order No. 235/97, dealing with the protection of water resources against pollution caused by nitrates of agricultural origin (vulnerable areas).
- Executive Order No. 140/99 of April 24, as amended and extended by Executive Order No. 49/2005 of February 24.
- Executive Order No. 382/99 of September 22, which establishes protection perimeters for the uptake of ground water destined for public supply.
- Executive Order No. 506/99 of November 20, laying down the quality goals for certain hazardous substances included within the families or groups of substances under List II of Annex XIX of Executive Order No. 236/98 of August 1.
- Executive Order No. 268/2002 of November 27, which revoked paragraph 4 of article 7 of Executive Order No. 156/98 of June 6, laying down rules for the acknowledgment

of natural mineral waters and the characteristics and conditions to be followed in the treatment, labeling and marketing of natural mineral waters and spring waters.

- Executive Order No. 261/2003 of October 21, which amends the Annex to Executive Order No. 506/99.
- Executive Order No. 72/2004 of March 25, which enacts European Commission Directive No. 2003/40/CE of May 16, which lays down the list, the concentration limits and the labeling of substances on natural mineral waters, as well as the usage conditions of ozone-enriched air for the treatment of natural mineral waters and spring waters.
- Executive Order No. 149/2004 of June 22, which amends Executive Order No. 152/97.
- Executive Order No. 77/2006 of March 30, which supplements the enactment of Directive No. 2000/60/CE and regulates Act No. 58/2005.
- Executive Order No. 178/2006 of September 5, as amended and republished by Executive Order No. 73/2011 of June 17, which approved the general waste management statute and enacted Directive No. 2008/98/CE of the European Parliament and of the Council of November 19.
- Executive Order No. 142/2008 of July 24, which defines the Natural Conservation Network and the regulations governing it.
- Executive Order No. 147/2008 of July 29 (the EL statute), which establishes the legal framework to be applied in a case of environmental damages and enacts Directive No. 2004/35/CE of the European Parliament and of the Council of April 21 (the EL Directive).
- Executive Order No. 198/2008 of October 8, which is the third amendment to Executive Order No. 152/97.
- Executive Order No. 208/2008 of October 28, which establishes the ground water protection statute against pollution and deterioration, enacting Directive No. 2006/118/CE.
- Executive Order No. 135/2009 of June 3, which establishes a system for the identification, management, monitoring and classification of the quality bathing water bodies and for the provision of information to the public about them.
- Executive Order No. 103/2010 of September 24, which establishes the environmental quality standards under the water policy and enacts Directive No. 2008/105/CE of the European Parliament and of the Council of December 16, and partially enacts European Commission Directive No. 2009/90/CE of July 31.
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- Directive No. 2000/60/CE of the European Parliament and of the Council of October 23, which establishes a community-level action plan under the Water Policy.
- Directive No. 2004/35/CE of the European Parliament and of the Council of April 21, 2004 (the EL Directive);
- European Council Directive No. 2006/105/CE of November 20, which adapts European Directives 73/239/CEE, 74/557/CEE and 2002/83/CE dealing with environmental matters, as a result of the incorporation of Bulgaria and Romania.
- Directive No. 2008/105/CE of the European Parliament and of the Council of December 16, dealing with environmental quality standards under the Water Policy, amending and revoking European Council Directives No. 82/176/CEE, 83/156/CEE, 84/491/CEE and 86/280/CEE, and amending Directive 2000/60/CE.
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## **ANNEXES**

**ANNEX I**  
**LIST OF PROTECTED SPECIES WITH PROVEN OCCURRENCE IN**  
**CONTINENTAL PORTUGAL**

Taxonomic group	Species
Amphibians	<i>Alytes cisternasii</i> <i>Alytes obstetricans</i> <i>Bufo calamita</i> <i>Chioglossa lusitanica</i> <i>Discoglossus galganoi</i> <i>Hyla arborea</i> <i>Hyla meridionalis</i> <i>Pelobates cultripes</i> <i>Rana iberica</i> <i>Rana perezi</i> <i>Triturus marmoratus</i>
Reptiles	<i>Caretta caretta</i> <i>Chalcides bedriagai</i> <i>Chelonia mydas</i> <i>Coluber hippocrepis</i> <i>Coronella austriaca</i> <i>Dermochelys coriacea</i> <i>Emys orbicularis</i> <i>Eretmochelys imbricata</i> <i>Lacerta monticola</i> <i>Lacerta schreiberi</i> <i>Lepidochelys kempii</i> <i>Mauremys leprosa</i> <i>Vipera seoanei, Vipera seoanni</i>
Invertebrates	<i>Caseolus sphaerula</i> <i>Discula testudinalis</i> <i>Discula turricula, Hystricella turricula</i> <i>Geomalacus maculosus</i> <i>Leiostyla abbreviata</i> <i>Leiostyla cassida</i> <i>Leiostyla gibba</i> <i>Leiostyla lamellosa</i> <i>Lithophaga lithophaga</i> <i>Margaritifera margaritifera</i> <i>Unio crassus</i> <i>Apteromantis aptera</i> <i>Austropotamobius pallipes</i> <i>Callimorpha quadripunctaria</i> <i>Cerambyx cerdo</i> <i>Coenagrion mercuriale</i> <i>Euphydrias aurinia, Euphydrias (Eurodrias, Hypodrias) aurinia</i> <i>Gomphus graslini, Gomphus graslinii</i> <i>Lucanus cervus</i> <i>Macromia splendens</i>

Taxonomic group	Species
	<i>Ophiogomphus cecilia</i> , <i>Ophiogomphus serpentinus</i> <i>Oxygastra curtisii</i> <i>Proserpinus proserpina</i> , <i>Proserpinus proserpinus</i> <i>Scyllarides latus</i>
Fish	<i>Alosa alosa</i> <i>Alosa fallax</i> <i>Anaocypris hispanica</i> <i>Barbus comizo</i> , <i>Barbus comiza</i> <i>Barbus bocagei</i> <i>Barbus microcephalus</i> <i>Barbus sclateri</i> <i>Barbus steindachneri</i> <i>Chondrostoma almacai</i> <i>Chondrostoma lusitanicum</i> <i>Chondrostoma duriensis</i> <i>Chondrostoma polylepis</i> <i>Chondrostoma willkommii</i> <i>Lampetra fluviatilis</i> <i>Lampetra planeri</i> <i>Petromyzon marinus</i> <i>Rutilus alburnoides</i> , <i>Tropidophoxinellus alburnoides</i> <i>Rutilus arcasii</i> <i>Rutilus lemmingii</i> <i>Rutilus macrolepidotus</i> <i>Salmo salar</i>
Mammals	<i>Barbastella barbastellus</i> <i>Canis lupus</i> <i>Capra pyrenaica</i> <i>Balaenoptera acutorostrata</i> <i>Balaenoptera physalus</i> <i>Delphinus delphis</i> <i>Globicephala macrorhynchus</i> <i>Grampus griseus</i> <i>Kogia breviceps</i> <i>Orcinus orca</i> <i>Stenella coeruleoalba</i> <i>Ziphius cavirostris</i> <i>Felis silvestris</i> <i>Galemys pyrenaicus</i> <i>Genetta genetta</i> <i>Herpestes ichneumon</i> <i>Lutra lutra</i> <i>Lynx pardinus</i> <i>Martes martes</i> <i>Eptesicus isabellinus</i> <i>Eptesicus serotinus</i> <i>Myotis daubentonii</i> , <i>Myotis daubentonii</i> <i>Myotis escalerae</i> <i>Myotis mystacinus</i> <i>Myotis nattereri</i> <i>Nyctalus lasiopterus</i> <i>Nyctalus leisleri</i> <i>Nyctalus noctula</i> <i>Pipistrellus kuhlii</i> , <i>Pipistrellus kuhlii</i>



Taxonomic group	Species
	<i>Pipistrellus pipistrellus</i> <i>Hypsugo savii</i> , <i>Pipistrellus savii</i> <i>Plecotus auritus</i> <i>Plecotus austriacus</i> <i>Tadarida teniotis</i> <i>Pipistrellus pygmaeus</i> <i>Microtus cabreræ</i> <i>Miniopterus schreibersi</i> , <i>Miniopterus schreibersii</i> <i>Monachus monachus</i> <i>Mustela putorius</i> <i>Myotis bechsteini</i> , <i>Myotis bechsteinii</i> <i>Myotis blythi</i> , <i>Myotis blythii</i> <i>Myotis emarginatus</i> <i>Myotis myotis</i> <i>Phoca hispida botnica</i> , <i>Phoca hispida bottnica</i> <i>Phoca vitulina</i> <i>Cystophora cristata</i> <i>Erignathus barbatus</i> <i>Phocoena phocoena</i> <i>Rhinolophus euryale</i> <i>Rhinolophus ferrumequinum</i> , <i>Rhinolophus ferrumequinum</i> <i>Rhinolophus hipposideros</i> <i>Rhinolophus mehelyi</i> <i>Tursiops truncatus</i>
Birds	<i>Accipiter gentilis</i> <i>Accipiter nisus</i> <i>Acrocephalus arundinaceus</i> <i>Acrocephalus paludicola</i> <i>Acrocephalus scirpaceus</i> <i>Actitis hypoleucos</i> <i>Aegithalos caudatus</i> <i>Aegypius monachus</i> <i>Alauda arvensis</i> <i>Alca torda</i> <i>Alcedo atthis</i> <i>Alectoris rufa</i> <i>Anas acuta</i> <i>Anas clypeata</i> <i>Anas crecca</i> <i>Anas penelope</i> <i>Anas platyrhynchos</i> <i>Anas strepera</i> <i>Anser anser</i> <i>Anthus campestris</i> <i>Anthus pratensis</i> <i>Anthus spinoletta</i> <i>Anthus trivialis</i> <i>Apus apus</i> <i>Apus caffer</i> <i>Apus pallidus</i> <i>Apus unicolor</i> <i>Aquila adalberti</i> <i>Aquila chrysaetos</i>

