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**Annex to the Guidelines for environmental and social  
impact assessment, stakeholder mapping and  
community consultation specific to the biofuels sector  
– Soil Specialist Guidelines**

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## RSB SOIL SPECIALIST STUDY GUIDELINES

### 1. Introduction

As is the case with the majority of agro-industrial developments, there is potential for impacts on soil largely resulting from soil erosion and the application of fertilizers to maximize crop yields. The purpose of this guideline is to assist in the identification, assessment and mitigation of these impacts. The RSB principles were used as a point of departure and a variety of references from the agro-industrial, biofuel and other sectors were used in the compilation of this guideline document.

### 2. RSB Principles applicable to soil specialist studies

There are three general RSB Principles (RSB, 2009) that are relevant to impacts on soil as shown in Boxes 1, 2 and 3.

#### Box 1:

**Principle 1: Legality – Biofuel production shall follow all applicable laws and regulations**

**Criterion 1.** Biofuel operations shall comply with all applicable laws and regulations of the country in which the operation occurs and with relevant international laws and agreements.

#### Box 2:

**Principle 2: Sustainable biofuel operations shall be planned, implemented, and continuously improved through an open, transparent, and consultative Environmental and Social Impact Assessment (ESIA) and an economic viability analysis.**

**Criterion 2a:** Biofuel operations shall undertake an Environmental and Social Impact Assessment (ESIA) to assess impacts and risks and ensure sustainability through the development of effective and efficient implementation, mitigation, monitoring and evaluation plans.

#### Box 3:

**Principle 7: Biofuel operations shall avoid negative impacts on biodiversity, ecosystems, and other conservation values.**

**Criterion 7a:** Conservation values within the potential or existing area of operations shall be identified through a land-use planning process. Conservation values of local, regional or global importance within the potential or existing area of operation shall be maintained or enhanced.

**Criterion 7b:** Ecosystem functions and services that are directly affected by biofuel operations shall be maintained or enhanced.

**Criterion 7c:** Biofuel operations shall protect, restore or create buffer zones.

In addition to the above, there are also more specific principles that are of relevance to the soil specialist study for any biofuel development. These are detailed in Box 4 below:

**Box 4:**

***Principle 8: Soil – Biofuel operations shall implement practices that seek to reverse soil degradation and/or maintain soil health.***

***Criterion 8a:*** Operators shall implement a soil management plan designed to maintain or enhance soil physical, chemical and biological conditions.

### 3. Establishment of baseline conditions

Before it is possible to assess the likely impacts of a proposed biofuel development on soil it is essential to obtain reliable baseline information i.e. a 'snap shot' of the current state of soil resources within the project area prior to the development. In addition to facilitating the identification and the rating of significance of expected impacts, the baseline will also enable operators and stakeholders to determine whether the facility is having an impact on soil resources during the operational phase.

Considering the potentially highly variable nature of soil at a small spatial scale, it is essential that the specialist gives careful consideration to the suite of parameters to be measured and the location of soil sample points. It is common practice for the developer to contract a specialist agronomist to undertake their own specialist study of soil types within the study area in order to determine the suitability for crops. These studies will provide information that is relevant to the establishment of a soil baseline study for the ESIA, and can then be used as the baseline information for the ESIA, with the main task then been the identification and assessment of impacts.

Table 1 provides guidance on the type of parameters that need to be considered during baseline monitoring of soil resources. Depending on the local context, certain of these parameters may be regarded as non-applicable and further parameters may be added on the advice of the soil resource specialist.

**Table 1:** Parameter to be considered for establishment of a baseline for soil

Baseline grouping	Parameters
<b><i>Nature of local soil resources</i></b>	<ul style="list-style-type: none"> <li>• The location and physical description of soils based on:-                             <ul style="list-style-type: none"> <li>○ National Soil Maps which differentiate soil units on the basis of geology, colour and texture</li> <li>○ Soil surveys – for complete morphological descriptions of the representative soils in the area.</li> </ul> </li> </ul>
<b><i>Soil Quality</i></b>	<ul style="list-style-type: none"> <li>• General soil properties                             <ul style="list-style-type: none"> <li>○ Texture</li> <li>○ pH (H<sub>2</sub>O)</li> <li>○ pH (KCl)</li> <li>○ Cation Exchange Capacity (CEC), calcium, magnesium, Potassium, Phosphorus</li> <li>○ Total and available phosphorus and potassium</li> <li>○ Electrical Conductivity</li> <li>○ Organic Matter</li> <li>○ H + Al</li> <li>○ Percentage sand, silt and/or clay</li> </ul> </li> </ul>

<b>Soil Use</b>	<ul style="list-style-type: none"> <li>• Determine current agricultural potential/use of these soils.</li> <li>• The extent of use of the various soil types by local communities</li> </ul>
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#### 4. Potential impacts to soil associated with biofuel developments

There are a number of potential impacts to soils associated with biofuel developments. Although these have been incorporated into the RSB principles (see Boxes 1 – 4), for the purpose of this guideline it is necessary to list the most common impacts. A list of key impacts to soil resources and sources of the impacts is provided in Table 2. It should be noted that it is necessary to consider both the direct impacts associated with the proposed development as well as potential cumulative impacts. While the direct impacts may be of low significance, their significance might be elevated when considered in the broader context.

