

Guidebook
on
Environmental Impact Assessment
in the Military

**A Joint United States – Republic of South Africa
Environmental Security Working Group Project**

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Guidebook on Environmental Impact Assessment in the Military



Preface

The relationship between the United States of America (US) and the Republic of South Africa (RSA), which has taken shape under the US – RSA Defense Committee, is a critical one to both countries. The cooperative relationship that we have forged in recent years has deepened our mutual understanding and serves as a model for other nations to jointly address common interests and problems.

Over several decades, we have repeatedly witnessed confirmation of the basic premise that bilateral and multilateral cooperation on topics of mutual concern and interest reap great rewards, including saving time, money and resources as well as learning from the past experiences of others. This has proven to be especially true in the area of international defense-related environmental cooperation. While still a relatively new bilateral relationship, the environmental security initiatives between the US Department of Defense and the RSA Department of Defence have already created a number of specific products. This guidebook is only one of the most recent products. A list of other completed efforts is provided at the end of this document.

There is global recognition that world dynamics are creating new environmental challenges and requirements for military organizations worldwide. At the same time, military mission readiness must not be impaired; defense organizations must be able to train their troops and sustain their installations in an environmentally sound manner.

This guidebook is intended to assist the international military community in identifying measures and processes to assess the environmental impacts of their activities and operations. Environmental impact assessment is an integral component of informed decision-making; thus, integration of environmental stewardship into project planning as well as day-to-day operations enhances the military organizations' ability to sustain their missions in an environmentally sound manner. This guidebook is written in a manner that can be utilized by any defense department organization, and will assist them in achieving their overall environmental goals and objectives.

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Executive Summary

The focus on environmental issues is global in nature, and the integration of environmental considerations into military operations is a growing challenge worldwide. The United States of America (US) and Republic of South Africa (RSA) have forged a cooperative relationship on defense-related issues of mutual concern. Within the US-RSA Defense Committee (DEFCON), an Environmental Security Working Group (ESWG) has been in place since 1997. Under the ESWG, bilateral initiatives are identified, with joint US-RSA teams established to develop and complete specific projects. This particular “Guidebook” was identified as a topic beneficial to contemporary integrated environmental management processes within the military.

The purpose of this guidebook is to facilitate and assist the international military community in the integration of environmental considerations in the decision-making process by utilizing appropriate environmental impact assessment (EIA) processes. Commanders, soldiers, and civilians within the various military and defense organizations are ultimately responsible for the lands and associated environment entrusted to their care. Unless military organizations establish and implement procedures to adequately assess the impacts of their activities, they will not be able to achieve their environmental protection and stewardship objectives. The EIA process is critical to ensuring that any adverse effects of their activities on the environment can be avoided or mitigated as necessary. This guidebook is designed to be general in nature, so that military organizations will have a basic understanding of the importance of and need to establish environmental impact assessment policies and procedures. Practical EIA concepts and processes are critical to ensuring that environmental considerations are an integral part of the decision-making process.

This document provides information that can be used by military organizations in developing and/or tailoring their own environmental impact assessment policies and procedures. It contains guidance on general processes for EIA, typical functional areas and activities associated with military operations, how to identify potential environmental impacts, gather data for EIA purposes, and identify mitigation measures that may be necessary to offset potential negative impacts. The EIA “process” constitutes the heart of this guidebook. It discusses the need for identifying short- and long-term impacts, as well as direct, indirect and cumulative impacts of military activities on the environment.

All military organizations face environmental challenges as part of their day-to-day operations. The concepts of interoperability among different nations and principles associated with proper environmental stewardship are relevant to increased environmental stewardship on a global scale.

This guidebook was developed via a joint US-RSA project team, comprised of subject matter experts in both environmental management and training development from both countries. A list of team members and a glossary of terms used are provided at the end of the guidebook.

Background

The United States of America (US) and Republic of South Africa (RSA) have forged a cooperative relationship on defense-related issues of mutual concern under the bilateral Defense Committee (DEFCOM). The Environmental Security Working Group (ESWG), which was established in December 1997 to address strategic environmental considerations, has been incorporated into the DEFCOM structure. The ESWG is co-chaired by the RSA and US DOD senior environmental leadership executives and convenes annually. Bilateral project initiatives are identified, and joint project teams are established based upon the required subject matter expertise, with project teams convening in either of the two countries to develop and complete their efforts. Both countries identified this particular “Guidebook” effort as a topic beneficial to contemporary integrated environmental management in the military. The objective of this guidebook is to facilitate cooperative information exchanges among the international military community on the importance of and processes for integrating environmental considerations into the decision making process via environmental impact assessment.