Taxonomic group	Species
Birds	<i>Aquila fasciatus</i> <i>Ardea cinerea</i> <i>Ardea purpurea</i> <i>Ardeola ralloides</i> <i>Arenaria interpres</i> <i>Asio flammeus</i> <i>Asio otus</i> <i>Athene noctua</i> <i>Aythya ferina</i> <i>Aythya fuligula</i> <i>Aythya nyroca</i> <i>Botaurus stellaris</i> <i>Bubo bubo</i> <i>Bubulcus ibis</i> <i>Burhinus oedicephalus</i> <i>Buteo buteo</i> <i>Calandrella brachydactyla</i> <i>Calandrella rufescens</i> <i>Calidris alba</i> <i>Calidris alpina</i> <i>Calidris canutus</i> <i>Calidris ferruginea</i> <i>Calidris maritima</i> <i>Calidris minuta</i> <i>Calonectris diomedea</i> <i>Caprimulgus europaeus</i> <i>Caprimulgus ruficollis</i> <i>Carduelis cannabina</i> <i>Carduelis carduelis</i> <i>Carduelis chloris</i> <i>Carduelis spinus</i> <i>Certhia brachydactyla</i> <i>Cettia cetti</i> <i>Charadrius alexandrinus</i> <i>Charadrius dubius</i> <i>Charadrius hiaticula</i> <i>Chlidonias hybrida</i> <i>Ciconia ciconia</i> <i>Ciconia nigra</i> <i>Cinclus cinclus</i> <i>Circaetus gallicus</i> <i>Circus aeruginosus</i> <i>Circus cyaneus</i> <i>Circus pygargus</i> <i>Cisticola juncidis</i> <i>Clamator glandarius</i> <i>Coccothraustes coccothraustes</i> <i>Columba livia</i> <i>Columba oenas</i> <i>Columba palumbus</i> <i>Coracias garrulus</i> <i>Corvus corax</i> <i>Corvus corone</i> <i>Corvus monedula</i>

Taxonomic group	Species
Birds	<i>Coturnix coturnix</i> <i>Cuculus canorus</i> <i>Cyanopica cyana</i> <i>Delichon urbicum</i> <i>Dendrocopus major</i> <i>Dendrocopus minor</i> <i>Egretta garzetta</i> <i>Elanus caeruleus</i> <i>Emberiza cia</i> <i>Emberiza cirrus</i> <i>Emberiza citrinella</i> <i>Emberiza hortulana</i> <i>Emberiza shoeniclus</i> <i>Erithacus rubecula</i> <i>Cercotrichas galactotes</i> <i>Falco columbarius</i> <i>Falco naumanni</i> <i>Falco peregrinus</i> <i>Falco subbuteo</i> <i>Falco tinnunculus</i> <i>Fratercula arctica</i> <i>Fringilla coelebs</i> <i>Fringilla montifringilla</i> <i>Fulica atra</i> <i>Fulica cristata</i> <i>Galerida cristata</i> <i>Galerida theklae</i> <i>Gallinago gallinago</i> <i>Gallinula chloropus</i> <i>Garrulus glandarius</i> <i>Glareola pratincola</i> <i>Grus grus</i> <i>Gyps fulvus</i> <i>Haematopus ostralegus</i> <i>Hieraaetus pennatus</i> <i>Himantopus himantopus</i> <i>Hippolais opaca</i> <i>Hippolais polyglotta</i> <i>Hirundo daurica</i> <i>Hirundo rupestris</i> <i>Hirundo rustica</i> <i>Ixobrychus minutus</i> <i>Jynx torquilla</i> <i>Lanius collurio</i> <i>Lanius excubitor</i> <i>Lanius senator</i> <i>Larus audouinii</i> <i>Larus fuscus</i> <i>Larus fuscus</i> <i>Larus melanocephalus</i> <i>Larus michahellis</i> <i>Larus ridibundus</i> <i>Limosa lapponica</i> <i>Limosa limosa</i>

Taxonomic group	Species
Birds	<i>Locustella luscinioides</i>
	<i>Loxia curvirostra</i>
	<i>Lullula arborea</i>
	<i>Luscinia megarhynchos</i>
	<i>Luscinia svecica</i>
	<i>Lymnocyrtus minimus</i>
	<i>Melanitta nigra</i>
	<i>Melanocorypha calandra</i>
	<i>Mergus serrator</i>
	<i>Merops apiaster</i>
	<i>Miliaria calandra</i>
	<i>Milvus migrans</i>
	<i>Milvus milvus</i>
	<i>Monticola saxatilis</i>
	<i>Monticola solitarius</i>
	<i>Morus bassanus</i>
	<i>Motacilla alba</i>
	<i>Motacilla cinerea</i>
	<i>Motacilla flava</i>
	<i>Muscicapa striata</i>
	<i>Neophron percnopterus</i>
	<i>Netta rufina</i>
	<i>Numenius arquata</i>
	<i>Numenius phaeopus</i>
	<i>Nycticorax nycticorax</i>
	<i>Oceanodroma castro</i>
	<i>Oenanthe hispanica</i>
	<i>Oenanthe leucura</i>
	<i>Oenanthe oenanthe</i>
	<i>Oriolus oriolus</i>
	<i>Hirundo rupestris</i>
	<i>Hirundo rustica</i>
	<i>Ixobrychus minutus</i>
	<i>Jynx torquilla</i>
	<i>Lanius collurio</i>
	<i>Lanius excubitor</i>
	<i>Lanius senator</i>
	<i>Larus audouinii</i>
	<i>Larus fuscus</i>
	<i>Larus fuscus</i>
	<i>Larus melanocephalus</i>
	<i>Larus michahellis</i>
	<i>Larus ridibundus</i>
	<i>Limosa lapponica</i>
	<i>Limosa limosa</i>
	<i>Locustella luscinioides</i>
	<i>Loxia curvirostra</i>
	<i>Lullula arborea</i>
	<i>Luscinia megarhynchos</i>
	<i>Luscinia svecica</i>
	<i>Lymnocyrtus minimus</i>
	<i>Melanitta nigra</i>
	<i>Melanocorypha calandra</i>
	<i>Mergus serrator</i>

Taxonomic group	Species
Birds	<i>Merops apiaster</i> <i>Miliaria calandra</i> <i>Milvus migrans</i> <i>Milvus milvus</i> <i>Monticola saxatilis</i> <i>Monticola solitarius</i> <i>Morus bassanus</i> <i>Motacilla alba</i> <i>Motacilla cinérea</i> <i>Motacilla flava</i> <i>Muscicapa striata</i> <i>Neophron percnopterus</i> <i>Netta rufina</i> <i>Numenius arquata</i> <i>Numenius phaeopus</i> <i>Nycticorax nycticorax</i> <i>Oceanodroma castro</i> <i>Oenanthe hispanica</i> <i>Oenanthe leucura</i> <i>Oenanthe oenanthe</i> <i>Oriolus oriolus</i> <i>Otis tarda</i> <i>Otus scops</i> <i>Pandion haliaetus</i> <i>Parus ater</i> <i>Parus caeruleus</i> <i>Parus cristatus</i> <i>Parus major</i> <i>Passer domesticus</i> <i>Passer hispaniolensis</i> <i>Passer montanus</i> <i>Pelagodroma marina</i> <i>Pernis apivorus</i> <i>Petronia petronia</i> <i>Phalacrocorax aristotelis</i> <i>Phalacrocorax carbo</i> <i>Philomachus pugnax</i> <i>Phoenicopterus roseus</i> <i>Phoenicurus ochruros</i> <i>Phoenicurus phoenicurus</i> <i>Phylloscopus bonelli</i> <i>Phylloscopus collybita</i> <i>Phylloscopus ibericus</i> <i>Pica pica</i> <i>Picus viridis</i> <i>Platalea leucorodia</i> <i>Plegadis falcinellus</i> <i>Pluvialis apricaria</i> <i>Pluvialis squatarola</i> <i>Podiceps cristatus</i> <i>Podiceps nigricollis</i> <i>Porphyrio porphyrio</i> <i>Porzana porzana</i> <i>Porzana pusilla</i>