**Table 2:** Potential direct impacts to soil resources associated with biofuel developments

Issue	Impacts
Land clearing and preparation/transformation	<ul style="list-style-type: none"> <li>• Loss of top soil</li> <li>• Soil erosion</li> </ul>
Application of fertilizers	<ul style="list-style-type: none"> <li>• Change to soil's physical, chemical and biological properties</li> </ul>
Management and disposal of solid co-products and wastes	<ul style="list-style-type: none"> <li>• Soil contamination</li> </ul>
Management of soil	<ul style="list-style-type: none"> <li>• Soil degradation</li> </ul>

#### 5. Assessment of the significance of key issues

The general approach to the identification and assessment of impacts as outlined in the ESIA guidelines must be adopted. The discussion of the impacts should be specific rather than general and must apply the impact significance rating scale adopted for the ESIA. The impact rating scale used must be the same as that used by all the other specialists. The impacts of the construction and operational stages of the proposed project need to be identified and assessed, as do the impacts of the project alternatives. The significance of the impacts also needs to be rated for the before and after mitigation scenarios. The following should be considered:

- It is important to seek input from local communities and other I&APs who may have extensive knowledge of local baseline conditions;
- The IA practitioner must ensure that the specialist(s) are appropriately experienced and sufficiently knowledgeable about local conditions, the proposed development and assessment techniques to provide an accurate and defensible assessment of the potential impacts to soil resources;

#### 6. Issues and impacts to be considered during a Rapid Assessment

As discussed in the general guideline document, under certain circumstances it may be appropriate to conduct a rapid assessment rather than a full EIA. Under such circumstances, the level of detail required is normally limited. Key issues related to soil resources that should be considered are listed in the checklist below (Table 3). If the answer to any of the screening questions in Table 3 is "Yes" then it is recommended that a specialist soil quality study be undertaken prior to approval of the project.

**Table 3: Key questions to assess the significance of impacts to soil resources during a Rapid Assessment**

Key Questions	Yes	No
1. Is the proposed project sited close to sensitive soil types (e.g. highly erodable soils)?		
2. Will the proposed development result in the release of untreated effluent, including sewage, into the soils?		
3. Is the proposed development likely to result in a measurable decrease in the quality of soil resources?		
4. Is the proposed development likely to result in the erosion of soil resources?		
5. Is the proposed development likely to result in a measurable decrease in the quantity of soil resources available to other users?		
6. Is the proposed development likely to result in transgression of international agreements or national or sub-national legislative requirements?		
7. Is the proposed development likely to impinge upon the formal or customary soil use rights of others?		
8. Is the proposed development likely to highly alter the quality of soil which will then impact on the type of crops that can be grown on that land in the future?		

## 7. Mitigation and monitoring

### *Mitigation measures:*

- Should address key issues;
- Should be practical and appropriate to the context of the biofuel development;
- Will depend on the specific impacts and they must be effective;
- The management of fertilizer application (both type and rate) should be considered

### *Monitoring:*

- Monitoring locations and frequency should be selected with the objective of providing representative soil monitoring data;
- Parameters selected for monitoring should be indicative of the potential impacts or pollutants of concern from the proposed development as well as the soil quality particularly organic matter requirements necessary to maintain soil health;
- Parameters selected for monitoring should also include parameters that are regulated under compliance requirements;
- Monitoring programmes should apply internationally approved methods for sample collection, preservation and analysis;
- Analysis should be conducted by entities permitted or certified for this purpose;
- Sampling and analysis quality assurance / quality control plans should be prepared and implemented;
- The monitoring programme should also incorporate mechanisms to assess potential non-compliance or infringement on soil use by local communities within and surrounding the project area.

## 8. Contents of specialist reports

Recommendations regarding the general structure of specialist reports are provided in section 7.5.3. of the main guideline document. More specific guidelines for the soil specialist report are provided below.

#	Section Title	Contents
1	Summary	This should provide a summary of the specialist study including the impacts, conclusions and recommendations.
2	Introduction	The introduction should provide brief background information, the terms of reference for the study, and the study team.
3	Project Description	An overview of the proposed development, including details of the agricultural, industrial and auxiliary components.

#	Section Title	Contents
		This section should also provide a list of all aspects of the development requiring the use of soil, and total land agricultural area required.
4	Methodology	This section should indicate what data sources and research methods were used as well as the methods employed during the gathering of data and assessment of impacts should be explained in detail and should conform to internationally accepted methods;
5	Description of the Environment	This section should provide an in-depth description of the regional and local existing soil use within the project area or which may be impacted negatively by the proposed development.
6	Legislative and Policy Review	An overview of the legislative framework, including applicable international agreement and conventions, national Acts, and sub-national laws and regulations, that is of relevance to the management and conservation of soil resources. In addition, the relevance of specific legislation to the proposed project should be highlighted;
7	Impact Assessment and Mitigation Measures	This section should form the bulk of the report. It should identify and discuss each of the individual impacts and use the impact ratings method to rate their significance before and after mitigation, as well as during the construction, operational and decommissioning phases of the project. For each impact, the recommended mitigation measures needed in order to reduce the negative impacts and enhance the positive impacts associated with the proposed development should be discussed. Attention should be drawn to any very high and irreversible impacts that cannot be mitigated as these may be fatal flaws that prevent the project from going ahead and detailed justification for such a significance rating will need to be provided.
8	Monitoring Recommendations	This section should identify the key indicators that should be monitored over time and the methods that should be employed to monitor them.
9	Conclusion	This should provide a summary of the context and impacts.
10	Recommendation	The recommendations should focus on the suggested mitigation measures.
11	References	A list of all the references and sources used during preparation of the specialist report.
12	Appendices	Appendices to the specialist report should include all relevant documents including but not limited to: <ul style="list-style-type: none"> <li>○ Any checklists, data sheets or questionnaires used during the baseline assessment</li> <li>○ Details of analytical techniques and methodologies for preparation of samples</li> <li>○ Any questionnaires used during the baseline assessment</li> <li>○ Proof of certification for the analytical laboratory</li> </ul>

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