What Is the Environment – What Does It Mean?

The concept of “environment” encompasses a variety of elements. Because the word environment often means different things to different people, it is necessary to have a fundamental understanding of what constitutes **environmental aspects**. The environment in its entirety is *not* just the various elements (e.g., air, water, soil); rather, it is the dynamic interaction between such different elements as well as any external influences (humans, animals, manmade structures, etc.). The concept of **environmental impact assessment** (EIA) addresses potential effects upon the various elements (water, soil, air, etc.). In general, the environment can be defined as the conditions and influences under which individuals and/or beings (e.g., flora, fauna) develop and live. These include:

- ◆ The natural environment, to include renewable and non-renewable natural resources such as air, water, land and all forms of life;
- ◆ Physical and biological systems that provide resources necessary to sustain productive human life;
- ◆ Manmade structures such as dams and industrial facilities, and water/wastewater treatment;
- ◆ Natural and cultural resources; and
- ◆ The social, political, economic and other factors that determine human influence on the environment.

The Environment-Military Connection

Environmental stewardship is a shared value and a common interest among many nations. Thus, it forms a solid basis for furthering broader relationships among countries, including those within the defense departments and military structures. Because the primary business of defense and military organizations (from both the civilian and military perspective) is centered on readiness preparation in order to ensure effective and efficient deployment of forces as needs arise, environmental considerations must be integrated and woven into the fabric of all military operations and activities.

These considerations are to be applied to the entire spectrum of military activities associated with force preparation, force support, force employment, and strategic direction. Given their pivotal role in all operations, military commanders - as well as soldiers and civilian leadership at all levels - must be fully aware of and informed of the potential environmental impacts of their operations, and on how to properly integrate environmental considerations into their decision-making processes. This is critical to ensuring that any potential adverse effects of their activities on the environment can be avoided or mitigated as necessary. This can only be accomplished when appropriate environmental impact assessment principles and processes are properly conducted and appropriate **mitigation** measures implemented.

Commanders, soldiers, and civilians within the various military and defense organizations are ultimately responsible for the lands and associated environment entrusted to their care. Unless military organizations establish and implement procedures to adequately assess the impacts of their activities, they will not be able to achieve their environmental protection and stewardship objectives.

Who Are the Intended Users of This Guidebook?

This guidebook has been developed and written with an extensive target audience in mind. It is intended for use by the broader international military community and civilian personnel at any level that may have responsibility for project planning and those persons responsible for planning and conducting military operations and activities (i.e., **proponents**). It is designed to assist them in identifying appropriate processes and information needed to develop and/or implement methods to assess environmental impacts of proposed actions. It is important to remember the military mission perspective, as well as the need to address and improve environmental stewardship. The EIA process and related information required can thus be used as a tool to support informed decision-making. This document is designed for use by the broader international military community, as other countries develop their own policies and methods for implementing environmental impact analysis/assessment. Additionally, the global tendency toward joint military operations and interoperability becomes a “**driver**,” that is, a motivating factor toward ensuring that environmental considerations are an integral part of planning and decision-making.

This document is NOT intended to prescribe comprehensive methods or required information for environmental impact assessment. Rather, it is intended to be a guide or “tool” that can be utilized to assist organizations in their approach and strategy toward environmental impact assessment of military activities.

Purpose of an Environmental Impact Assessment

The core purpose of EIA is to integrate environmental considerations early in the decision-making process in order to identify and mitigate potential negative impacts of proposed actions. This is necessary to ensure that appropriate mitigation measures are incorporated *during the planning phases* of projects, activities and operations, and *not* after decisions are made and actions have been initiated.

Commanders must be aware of the environmental consequences of their activities and act responsibly to offset or avoid negative impacts. Often there may be criminal and/or civil liabilities associated with failure to adhere to prescribed environmental regulations and procedures. EIAs may be legally required in some countries, or they may simply be manifested in national policy documents.