Taxonomic group	Species
Birds	<i>Prunella collaris</i> <i>Prunella modularis</i> <i>Pterocles alchata</i> <i>Pterocles orientalis</i> <i>Puffinus mauretanicus</i> <i>Pyrrhocorax pyrrhocorax</i> <i>Pyrrhula pyrrhula</i> <i>Rallus aquaticus</i> <i>Recurvirostra avosetta</i> <i>Regulus ignicapillus</i> <i>Regulus regulus</i> <i>Remiz pendulinus</i> <i>Riparia riparia</i> <i>Rissa tridactyla</i> <i>Saxicola rubetra</i> <i>Saxicola torquatus</i> <i>Scolopax rusticola</i> <i>Serinus serinus</i> <i>Sitta europaea</i> <i>Stercorarius skua</i> <i>Sterna albifrons</i> <i>Sterna caspia</i> <i>Sterna dougallii</i> <i>Sterna fuscata</i> <i>Sterna hirundo</i> <i>Sterna nilotica</i> <i>Sterna sandvicensis</i> <i>Streptopelia decaocto</i> <i>Streptopelia turtur</i> <i>Strix aluco</i> <i>Sturnus unicolor</i> <i>Sturnus vulgaris</i> <i>Sylvia atricapilla</i> <i>Sylvia borin</i> <i>Sylvia cantillans</i> <i>Sylvia communis</i> <i>Sylvia conspicillata</i> <i>Sylvia hortensis</i> <i>Sylvia melanocephala</i> <i>Sylvia undata</i> <i>Tachybaptus ruficollis</i> <i>Tachymarptis melba</i> <i>Tadorna tadorna</i> <i>Tetrax tetrax</i> <i>Tringa erythropus</i> <i>Tringa nebularia</i> <i>Tringa ochropus</i> <i>Tringa totanus</i> <i>Troglodytes troglodytes</i> <i>Turdus iliacus</i> <i>Turdus merula</i> <i>Turdus philomelos</i> <i>Turdus pilaris</i> <i>Turdus torquatus</i>

Taxonomic group	Species
Birds	<i>Turdus viscivorus</i> <i>Tyto alba</i> <i>Upupa epops</i> <i>Uria aalge</i> <i>Vanellus vanellus</i>
Non-vascular plants	<i>Bruchia vogesiaca</i> <i>Bryoerythrophyllum campylocarpum</i> , <i>Bryoerythrophyllum machadoanum</i> <i>Cladonia spp</i> <i>Marsupella profunda</i> <i>Petalophyllum ralfsii</i> <i>Riella helicophylla</i> <i>Sphagnum spp.</i> <i>Thamnobryum fernandesii</i>
Vascular plants	<i>Alyssum pintodasilvae</i> <i>Anarrhinum longipedicelatum</i> <i>Anthyllis lusitanica</i> <i>Antirrhinum lopesianum</i> <i>Apium repens</i> <i>Arabis sadina</i> <i>Armeria berlengensis</i> <i>Armeria neglecta</i> <i>Armeria pseudarmeria</i> <i>Armeria rouyana</i> <i>Armeria sampaioi</i> <i>Armeria velutina</i> <i>Arnica montana</i> <i>Asphodelus bento-rainhae</i> <i>Asplenium hemionitis</i> <i>Astragalus algarbiensis</i> <i>Avenula hackelii</i> <i>Bellevalia hackelii</i> <i>Biscutella vincentina</i> , <i>Biscutella vicentina</i> <i>Centaurea micrantha ssp. herminii</i> <i>Centaurea rothmalerana</i> <i>Centaurea fraylensis</i> , <i>Centaurea vicentina</i> <i>Chaenorhinum serpyllifolium ssp. lusitanicum</i> , <i>Chaenorrhinum serpyllifolium ssp. lusitanicum</i> <i>Cistus palhinhae</i> <i>Convolvulus fernandesii</i> <i>Culcita macrocarpa</i> <i>Dianthus cintranus ssp. Cintranus</i> <i>Dianthus marizii</i> <i>Diplotaxis vicentina</i> <i>Doronicum plantagineum ssp. tournefortii</i> <i>Dorycnium pentaphyllum ssp. transmontana</i> <i>Eryngium viviparum</i> <i>Euphorbia transtagana</i> <i>Euphrasia mendoncae</i> <i>Festuca brigantina</i> <i>Festuca duriotagana</i> <i>Festuca elegans</i> <i>Festuca henriquesii</i> <i>Festuca summilusitana</i> , <i>Festuca summilusitanica</i>

Taxonomic group	Species
Vascular plants	<i>Gentiana lutea</i> <i>Halimium verticillatum</i> <i>Herniaria algarvica</i> <i>Herniaria berlengiana</i> , <i>Herniaria lusitanica</i> ssp. <i>berlengiana</i> <i>Herniaria maritima</i> <i>Holcus setiglumis</i> ssp. <i>duriensis</i> <i>Hyacinthoides vicentina</i> <i>Iberis procumbens</i> ssp. <i>microcarpa</i> <i>Iris boissieri</i> <i>Iris lusitanica</i> <i>Jasione crispa</i> ssp. <i>serpentinica</i> <i>Jasione lusitanica</i> <i>Jonopsidium acaule</i> <i>Juncus valvatus</i> <i>Leuzea longifolia</i> <i>Leuzea rhaponticoides</i> <i>Limonium dodartii</i> ssp. <i>lusitanicum</i> <i>Limonium lanceolatum</i> <i>Limonium multiflorum</i> <i>Linaria algarviana</i> <i>Linaria coutinhoi</i> <i>Linaria ficalhoana</i> <i>Linaria ricardoi</i> <i>Diphasiastrum complanatum</i> <i>Huperzia selago</i> , <i>Lycopodium selago</i> <i>Lycopodiella cernua</i> , <i>Lycopodiella cernuum</i> <i>Lycopodiella inundata</i> , <i>Lycopodium inundatum</i> <i>Lycopodium clavatum</i> <i>Malcolmia lacera</i> ssp. <i>gracilima</i> <i>Marsilea batardae</i> <i>Marsilea quadrifolia</i> <i>Melilotus segetalis</i> ssp. <i>fallax</i> <i>Murbeckiella pinnatifida</i> ssp. <i>herminii</i> <i>Murbeckiella sousae</i> <i>Myosotis lusitanica</i> <i>Myosotis retusifolia</i> <i>Narcissus asturiensis</i> <i>Narcissus bulbocodium</i> <i>Narcissus calcicola</i> <i>Narcissus cyclamineus</i> <i>Narcissus fernandesii</i> <i>Narcissus humilis</i> <i>Narcissus pseudonarcissus</i> ssp. <i>nobilis</i> <i>Narcissus scaberulus</i> <i>Narcissus triandrus</i> <i>Omphalodes kuzinskyanae</i> <i>Ononis hackelii</i> <i>Picris willkommii</i> <i>Plantago algarbiensis</i> <i>Plantago almogravensis</i> <i>Pseudarrhenatherum pallens</i> <i>Coincya cintrana</i> , <i>Rhynchosinapis erucastrum cintrana</i> <i>Rubus genevieri</i> ssp. <i>herminii</i>



Taxonomic group	Species
Vascular plants	<i>Ruscus aculeatus</i> <i>Salix salvifolia</i> ssp. <i>australis</i> , <i>Salix salviifolia</i> ssp. <i>australis</i> <i>Santolina impressa</i> <i>Santolina semidentata</i> <i>Saxifraga cintrana</i> <i>Scilla beirana</i> <i>Scilla odorata</i> <i>Scrophularia grandiflora</i> ssp. <i>grandiflora</i> <i>Scrophularia berminii</i> , <i>Scrophularia herminii</i> <i>Scrophularia sublyrata</i> <i>Senecio caespitosus</i> <i>Senecio lagascanus</i> ssp. <i>lusitanicus</i> <i>Silene longicilia</i> <i>Silene rothmaleri</i> <i>Spiranthes aestivalis</i> <i>Teucrium salviastrum</i> ssp. <i>salviastrum</i> <i>Thorella verticillatinundata</i> <i>Thymelaea broterana</i> <i>Thymus camphoratus</i> <i>Thymus capitellatus</i> <i>Thymus carnosus</i> <i>Thymus cephalotos</i> , <i>Thymus lotocephalus</i> <i>Thymus villosus</i> ssp. <i>villosus</i> <i>Trichomanes speciosum</i> <i>Tuberaria major</i> <i>Ulex densus</i> <i>Verbascum litigiosum</i> <i>Veronica micrantha</i> <i>Vicia dennesiana</i> <i>Woodwardia radicans</i>