Regardless of whether it is driven by legal or policy requirements, environmental stewardship must be an integral part of the military organization.

Assessment of proposed actions is necessary in order to:

- Document environmental impacts (both negative and positive) to inform decision-makers;
- Identify any appropriate alternatives and options;
- Ensure environmental accountability of project proponents;
- Protect natural resources as a means for ensuring continued mission readiness;
- Identify short-, long-term, and cumulative impacts associated with the proposed action;
- Document any irreversible or irretrievable commitment of natural resources;
- Provide related project benefits to society (e.g., legacy), thereby helping to ensure public confidence;
- Resolve and mitigate potential negative impacts early in the planning phases; and
- Identify environmental compliance (regulatory/legal) requirements.

As stewards of vast amounts of land, military organizations often must act prudently to preserve their mission capability, sustain their valuable training areas, and interact with the local community and stakeholders. The EIA process can assist in all of those facets. Information collected during the EIA process provides valuable input to the military organization, and can be used to identify not only the potential impacts and compliance requirements, but more importantly, to enhance mission success.

General EIA Process

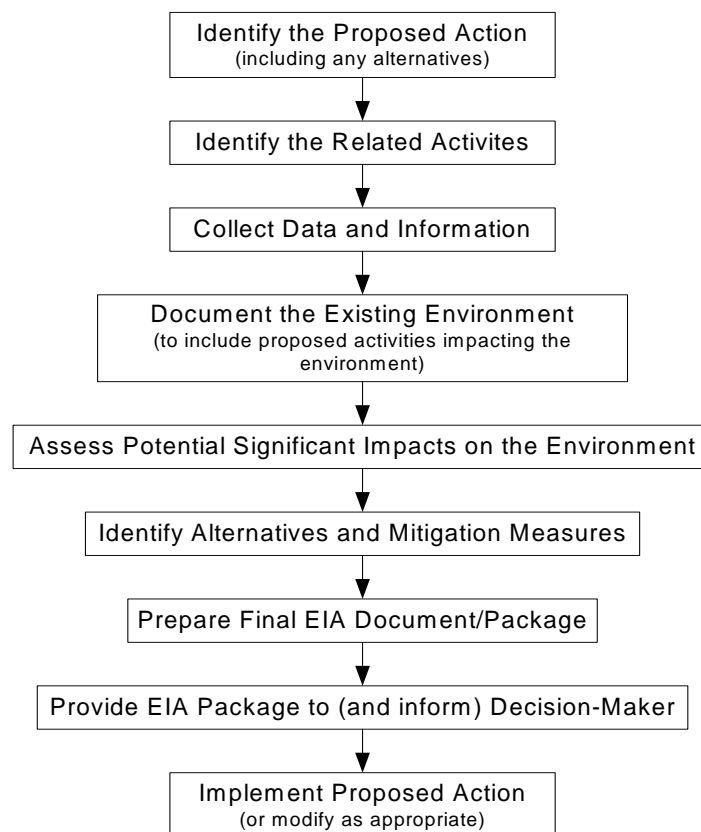
For purposes of this guidebook, the user must clearly understand that the actual EIA process to be utilized will depend upon the drivers, policies and procedures established by their organization. Specific methods and procedures for environmental impact assessment and analyses may vary widely by country, military organization, or region. Factors affecting the “how” and “why” of EIA may be driven by regulatory and legal compliance, community/public interests, and/or federal, state or local policies prescribing EIA procedures. Regardless of the driver for the EIA, there are common elements in the EIA process that must be integrated in order to adequately assess the potential impacts of a proposed action.

In general, a “**proponent**” (that is, the organization or person who is principally responsible for the proposed action) will need to initiate the EIA process. Often the proponent may lack the environmental expertise to fully execute an EIA and must seek the input and advice of the appropriate environmental staff. However, as we have noted previously (Purpose of EIA), it is ultimately the proponent of the action who is responsible for the environmental impacts of his/her proposed action and must therefore be accountable. In some cases, the proponent may also be the one to prepare the EIA document/package, as that person is in the best position to alter the project as necessary to minimize impacts. This guidebook provides a general overview of the most common steps toward accomplishing the EIA process.

The EIA process should start with a clear and full description of the **proposed action**, to include the related “**activities**” that are anticipated to be accomplished as part of the overall action. When the activities (e.g., excavation, maneuvering, live firing) have been identified, the potential environmental effects (dust, air emissions, waste) that may impact or affect the environment can then be identified. It is important that those environmental impacts be given careful consideration as their influence may vary in scope and magnitude. Such considerations should include an analysis of the significance of direct and indirect impacts, as well as any cumulative impacts. An important element of the EIA process includes the need to consider other *alternatives* to the proposed action. Once all of the potential impacts, alternatives and other related information have been developed and documented, the appropriate mitigation measures must also be incorporated. A complete EIA package that includes all of the relevant data, information and recommendations must be prepared for the ultimate **decision-maker**. Both the decision-maker and the proponent must also clearly understand that any mitigation measures identified as part of the EIA process must be implemented and continuously monitored to ensure their effectiveness. The actual written EIA package developed as part of the process may have different terms of reference in different countries, organizations, or military departments. (It could be called an environmental assessment, environmental impact study, statement or record, etc.)

The process flowchart in Figure 1 provides a general overview of the broad categories or steps to be conducted as part of the EIA process. Again, the user of this guidebook must tailor the actual EIA process to the unique needs of his/her organization or situation.

Figure 1. General Environmental Impact Assessment Process



Note: This figure provides only the broad steps in the EIA process; steps must be tailored to accommodate the requirements of the specific user and project needs.

Often public and community participation may be required and desired during the EIA process. Informational meetings often provide valuable input to the EIA process and facilitate public understanding of the action, to include potential negative impacts, as well as the positive benefits to the community.

The following bullets provide very brief descriptions of each of the steps identified in Figure 1. The users of this guidebook *must* tailor the EIA process to their particular requirements as needed.

- ◆ **Identify the Proposed Action:** The proponent must first clearly identify and describe the nature of the proposed action. The description of the proposed action must provide sufficient detail in order for the intended action to be fully understood. The extent of the description will be dependent upon the nature and breadth of the action. For example, the proposed action may be to construct barracks; the description must include adequate data related to the building size, location, materials, excavation, type of utilities that may be needed, etc. It is early in the EIA process that the proponent must also identify any appropriate alternatives to the action. For example, there may be several locations available for constructing a new barracks, one of which may have less impact.
- ◆ **Identify the Related Activities:** Every proposed action will have related “activities,” (examples are listed in the explanatory paragraphs of the next section on Typical Military Functional Areas). Identifying the activities associated with a proposed action or project is a critical step in the EIA process, as those activities become the ultimate focus of the assessment as it relates to determining “impacts.” In the example of barracks construction, activities such as grading, providing utilities, building materials as well as ultimate building use must all be assessed. Cumulatively they may have a more significant impact than if they were to only be considered individually.
- ◆ **Collect Data and Information:** There are numerous methods by which to collect information vital to the EIA process. Information is first needed about the proposed action, in sufficient detail to support the EIA and analysis. Equally important are data about the related activities. Finally, information is needed about the existing environmental conditions (the **environmental baseline data**). When completed, the environmental baseline data should provide sufficient information to allow the decision-maker a clear understanding of the existing environmental conditions, and facilitate the requirement to describe the activities that can affect the environment (see next step). Potential data/information sources include those organizations/persons closely involved with the project, staff environmental managers, as well as various reference materials. Examples of where and how to obtain additional information sources are provided at the end of this guidebook.
- ◆ **Document the Existing (Affected) Environment:** In order to convey the anticipated environmental impacts of the proposed action, one must first describe the environment as it currently exists. A review of environmental aspects (components such as air, water) provides a logical approach to describing the “affected environment” that may be impacted by the proposed action. When completed, the environmental baseline data to be developed as part of the EIA process should provide sufficient information to allow the decision-maker a clear understanding of the existing environmental conditions, and facilitates the requirement to describe the affected environment.