## ANNEX II

### List of protected natural and semi-natural habitats with proven occurrence in continental Portugal

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#### Code Habitat

- 1110 Sandbanks permanently covered by shallow sea water
- 1130 Estuaries
- 1140 Mudflats and sandflats not covered by seawater at low tide
- 1150 \*Coastal lagoons
- 1160 Shallow inlets and bays
- 1170 Reefs
- 1210 Annual vegetation of drift lines
- 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts
- 1240 Vegetated sea cliffs of the Mediterranean coasts with endemic *Limonium* spp.
- 1250 Sea cliffs with endemic flora of the Macaronesian coasts
- 1310 *Salicornia* and other annual species colonizing mud and sand
- 1320 *Spartina* swards (*Spartinion maritimae*)
- 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- 1410 Mediterranean salt meadows (*Juncetalia maritimi*)
- 1420 Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*)
- 1430 Halo-nitrophilous scrubs (*Pegano-Salsoletea*)
- 1510 \*Mediterranean salt marshes (*Limonietalia*)
- 2110 Embryonic shifting dunes
- 2120 Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")
- 2130 \*Fixed dunes with herbaceous vegetation ("gray dunes")
- 2150 \*Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)
- 2170 Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)
- 2180 Wooded dunes of the Atlantic, Continental and Boreal regions
- 2190 Humid dune slacks
- 2230 *Malcolmietalia* dune grasslands
- 2250 \*Coastal dunes with *Juniperus* spp.
- 2260 *Cysto-Lavenduleta* dune sclerophyllous scrubs
- 2270 \*Wooded dunes with *Pinus pinea* and *Pinus pinaster*
- 2330 Inland dunes with open *Corynephorus* and *Agrostis* grasslands
- 3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)
- 3120 Oligotrophic waters containing very few minerals generally on sandy soils of the West Mediterranean, with *Isoetes* spp.
- 3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*
- 3140 Hard oligomesotrophic waters with benthic vegetation of *Chara* spp.
- 3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation
- 3160 Natural dystrophic lakes and ponds
- 3170 \*Mediterranean temporary ponds
- 3250 Constantly flowing Mediterranean rivers with *Glaucium flavum*
- 3260 Water courses of plain and montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
- 3270 Rivers with muddy banks with *Chenopodion rubric* p.p. and *Bidenton* p.p. vegetation
- 3280 Constantly flowing Mediterranean rivers with *Paspalo Agrostidion* species and hanging curtains of *Salix* and *Populus alba*
- 3290 Intermittently flowing Mediterranean rivers of the *Paspalo-Agrostidion*

4010 Northern Atlantic wet heaths with *Erica tetralix*  
 4020 \*Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix*  
 4030 European dry heaths  
 4060 Alpine and boreal heaths  
 4090 Endemic oro-Mediterranean heaths with gorse  
 5110 Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (*Berberidion* p.p.)  
 5120 Mountain *Cytisus purgans* formations  
 5140 \**Cistus palhinhae* formations on maritime wet heaths  
 5210 Arborescent matorral with *Juniperus* spp.  
 5230 \*Arborescent matorral with *Laurus nobilis*  
 5320 Low formations of *Euphorbia* close to cliffs  
 5330 Thermo Mediterranean and pre-desert scrub  
 5410 Western Mediterranean clifftops *phryganas* (*Astragalo-Plantaginietum subulatae*)  
 6110 \*Rupicolous calcareous or basophilic grasslands of the *Alysso-Sedion albi*  
 6160 Oro-Iberian *Festuca indigesta* grasslands  
 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco- Brometalia*) (\*when orchid populations occur on them)  
 6220 \*Pseudo-steppe of grasses and annuals of the *Thero-Brachypodietea*  
 6230 \*Species-rich *Nardus* grasslands, on siliceous substrates on mountain areas (and submountain areas in Continental Europe)  
 6310 Dehesas with evergreen *Quercus* spp.  
 6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)  
 6420 Mediterranean tall humid herb grasslands of the *Molinio-Holoschoenion*  
 6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels  
 6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)  
 7140 Transition mires and quaking bogs  
 7150 Depressions on peat substrates of *Rhynchosporion*  
 8130 Western Mediterranean and thermophilous scree  
 8210 Calcareous rocky slopes with chasmophytic vegetation  
 8220 Siliceous rocky slopes with chasmophytic vegetation  
 8230 Siliceous rock with pioneer vegetation of the *Sedo-Scleranthion* or *Sedo albi-Veronicion dillenii*  
 8240 \*Limestone pavements  
 8310 Caves not open to the public  
 8320 Fields of lava and natural excavations  
 8330 Submerged or partially submerged sea caves  
 9160 Sub-Atlantic or medio-European oak or oak-hornbeam forests of the *Carpinion betuli*  
 91B0 Thermophilous *Fraxinus angustifolia* woods  
 91E0 \*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)  
 91F0 Riparian mixed forests of *Quercus robur*, *Ulmus laevis* and *Ulmus minor*, *Fraxinus excelsior* or *Fraxinus angustifolia*, along the great rivers (*Ulmenion minoris*)  
 9230 Galician-Portuguese *Quercus robur* and *Quercus pyrenaica* woods  
 9240 Iberian *Quercus faginea* and *Quercus canariensis*  
 9260 *Castanea sativa* woods  
 92A0 *Salix alba* and *Populus alba* galleries  
 92B0 Riparian formations on intermittent Mediterranean water courses with *Rhododendron ponticum*, *Salix* and others  
 92D0 Southern riparian galleries and thickets (*Nerio-Tamaricetea* and *Securinegion tinctoriae*)

9320 *Olea* and *Ceratonia* forests  
9330 *Quercus suber* forests  
9340 *Quercus ilex* and *Quercus rotundifolia* forests  
9380 Forests of *Ilex aquifolium*  
9560 \*Endemic forests with *Juniperus* spp.  
9580 \*Mediterranean *Taxus baccata* woods

\* Priority Habitats

**ANNEX III**  
**List of areas under the SNAC**

**Sites from the National List of Sites**

**NOTE:** A blue background indicates sites with maritime areas

<b>Code</b>	<b>Name</b>	<b>Area (ha)</b>	<b>Maritime area (ha)</b>
PTCON0001	Peneda/Geres	88,845.00	
PTCON0002	Montesinho/Nogueira	108,010.55	
PTCON0003	Alvão/Marão	58,788.00	
PTCON0004	Malcata	79,079.00	
PTCON0005	Paul de Arzila	666.00	
PTCON0006	Berlenga Archipelago	95.77	
PTCON0007	S. Mamede	116,114.00	
PTCON0008	Sintra/Cascais	16,632.00	8,522.00
PTCON0009	Tejo estuary	44,609.00	17,814.00
PTCON0010	Arrabida/Espichel	20,663.00	3,532.00
PTCON0011	Sado estuary	30,968.00	6,905.00
PTCON0012	Southwest coast	118,267.00	18,810.00
PTCON0013	Formosa/Castro Marim inlet	17,520.00	
PTCON0014	Estrela hills	88,291.70	
PTCON0015	D'Aire and Candeeiros hills	44,226.95	
PTCON0016	Cambarinho	23.00	
PTCON0017	North coast	2,796.29	492.00
PTCON0018	Barrinha de Esmoriz	396.00	
PTCON0019	Minho River	4,554.00	
PTCON0020	Lima River	5,360.80	
PTCON0021	Sabor and Maças rivers	33,476.00	
PTCON0022	Douro internacional	36,187.00	
PTCON0023	Morais	12,878.00	
PTCON0024	Valongo	2,553.00	
PTCON0025	Montemuro	38,763.00	
PTCON0026	Vouga River	2,769.00	
PTCON0027	Carregal do Sal	9,554.00	
PTCON0028	Gardunha	5,935.39	
PTCON0029	Cabeção	48,607.00	
PTCON0030	Caia	31,115.00	
PTCON0031	Monfurado	23,946.00	
PTCON0032	Guadiana/Juromenha River	2,501.00	
PTCON0033	Cabrela	56,555.00	
PTCON0034	Comporta/Galé	32,051.00	
PTCON0035	Alvito/Cuba	922.00	
PTCON0036	Guadiana	38,463.34	
PTCON0037	Monchique	76,008.00	
PTCON0038	Ribeira de Quarteira	582.00	
PTCON0039	Serra d'Arga	4,493.00	
PTCON0040	Corno do Bico	5,139.00	
PTCON0041	Samil	91.00	
PTCON0042	Minas de St. Adrião	3,495.00	
PTCON0043	Romeu	4,768.58	
PTCON0044	Nisa/Lage da Prata	12,568.00	

Code	Name	Area (ha)	Maritime area (ha)
PTCON0045	Sico/Alvaizere	31,678.00	
PTCON0046	Azabuxo-Leiria	136.00	
PTCON0047	Freita and Arada hills	28,659.00	
PTCON0048	Montejunto hills	3,830.00	
PTCON0049	Barrocal	20,864.00	
PTCON0050	Cabeça hill	574.01	
PTCON0051	Açor compound	1,362.00	
PTCON0052	Arade/Odelouca	2,112.00	
PTCON0053	Moura/Barrancos	43,309.00	
PTCON0054	Fernão Ferro/Albufeira lagoon	4,318.22	
PTCON0055	Dunes of Mira, Gandara and Gafanhas	20,530.45	
PTCON0056	Peniche/Santa Cruz	8,285.54	5,633.00
PTCON0057	Caldeirão	47,286.35	
PTCON0058	Alvor inlet	1,454.00	
PTCON0059	Paiva River	14,562.00	
PTCON0060	Lousa hills	15,158.11	

### Special Protection Areas

**NOTE:** Blue background indicates sites with maritime areas

Code	Name	Area (ha)	Maritime area (ha)
PTCON0002	Montesinho/Nogueira	108,010.55	
PTCON0037	Monchique	76,544.60	
PTCON0057	Caldeirão	47,348.14	
PTZPE0001	Estuaries of the Minho and Coura rivers	3,392.92	312.00
PTZPE0002	Geres hills	63,348.11	
PTZPE0004	Aveiro inlet	51,406.63	20,737.00
PTZPE0005	Paul de Arzila	482.03	
PTZPE0006	Paul da Madriz	89.35	
PTZPE0007	Malcata hills	16,347.79	
PTZPE0008	Paul do Boquilobo	432.78	
PTZPE0009	Berlenga Islands	9,560.42	9,461.00
PTZPE0010	Tejo estuary	44,771.80	
PTZPE0011	Sado estuary	24,632.50	
PTZPE0012	Murta dam	497.70	
PTZPE0013	Santo Andre lagoon	2,164.61	759.00
PTZPE0014	Sancha lagoon	408.80	274.00
PTZPE0015	Southwest coast	74,414.89	17,462.00
PTZPE0016	Leixão da Gaivota	0.16	
PTZPE0017	Formosa inlet	23,269.66	7,305.00
PTZPE0018	Sapais de Castro Marim	2,146.57	
PTZPE0037	Sabor and Maças rivers	50,687.89	
PTZPE0038	Douro Internacional and the Agueda valley	50,788.76	
PTZPE0039	Coa valley	20,607.35	
PTZPE0040	Paul do Taipal	233.31	
PTZPE0042	Tejo Internacional, Erges and	25,775.33	

Code	Name	Area (ha)	Maritime area (ha)
	Ponsul		
PTZPE0043	Campo Maior	9,579.38	
PTZPE0045	Mourao/Moura/Barrancos	84,915.99	
PTZPE0046	Castro Verde	85,344.68	
PTZPE0047	Guadiana valley	76,546.58	
PTZPE0049	Lagoa Pequena	68.77	
PTZPE0050	Cape Espichel	3,415.78	2,516.00
PTZPE0051	Monforte	1,885.98	
PTZPE0052	Veios	1,959.40	
PTZPE0053	Vila Fernando	5,260.22	
PTZPE0054	Sao Vicente	3,564.65	
PTZPE0055	Evora	14,707.41	
PTZPE0056	Reguengos	6,042.69	
PTZPE0057	Cuba	4,080.87	
PTZPE0058	Piçarras	2,827.42	
PTZPE0059	Torre da Bolsa	868.80	

**Continental Portugal/National Network of Protected Areas (RNAP) – Executive Order No. 142/2008 of July 24**

**NOTE:** Blue background indicates administrative proceedings not yet completed

<b>Name</b>	<b>Classification</b>	<b>Level</b>
Peneda-Geres	National park	National
Alvão	Natural park	National
Arrabida	Natural park	National
Douro Internacional	Natural park	National
Esposende coast	Natural park	National
Montesinho	Natural park	National
Formosa inlet	Natural park	National
Estrela hills	Natural park	National
S. Mamede hills	Natural park	National
Aire and Candeeiros hills	Natural park	National
Sintra-Cascais	Natural park	National
Alentejan Southwest and the Vicente Coast	Natural park	National
Tejo Internacional	Natural park	National
Guadiana valley	Natural park	National
Berlenga	Natural reserve	National
Dunes of São Jacinto	Natural reserve	National
Sado estuary	Natural reserve	National
Tejo estuary	Natural reserve	National
Santo Andre and Sancha lagoons	Natural reserve	National
Paul de Arzila	Natural reserve	National
Paul do Boquilobo	Natural reserve	National
Sapal de Castro Marim and Vrs. Antonio	Natural reserve	National
Malcata hills	Natural reserve	National
Paul de Tornada	Natural reserve	Local
Botanical reserve of Cambarinho	Ongoing reclassification as a Natural Reserve	
Caparica coast	Protected landscape	National
Açor hills	Protected landscape	National
Albufeira do Azibo	Protected landscape	Regional
Corno do Bico	Protected landscape	Regional
Bertiandos and São Pedro de Arcos lagoons	Protected landscape	Regional
Coast of Vila do Conde and ornithological reserve of Mindelo	Protected landscape	Regional
Montejunto hills	Protected landscape	Regional
Agolada dam	Protected landscape	Local
Monte da Barca dam	Protected landscape	Local
Benemola springs	Protected landscape	Local
Rocha da Pena	Protected landscape	Local
Cape Mondego	Natural Heritage	National
Carenque	Natural Heritage	National
Zambujal cave	Ongoing reclassification as a Natural Heritage	National
Lagosteiros	Natural Heritage	National



São Bartolomeu hill	Ongoing reclassification as a Natural Heritage	National
Pedra da Mua	Natural Heritage	National
Pedreira do Avelino	Natural Heritage	National
Dinosaur footprints of Ourem/Torres Novas	Natural Heritage	National
Portas do Rodão	Natural Heritage	National
Karst outcrops of Granja dos Serroes	Ongoing reclassification as a Natural Heritage	National
Karst outcrops of Negrais	Ongoing reclassification as a Natural Heritage	National
Santa Olaia e Ferrestelo hills	Ongoing reclassification as a Natural Heritage	National
Faia Brava	Protected private area	Private

### **List of RAMSAR sites in continental Portugal**

Formosa inlet  
 Sapal de Castro Marim  
 Alvor inlet  
 Paul de Tornada  
 Paul do Taipal  
 Paul de Madriz  
 Paul do Boquilobo  
 Paul de Arzila  
 Superior plateau of the Estrela hills and upper Zêzere River  
 Santo Andre Lagoon / Sancha Lagoon  
 Bertiandos and São Pedro de Arcos lagoons  
 Albufeira lagoon  
 Tejo Estuary  
 Sado Estuary  
 Mondego Estuary  
 Poldje de Mira-Minde and associated springs

## ANNEX IV

### CLASSIFICATION CRITERIA FOR THE DEFINITION OF THE STATUS OF WATER BODIES

#### I.1 Surface water bodies

**Table A.1.** Classification criteria for the definition of the status of surface water bodies

	Quality elements	Documents to be consulted
Ecological status or ecological potential	Biological	<p><i>"Criteria for the Classification of the status of surface water bodies - Rivers and Reservoirs"</i> (Annex A)</p> <p><i>"Criteria for the classification of the status of surface water bodies - transitional and coastal waters"</i></p> <p>Executive Order No. 77/2006 (Annex V)</p>
	Chemical and physicochemical	<p><u>General Elements:</u></p> <p><i>"Criteria for the Classification of the status of surface water bodies - Rivers and Reservoirs"</i> (Tables 9 and 11)</p> <p><b>TABLE A.2</b></p>
		<p><u>Specific pollutants:</u></p> <p><i>"Criteria for the Classification of the status of surface water bodies - Rivers and Reservoirs"</i> (Appendix B)</p> <p><b>TABLE A.3</b></p>
	Hydromorphological	<p><i>"Criteria for the Classification of the status of surface water bodies - Rivers and Reservoirs"</i> (Annex C)</p> <p>Executive Order No. 77/2006 (Annex V)</p>
Chemical status	Priority substances	<p>Executive Order No. 103/2010 (Part A of Annex III)</p> <p><b>TABLE A.4</b></p>
	Other pollutants	<p>Executive Order No. 103/2010 (Part B of Annex III)</p> <p><b>TABLES A.5 and A.6</b></p>

**Table A.2.** Maximum thresholds of general physicochemical elements for the definition of the Ecological Status of rivers and of the Ecological Potential of heavily modified water bodies (reservoirs).

Parameters	Maximum threshold, by group			
	Rivers		Reservoirs	
	North [a]	South [b]	North [a]	South [b]
Total phosphorus [c]	≤ 0.10 mg/L	≤ 0.13 mg/L	≤ 0.05 mg/L	≤ 0.07 mg/L
Oxygen saturation [d]	60% - 120%		60% - 120%	60% - 140%
Dissolved oxygen [d]	≥ 5 mg O <sub>2</sub> /L		≥ 5 mg O <sub>2</sub> /L	
pH [d]	6-9 [e]		6-9 [e]	
Nitrates [c]	≤ 25 mg NO <sub>3</sub> /L		≤ 25 mg NO <sub>3</sub> /L	
CBO <sub>5</sub> [d]	≤ 6 mg O <sub>2</sub> /L		-	
Nitrogen ammonia [d]	≤ 1 mg NH <sub>4</sub> /L		-	

[a] North group: Types M, N1 ≤ 100 km<sup>2</sup>, N1 ≥ 100 km<sup>2</sup>, N2, N3 and N4

[b] South group: Types L, S1 ≤ 100 km<sup>2</sup>, N1 ≥ 100 km<sup>2</sup>, S2, S3 and S4

[c] Annual average

[d] 80% of the samples, provided the sampling periodicity is monthly or higher

[e] The indicated thresholds may be exceeded if occurring naturally

**Table A.3.** Environmental Quality Standards (EQS) for specific pollutants for the definition of the **Ecological Status** of surface water bodies