- ◆ **Assess Potential Significant Impacts on Environment:** Using the data and information collected, and after consulting with the appropriate persons and organizations and having established the “environmental baseline,” it is then necessary to document the potential environmental impacts of the proposed action. A thorough account of the environmental attributes is necessary, as is an evaluation of the magnitude, severity or significance of the environmental impacts. While often people will focus on environmental impacts perceived to be negative, one must keep in mind that *impacts may also be positive*, and can even be significantly positive.
- ◆ **Identify Alternatives and Mitigation Measures:** Once potential negative environmental impacts of the action have been identified, it is necessary to identify measures to avoid or mitigate them. Doing so presents a more environmentally acceptable proposal to the decision-maker as well as regulators and those interested in the action. It also demonstrates the commitment to sound environmental stewardship by minimizing, to the extent practicable, the project’s impact while allowing it to proceed. In considering the application of various alternatives or mitigations, one must recognize that there may even be impacts associated with the mitigation measure itself. For instance, if the mitigation involves restoration of native plant species, those must be obtained from somewhere else; the act of obtaining the plants may in and of itself result in impacts.
- ◆ **Prepare Final EIA Document/Package:** All of the information assembled for the EIA must now be assembled in a final document or package that will be provided to the decision-maker and other interested parties. This is the primary and most important reason for conducting the assessment. Therefore, it is important to prepare a document that is thorough enough to fully explain the action, its impacts, mitigations, persons/organizations consulted throughout the EIA process, and the recommended path forward. However, the EIA document should not be so lengthy as to diminish its ability to serve as a useful decision making tool. As a general rule, the length of the document should be commensurate with the scope of the project. Logically, the actual text and relevant information should reiterate the steps listed above in some manner.
- ◆ **Provide EIA Package to (and inform) Decision-maker:** This vital step provides the ultimate decision-maker the necessary information on which to base his or her decision as to whether, or how, the proposed action should be implemented. The decision-maker must fully accept his/her responsibility to consider the entire content of the EIA, and make the best possible decision. Full understanding of the proposal, its impacts, and related mitigation measures is necessary to result in an environmentally sound action that demonstrates stewardship.
- ◆ **Implement Proposed Action (or Modify as Appropriate):** The next step in the process is implementing the decision. It may be the actual proposed action, or it may include specific alternatives, mitigation measures, or modifications incorporated by the decision-maker. Note that the decision-maker’s recommendation serves as a firm commitment to execute the action (and any mitigation measures prescribed) in the agreed upon manner.

NOTE: It should be understood that many projects will require follow-on monitoring to ensure that mitigation measures committed to during the EIA decision process are, in fact, being implemented. The whole process implies a commitment to monitor the action to ensure it is executed according to the EIA decision, and to make adjustments if necessary to bring it back within the bounds of what was agreed upon. Many actions

may require that such monitoring continue for some time after the primary action is completed, to ensure that all mitigation measures are successfully functioning as planned.

Typical Military Functional Areas

Most military organizations conduct similar types of activities that can be grouped into broad “**functional areas**” for purposes of EIA. Examples of the major functional areas include (but are not limited to):

- ◆ Training
- ◆ Deployments and (Military) Operations
- ◆ Construction
- ◆ Maintenance and Repair (M&R)
- ◆ Research, Development and Testing (RDT)
- ◆ Medical Services
- ◆ Installation (Base) Operations

To better understand the “related activities” of actions falling under one of the functional areas above (which may have an impact on the environment), examples are provided below.

- ◆ **Training:** Military training consists of activities such as air, land, and naval exercises. Such exercises may include (but are not limited to) maneuvers, live firing, bivouac/encampment, transportation convoys, logistics and sanitation support services. Within the broad range of activities, there are more specific examples such as munitions and waste management, and earth disturbing activities.
- ◆ **Deployments and (Military) Operations:** Many of the same related activities found in training apply to military “operations” including deployments. Often such operations occur on a large scale, and thus the severity of environmental impacts must be carefully considered. It is especially important to consider the environmental impacts during the planning stages of a deployment. Although deployment is discussed in greater detail in a subsequent section of this guidebook, it should be emphasized here that it is critical to examine all phases of the process, which includes:
 - Pre-deployment
 - Deployment
 - Post-Deployment
- ◆ **Construction:** Construction involves a whole host of related activities that can potentially impact the environment. These include: earth disturbing activities; use of natural resources; managing water runoff; generating and managing waste streams; and transport, storage and disposal of hazardous materials and wastes. Again, early and proper planning is essential to minimizing environmental impacts associated with construction. Whether assessing a single facility or an entire installation (and its operations), full consideration of the impacts of the related activities is vital.