Specific pollutants		EQS (µg/L)
1	Arsenic and its compounds	50
2	Azinphos-ethyl	0.01
3	Azinphos-methyl	0.01
4	Biphenyl	1
5	Chloroacetic acid	10
6	2-chloroaniline	10
7	3-chloroaniline	10
8	4-chloroaniline	10
9	Chlorobenzene	1.0
10	4-chloro-3-methylphenol (chlorocresol)	40
11	1-chloronaphtalene	1
12	1-chloro-2-nitrobenzene	1.0
13	1-chloro-3-nitrobenzene	1.0
14	1-chloro-4-nitrobenzene	1.0
15	4-chloro-2-nitrotoluene	1.0
16	2-chloro-6-nitrotoluene	10
17	2-chloro-3-nitrotoluene	10
18	4-chloro-3-nitrotoluene	10
19	2-chlorophenol	50
20	3-chlorophenol	50
21	4-chlorophenol	50
22	2-chlorotoluene	1.0

23	3-chlorotoluene	1.0
24	4-chlorotoluene	1.0
25	Chlorotoluidines (except 2-chloro-p-toluidine)	10
26	2,4-D (2,4-dichlorophenoxyacetic acid – salts and esters)	1.0
27	Demethion-O	0.1
28	Demethion-S (-S; -S-methyl; -S-methyl-sulfone)	0.1
29	1,2-dibromoethane	2
30	Dibutyltin dichloride	0.01
31	Dibutyltin oxide	0.01
32	Other dibutyltin salts	0.01
33	3,4-dichloroaniline	1.0
34	2,5-dichloroaniline	1.0
35	1,2-dichlorobenzene	10
36	1,3-dichlorobenzene	10
37	1,4-dichlorobenzene	10
38	1,1-dichloroethane	7
39	1,2-dichloroethylene	10
40	3,5-dichloronitrobenzene	1.0
41	2,5-dichloronitrobenzene	1.0
42	2,4-dichloronitrobenzene	1.0
43	3,4-dichloronitrobenzene	1.0
44	2,3-dichloronitrobenzene	1.0
45	2,4-dichlorophenol	20
46	1,2-dichloropropane	10
47	2,3-dichloropropane-2-ol	10
48	1,3-dichloropropene	10
49	2,3-dichloropropene	10
50	Dichloroprop	40
51	Dichlorvos	0.001
52	Dimethoate	1.0
53	Disulfoton	0.1
54	Epichlorhydrin	10
55	Ethylbenzene	10
56	Fenitrothion	0.01
57	Fenthion	0.01
58	Hexachloroethane	10
59	Isopropylbenzene	0.5
60	Linuron	1.0
61	Malathion	0.01
62	MCPA	2.0
63	Mecoprop	20
64	Mevinphos	0.01
65	Omethoate	0.22
66	Methyl parathion	0.01

67	Ethyl parathion	0.01
68	PCB (including PCT)	20
69	Propanil	0.1
70	2,4,5,T (2,4,5-trichlorophenoxyacetic acid – salts and esters)	1.0
71	1,2,4,5-tetrachlorobenzene	0.2
72	1,1,2,2-tetrachloroethane	10
73	Toluene	10
74	Tributyl phosphate	10
75	1,1,1-trichloroethane	100
76	1,1,2-trichloroethane	400
77	2,4,5-trichlorophenol	1.0
78	2,4,6-trichlorophenol	1.0
79	Trifluralin	0.1
80	Triphenyltin acetate	0.01
81	Triphenyltin chloride	0.01
82	Triphenyltin hydroxide	0.01
83	Vinyl chloride (chloroethylene)	2
84	o-xylene	10
85	m-xylene	10
86	p-xylene	10
87	Bentazone	100
88	Antimony	0.4
89	Barium	1000
90	Beryllium	500
91	Boron	1000
92	Cobalt	50
93	Copper	100
94	Chrome	50
95	Tin	2000
96	Molybdenum	50
97	Silver	0.05
98	Selenium	10
99	Vanadium	100
100	Zinc	500
101	Metolachlor	0.14
102	Molinate	2
103	Ammonia	25
104	Cyanides	50
105	Fluorides	1700
106	Bromophos-methyl	EQS not available
107	Diazinon	
108	Terbuthylazine	
109	Amitrol	
110	Bromodichloroethane	
111	Bromoform	
112	Captana	

113	Carbofuran
114	Cimoxanil
115	Desethylatrazine
116	Desethylsimazine
117	Desethylterbutylazine
118	EPTC
119	Mancozeb
120	Metalaxyl
121	Paraquat
122	Pendimethalin
123	Pyrene
124	Pyrimethanil
125	Tebucozanole
126	Thiram

**Table A.4.** Environmental Quality Standards for priority substances for the definition of the **Chemical Status** of surface water bodies (Part A of Annex III of **Executive Order No. 103/2010**)

Priority substances		CAS number [a]	EQS – AA (µg/l) [b]		EQS – AAC (µg/l) [d]	
			Fresh [c]	Others [e]	Fresh [c]	Others [e]
(1)	Alachlor	15972-60-8	0.3		0.7	
(2)	Anthracene	120-12-7	0.1		0.4	
(3)	Atrazine	1912-24-9	0.6		2.0	
(4)	Benzene	71-43-2	10	8	50	
(5)	Brominated diphenyl ether [f]	32534-81-9	0.0005	0.0002	n.a.	
(6)	Cadmium and its compounds (according to the water's hardness class) [g]	7440-43-9	≤0.08 (class 1) 0.08 (class 2) 0.09 (class 3) 0.15 (class 4) 0.25 (class 5)	0.2	≤0.45 (class 1) 0.45 (class 2) 0.6 (class 3) 0.9 (class 4) 1.5 (class 5)	
(7)	Chloroalkanes C10-13	85535-84-8	0.4		1.4	
(8)	Chlorfenvinphos	470-90-6	0.1		0.3	
(9)	Chlorpyrifos (Chlorpyrifos-ethyl)	2921-88-2	0.03		0.1	
(10)	1,2-dichloroethane	107-06-2	10		n.a.	
(11)	Dichloromethane	75-09-2	20		n.a.	
(12)	Di(2-ethyl-hexyl) phthalate (DEHP)	117-81-7	1.3		n.a.	
(13)	Diuron	330-54-1	0.2		1.8	
(14)	Endosulfan	115-29-7	0.005	0.0005	0.01	0.004
(15)	Fluoranthene	206-44-0	0.1		1	
(16)	Hexachlorobenzene	118-74-1	0.01 [h]		0.05	
(17)	Hexachlorobutadiene	87-68-3	0.1 [h]		0.6	
(18)	Hexachlorocyclohexane	608-73-1	0.02	0.002	0.04	0.02
(19)	Isoproturon	34123-59-6	0.3		1.0	
(20)	Lead and its compounds	7439-92-1	7.2	7.2	n.a.	
(21)	Mercury and its compounds	7439-97-6	0.05 [h]		0.07	
(22)	Naphthalene	91-20-3	2.4	1.2	n.a.	
(23)	Nickel and its compounds	7440-02-0	20		n.a.	
(24)	Nonylphenyl (4-nonylphenol)	104-40-5	0.3		2.0	
(25)	Octylphenol (4-(1,1',3,3'-tetramethylbutyl)phenol))	140-66-9	0.1	0.01	n.a.	
(26)	Pentachlorobenzene	608-93-5	0.007	0.0007	n.a.	
(27)	Pentachlorophenol	87-86-5	0.4		1	

Priority substances		CAS number [a]	EQS – AA (µg/l) [b]		EQS – AAC (µg/l) [d]	
			Fresh [c]	Others [e]	Fresh [c]	Others [e]
(28)	Polycyclic aromatic hydrocarbons (PAH) [i]	n.a.	n.a.		n.a.	
	Benzo(a)pyrene	50-32-8	0.05		0.1	
	Benzo(b)fluoranthene	205-99-2	$\Sigma = 0.03$		n.a.	
	Benzo(k)fluoranthene	207-08-9	$\Sigma = 0.02$		n.a.	
	Benzo(g,h,i)-perylene	191-24-2	$\Sigma = 0.02$		n.a.	
	Indeno(1,2,3-cd)-pyrene	193-39-5				
(29)	Simazine	122-34-9	1		4	
(30)	Tributyltin compounds (tributyltin cation)	36643-28-4	0.0002		0.0015	
(31)	Trichlorobenzenes	12002-48-1	0.4		n.a.	
(32)	Trichloromethane	67-66-3	2.5		n.a.	
(33)	Trifluralin	1582-09-8	0.03		n.a.	

[a] CAS: Chemical Abstracts Service.

[b] This parameter is the EQS expressed as an annual average value (EQS-AA). Unless otherwise stated, it applies to the total concentration of all isomers and refers to the total concentration in the whole water sample, except in the case of metals (cadmium, lead, mercury and nickel).

[c] These standards are applied to waters of rivers and lakes and all artificial and strongly modified waters related to them.

[d] This parameter is the EQS expressed as the maximum allowable concentration (MAC-EQS) and refers to the total concentration in the whole water sample, except for metals (cadmium, lead, mercury and nickel). Whenever “n.a.” (not applicable) is indicated in the corresponding column, it means that the EQS-AA values provide protection against short-term pollution peaks in continuous discharges, since they are significantly lower than the values determined for an acute toxicity.

[e] These standards are applied to transitional, coastal and inland waters.

[f] For the “brominated diphenyl ethers” group of priority substances (No. 5) listed in Decision No. 2455/2001/EC, the EQS is established only for the substances listed under numbers 28, 47, 99, 100, 153 and 154.

[g] In the case of cadmium and cadmium compounds (No. 6), the EQS values vary depending on the water hardness class (Class 1: <40 mg CaCO<sub>3</sub>/l; Class 2: 40 to <50 mg CaCO<sub>3</sub>/l; Class 3: 50 to <100 mg CaCO<sub>3</sub>/l; Class 4: 100 to < 200 mg CaCO<sub>3</sub>/l; and Class 5: ≥ 200 mg CaCO<sub>3</sub>/l).

[h] If no EQS are applied to the biota, stricter EQS should be applied to the surface waters so as to obtain the same level of EQS protection for the biota as provided by subparagraph a) of article 4 of this Executive Order.

[i] For the “polycyclic aromatic hydrocarbons” (PAHs) group of priority substances (No. 28), all EQS apply, i.e. the EQS for benzo[a]pyrene, the EQS for the sum of benzo[b]fluoranthene and benzo[k]fluoranthene, and the EQS for the sum of benzo[g,h,i]perylene and indeno[1,2,3-cd]pyrene must be met.

Table A.5. Environmental Quality Standards for other pollutants for the definition of the **Chemical Status** of surface water bodies (Part B of Annex III of **Executive Order No. 103/2010**)

Priority substances		CAS number [a]	EQS – MA (µg/l) [b]		EQS – CMA (µg/l) [d]	
			Fresh [c]	Others [e]	Fresh [c]	Others [e]
(6a)	Carbon tetrachloride [f]	56-23-5	12		n.a.	
(9a)	Cyclodiene pesticides: Aldrin [f] Dieldrin [f] Endrin [f] Isodrin [f]	309-00-2 60-57-1 72-20-8 465-73-6	$\Sigma=0.01$	$\Sigma=0.005$	n.a.	
(9b)	Total DDT [f], [g]	n.a.	0.025		n.a.	
	p-p-DDT [f]	50-29-3	0.01		n.a.	
(29a)	Tetrachloroethylene [f]	127-18-4	10		n.a.	
(29b)	Trichloroethylene [f]	79-01-6	10		n.a.	

[a] CAS: Chemical Abstracts Service.

[b] This parameter is the EQS expressed as an annual average value (EQS-AA). Unless otherwise stated, it applies to the total concentration of all isomers and refers to the total concentration in the whole water sample, except in the case of metals (cadmium, lead, mercury and nickel).

[c] These standards are applied to waters of rivers and lakes and all artificial and strongly modified waters related to them.

[d] This parameter is the EQS expressed as the maximum allowable concentration (MAC-EQS) and refers to the total concentration in the whole water sample, except for metals (cadmium, lead, mercury and nickel). Whenever “n.a.” (not applicable) is indicated in the corresponding column, it means that the EQS-AA values provide protection against short-term pollution peaks in continuous discharges, since they are significantly lower than the values determined for an acute toxicity.

[e] These standards are applied to transitional, coastal and inland waters.

[f] This is not a priority substance but another pollutant which EQS were established by the statutes referred to in article 13.

[g] “Total DDT” is the sum of the isomers 1,1,1-trichloro-2,2-bis-(p-chlorophenyl)ethane (CAS number 50-29-3; EU number 200-024-3); 1,1,1-trichloro-2-(o-chlorophenyl)-2-(p-chlorophenyl)ethane (CAS number 789-02-6; EU number 212-332-5); 1,1-dichloro-2,2-bis-(p-chlorophenyl)ethylene (CAS number 72-55-9; EU number 200-784-6); 1,1-dichloro-2,2-bis-(p-chlorophenyl)ethylene (CAS number 7254-8; EU number 200-783-0).



**Table A.6.** Quality goals for the assessment of the **Chemical Status** of surface water bodies

POLLUTANTS	Concentration (µg/L, except whenever so indicated)	REGULATIONS
Arsenic	50 [E] 25 [C]	<b>DL 506/99 (annex)</b> (amended by DL 261/2003) [Annex XXI, DL 236/98 f/As]
Azinphos-ethyl	0.01	
Azinphos-methyl	0.01	
Biphenyl	1.0	
Chloroacetic acid	10	
Chloroanilines (isomers 2, 3 and 4)	10 10 10	
Chlorobenzene	1.0	
4-chloro-3-methylphenol	40	
Chloronitrobenzenes (ortho, meta, para)	1.0 1.0 1.0	
4-chloro-2-nitrotoluene	1.0	
Chloronitrotoluenes	10	
2-chlorophenol	50	
2-chlorotoluene	1.0	
3-chlorotoluene	1.0	
4-chlorotoluene	1.0	
2,4-D (esters)	1.0	
2,4-D (salts)	40	
Demethion	0.1	<b>DL 506/99 (annex)</b> (amended by DL 261/2003)
Dibutyltin dichloride	0.01	
Dibutyltin oxide	0.01	
Other dibutyltin salts	0.01	
3,4-dichloroaniline	1.0	
2,5-dichloroaniline	1.0	
1,2-dichlorobenzene	10	
1,2-dichlorobenzene 1,3-dichlorobenzene 1,4-dichlorobenzene	10	
1,2-dichloroethylene	10	
Dichloronitrobenzenes (6 isomers)	1.0	
2,4-dichlorophenol	20	
1,2-dichloropropane (and other isomers)	10	
1,3-dichloropropene	10	
Dichloroprop	40	
Dichlorvos	0.001	
Dimethoate	1	
Disulfoton	0.1	<b>DL 506/99 (annex)</b> (amended by DL 261/2003)
Epichlorhydrin	10	
Ethylbenzene	10	
Fenitrothion	0.01	

POLLUTANTS	Concentration (µg/L, except whenever so indicated)	REGULATIONS
Fenthion	0.01	
Hexachloroethane	10	
Isopropylbenzene	0.5	
Linuron	1.0	
Malathion	0.01	
MCPA	2	
Mecoprop	20	
Mevinphos	0.01	
Methyl parathion	0.01	
Ethyl parathion	0.01	
2,4,5-T (salts and esters)	1.0	
Tetrabutyltin	0.001	
Toluene	10	
1,1,1-trichloroethane	100	
1,1,2-trichloroethane	400	
Trichlorophenols	1.0	
Triphenyltin acetate	0.01	
Triphenyltin chloride	0.01	
Triphenyltin hydroxide	0.01	
Xylenes	10	
1-chloronaphthalene	1	DL 261/2003 (annex) (which amended DL 506/99)
Chlorotoluidines (except 2-chloro-p-toluidine)	10	
1,2-dibromoethane	2	
1,1-dibromoethane	7	
Omethoate	0.22	
Propanil	0.1	
1,2,4,5-tetrachlorobenzene	0.2	
1,1,2,2-tetrachloroethane	10	
Tributyl phosphate	10	
Vinyl chloride	2	
Bentazone	100	
Antimony	0.4	
Metolachlor	0.14	
Molinate	2	
Silver	0.05 [E] 0.5 [C]	
pH	5.0-9.0 Sorensen Scale	DL 236/98 (annex XXI) [DL 506/99 f/As]
Temperature	30°C	
Temperature variation	3°C	
Dissolved oxygen	50% sat.	
CBO <sub>5</sub>	5 mg O <sub>2</sub> /l	
Nitrogen ammonia	1 mg/l	
Total phosphorus	1 mg/l	
Chlorides	250 mg/l	
Sulfates	250 mg/l	
Anionic tensioactive substances	0.5 mg/l	
Kjeldahl nitrogen	2 mg/l	

POLLUTANTS	Concentration (µg/L, except whenever so indicated)	REGULATIONS
Total cyanides	0.05 mg/l	
Total arsenic	0.1 mg/l	
Total chrome	0.05 mg/l	
Total copper	0.1 mg/l	
Total zinc	0.5 mg/l	

A: Surface inland waters

B: Estuarine waters

C: Coastal waters and territorial seawaters

D: Estuarine waters and territorial seawaters

E: Inland, estuarine and transitional waters

## I.2. GROUND WATER

**Table A.7.** Ground water quality classification criteria

	Classification criteria	Documents to be consulted
Quantitative status	Water table statute	DL 77/2006 (No. 2.1. of Annex V) Resolution No. 1115/2009 (article 7)
Chemical status	Quality standards (Annex I, DL 208/2008)	DL 208/2008 (Annex I) <b>TABLE A.8</b>
	Quality thresholds (to be established)	DL 208/2008 (Part B of Annex II) (Minimum list of pollutants) <b>TABLE A.9</b>
	<u>The pollutants concentrations:</u> - Allows meeting the <b>environmental goals for the associated surface water bodies</b> and does not significantly reduce its chemical or ecological quality; - Does not cause significant damages to land ecosystems directly dependant on the ground water body; - The quality standards applicable under other relevant EC legal statutes are not exceeded. <b>Saline or other intrusions:</b> conductivity alterations do not indicate the occurrence of saline or other intrusions to the ground water.	DL 77/2006 (No. 2.3.2. of Annex V)

**Table A.8.** Quality standards for the assessment of the Chemical Status of ground water bodies

Pollutant	Quality standard
Nitrates	50 g/l
Active component of pesticides, including the respective metabolites and degradation and reaction products <sup>[1]</sup>	0.1 µg/l 0.5 µg/l (total) <sup>[2]</sup>

<sup>[1]</sup> "Pesticides" are understood as phytopharmaceuticals and biocides as defined by article 2 of Directive 91/414/EEC and article 2 of Directive 98/8/EC, respectively, by line a) of paragraph 2 of article 2 of Executive Order No. 94/98 of April 15, as amended by Executive Order No. 22/2001 of January 30, and by article 3 of Executive Order No. 121/2002 of May 3.

<sup>[2]</sup> "Total" is understood as the sum of all individual pesticides detected and quantified in the course of the monitoring, including the respective metabolites and degradation and reaction products.

**Table A.9.** Minimum lists of pollutants and the respective indicators for which thresholds must be set for the purpose of assessment of the Chemical Status of ground water.

Group of pollutants or indicators	Pollutants or indicators
1- Substances or ions or indicators that may occur naturally or as a result of anthropic activity	Arsenic Cadmium Lead Mercury Nitrogen ammonia Chloride Sulfate
2- Artificial, synthetic substances	Trichloroethyl Tetrachloroethylene
3- Indicative parameter for saline or other intrusions	Conductivity

## ANNEX V

### Classification of lands and soils according to Executive Order No. 73/2009 of March 31

**Table A.10.** Classification of lands according to their suitability for agricultural use, according to the methodology defined by FAO (article 6 of Executive Order No. 73/2009 of March 31)

CLASS	DESCRIPTION
A1	Land units <b>highly</b> suitable for general agricultural use
A2	Land units <b>moderately</b> suitable for general agricultural use
A3	Land units <b>marginally</b> suitable for general agricultural use
A4	Land units suitable for agricultural use, <b>conditioned</b> to a specific use
A0	Land units unsuitable (unfit) for agricultural use

**Table A.11.** Classification of soils according to their usage capacity, according to the methodology defined by the former CNROA (article 7 of Executive Order No. 73/2009 of March 31)

CLASS	DESCRIPTION
A	Very high utilization capacity, with little or no limitations, with small or no risk of erosion, suitable for intensive use or other uses.
B	High utilization capacity, with moderate limitations, moderate erosion risk, suitable for moderately intensive agricultural use or other uses.
C	Moderate utilization capacity, with accentuated limitations, elevated erosion risk, suitable for low-intensity agricultural or other uses.
Ch	Soils belonging to Class C with excess water or a poor drainage, representing the main limiting factor for its utilization or the conditioner of the risks the soil is subjected to as a result of a slow permeability, an elevated water table or frequent flooding.
D	Low utilization capacity, severe limitations, high to very high risk of erosion, unsuitable for agricultural utilization except in very special cases, little or moderate limitations for grazing or forestry exploitation.
E	Very low utilization capacity, very severe limitations, very high risk of erosion, unsuitable for agricultural utilization, severe to critical limitations for grazing or forestry exploitation, in many cases unsuitable for any economic activity. It may be destined for the settlement of natural vegetation or protective or recovery forests.

## ANNEX VI

### Ontario Generic Criteria

**Table A.12.** Applicability of the different Ontario Generic Criteria as defined in *Soil, Ground water and Sediment Standards, 2009* (Ontario, 2009)

Ontario 2009		Applicability
No.	Title	
2	<b>Full depth</b> generic site conditions in a <b>potable</b> ground water condition	<ul style="list-style-type: none"> <li>- Criteria defined for soil and ground water</li> <li>- Criteria not differentiated by depth</li> <li>- Soil utilization: agricultural, residential and industrial/commercial</li> <li>- Potable ground water</li> <li>- Criteria between parentheses applicable to soils of fine/medium texture</li> </ul>
3	<b>Full depth</b> generic site condition standards in a <b>non-potable</b> ground water condition	<ul style="list-style-type: none"> <li>- Criteria defined for soil and ground water</li> <li>- Criteria not differentiated by depth</li> <li>- Soil utilization: residential and industrial/commercial</li> <li>- Non-potable ground water</li> <li>- Criteria between parentheses applicable to soils of fine/medium texture</li> </ul>
4	<b>Stratified</b> site condition standards in a <b>potable</b> ground water condition	<ul style="list-style-type: none"> <li>- Criteria defined for soil and ground water</li> <li>- Criteria differentiated by depth (stratified soils)</li> <li>- Soil utilization: residential and industrial/commercial</li> <li>- Potable ground water</li> <li>- Criteria between parentheses applicable to soils of fine/medium texture</li> </ul>
5	<b>Stratified</b> site condition standards in a <b>non-potable</b> ground water condition	<ul style="list-style-type: none"> <li>- Criteria defined for soil and ground water</li> <li>- Criteria differentiated by depth (stratified soils)</li> <li>- Soil utilization: residential and industrial/commercial</li> <li>- Non-potable ground water</li> <li>- Criteria between parentheses applicable to soils of fine/medium texture</li> </ul>
6	<b>Generic</b> site condition standards for <b>shallow soil</b> in a <b>potable</b> ground water condition	<ul style="list-style-type: none"> <li>- Criteria defined for soil and ground water</li> <li>- Surface soil layer over the bedrock &lt; 2 meters</li> <li>- Soil utilization: Agricultural, residential and industrial/commercial</li> <li>- Potable ground water</li> <li>- Criteria between parentheses applicable to soils of fine/medium texture</li> </ul>
7	<b>Generic</b> site condition standards for <b>shallow soil</b> in a <b>non-potable</b> ground water condition	<ul style="list-style-type: none"> <li>- Criteria defined for soil and ground water</li> <li>- Surface soil layer over the bedrock &lt; 2 meters</li> <li>- Soil utilization: Agricultural, residential and industrial/commercial</li> <li>- non-potable ground water</li> <li>- Criteria between parentheses applicable to soils of fine/medium texture</li> </ul>
8	<b>Generic</b> site condition standards for use within <b>30 m of a water body</b> in a <b>potable</b> ground water condition*	<ul style="list-style-type: none"> <li>- Criteria defined for soil, ground water and sediments</li> <li>- Criteria not differentiated by depth</li> <li>- Surface water body located less than 30 meters from the soil</li> <li>- Soil utilization: agricultural, residential and industrial/commercial</li> </ul>

Ontario 2009		Applicability
No.	Title	
		- Potable ground water
9	<b>Generic site condition standards for use within 30 m of a water body in a non-potable ground water condition*</b>	<ul style="list-style-type: none"> <li>- Criteria defined for soil, ground water and sediments</li> <li>- Criteria not differentiated by depth</li> <li>- Surface water body located less than 30 meters from the soil</li> <li>- Soil utilization: agricultural, residential and industrial/commercial</li> <li>- Non-potable ground water</li> </ul>

\*Criteria defined in order to avoid contamination of the surface water body as a result of dispersion of the contaminated soil toward a surface water body and the consequent sedimentation at the bottom, resulting in the buildup of contaminated sediments.

Regarding the “affected soil depth”, the Ontario Standards consider two different approaches: the adoption or not of different criteria according to soil depth – “*full depth site conditions*” (**Tables 2 and 3**) or “*stratified site conditions*” (**Tables 4 and 5**), respectively. The latter involves the use of two different sets of criteria, applicable in a differentiated fashion to the topsoil (up to **1.5 meters** deep) and subsurface layers.

**Tables 6 and 7** apply to situations in which the thickness of the contaminated soil layer over the bedrock is thinner than 2 meters. In this case, the criteria have been defined considering that there is no dilution in the aquifer or biodegradation of the subsurface soil.

Finally, the criteria contained in **Tables 8 and 9** apply to contaminated soils located within **30 meters** from the surface of a water body, so as to avoid contamination of the surface water as a result of dispersion of the contaminated soil towards the surface water body and the consequent deposition at the bottom and the buildup of contaminated sediments.



## ANNEX VII

### INFORMATION RELATED TO THE SOIL SAMPLING PLAN

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The definition of the soil sampling plan should take into consideration the following factors:

- Definition of the sampling grid (random, systematic, targeted);
- Number of sampling points (spacing within the sampling grid);
- Sampling depth;
- Volume of the collected samples;
- Sampling techniques and equipment;
- Number of sampling campaigns (usually a single one);
- Parameters to be analyzed.

With regard to the number of sampling points (no less than three points) and the respective sampling grid, their determination must depend on the following factors:

- Dimensions of the area to be investigated;
- Spatial distribution pattern of the contamination patch;
- Characteristics of the contaminant.

In order to obtain a preliminary diagnosis of the location of the contamination source (hot spot) and spatial distribution of the contamination patch around it, it may be useful to conduct semi-quantitative measurements *in-situ* using portable equipment (X-ray fluorescence spectroradiometer, VOC/PID detector (photoionization)) in order to detect the presence of certain pollutants in the soil (heavy metals, volatile organic compounds - VOCs).

In addition to soil sampling, it may be also necessary to collect surface water, ground water or sediment samples. Sediment sampling should be done when a contamination plume is found to be heading toward a water body.

For a more detailed guidance on the preparation of sampling plans, the following documents may be consulted:

- Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario (Ontario Ministry of Environment and Energy, 1996);
- Preparation of Soil Sampling Protocols: Sampling Techniques and Strategies (EPA, 1992);
- Hessen State Law, 1994
- ISO 5677 standard (Water quality - Sampling).

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