- ◆ **Maintenance and Repair:** Maintenance and Repair (M&R) is a very common functional area within all military organizations; this is essential to maintain the installations, bases and facilities that support the troops. M&R activities affect all facilities, utility infrastructure, vehicles (tactical and non-tactical), aircraft, ships, and an unlimited number of technical devices. Typically, these activities require use of hazardous materials, petroleum, oil and lubricants (POL) and solvents, and require provisions to control air and water emissions.
- ◆ **Research, Development and Testing:** Research, Development and Testing (RDT) may involve activities conducted either indoors or outdoors. Regardless of where the work is performed, consideration of the related activities is paramount to the EIA process. Typical RDT activities include: laboratory operations, weapons system testing, vehicle, aircraft, and ship testing, instrumentation, material and waste management, and air and water emission control. Important within the area of RD&T is the overall development, use and ultimate disposal of military *matériel*. From an environmental impact perspective, one should evaluate the life cycle of the system, item or process to ensure sound environmental principles and practices are incorporated at each phase. For example, such an approach would allow identification of substitute materials that may be less toxic.
- ◆ **Medical Services:** All military organizations typically provide medical and dental treatment for their troops. Those services consist of activities that include pharmaceutical and chemical use; nuclear and radiological materials use; biological hazards and waste management; and laboratory and dental operations. Providing such services in field conditions may also include additional activities such as transportation, storage and disposal of biological/hazardous materials and wastes, energy supply requirements, and sanitary waste management.
- ◆ **Installation/Base Operations:** Permanent military installations provide relatively standard services to the troops stationed therein. Typical services, or related activities, include: administrative functions, engineering, logistics, land use planning, utilities, recreation, and waste management. Even though an installation may have existed for quite some time, recurring as well as new activities have the potential to affect the environment. Therefore, the related potential impacts must be considered and periodically re-evaluated.

Environmental Aspects and Attributes

After determining which activities are possibly related to the proposed action being assessed, the possible impacts of these activities on environmental aspects and attributes must be considered. Environmental **aspects** can be regarded as broad categories of both natural and man-made features (e.g., air, water, transportation). Such aspects also have associated **attributes** (typically, characteristics of those aspects) that must be assessed during the EIA process.

Each activity associated with a proposed action may have potential impacts on the environmental attributes. Such impacts can be used to determine which environmental attributes require specific data and information collection as part of the EIA process.

Table 1 lists some common environmental aspects and the possible environmental attributes, along with activities impacting (affecting) the environment and some of the potential environmental *effects*. It is not a comprehensive list, but is provided to “guide” the user toward a better understanding of the EIA process and related data collection requirements.

**Table 1. Examples of Environmental Aspects and Attributes
and
Activities Impacting the Environment and Potential Environmental Effects**

Aspect	Attributes	Activities Impacting the Environment (affecting)	Potential Environmental Effects
Air	<ul style="list-style-type: none"> • Visibility • Nature/levels of pollution • Odor 	<ul style="list-style-type: none"> • Vehicle/Equipment exhaust • Fugitive dust • Range fires • Open air burning • Use of toxic industrial chemicals/material 	<ul style="list-style-type: none"> • Increased levels of particulate matter • Smog • Offensive odors • Adverse respiratory effects • Aesthetic and structural damage
Surface Water	<ul style="list-style-type: none"> • Nature/level of pollution • PH balance • Turbidity • Nutrients • Ability to sustain aquatic life 	<ul style="list-style-type: none"> • Unchecked drainage • Washing vehicles at unapproved sites • Refuelling operations near water sources • Hazardous material and waste spills • Unregulated effluents 	<ul style="list-style-type: none"> • Water contamination (POL, hazmats, etc.) • Erosion • Thermal impacts • Uncontrolled algae growth • Eutrophication
Groundwater	<ul style="list-style-type: none"> • Nature/level of pollution • Recharge rate (aquifer) • Water extraction potential (aquifer) • Water table 	<ul style="list-style-type: none"> • Hazardous material and waste spills • Disposal practices • Unchecked drainage • Washing vehicles at unapproved sites • Refueling operations near water recharge zones • Unregulated effluents • Improper well construction 	<ul style="list-style-type: none"> • Water contamination (hazmats, waste) • Depletion of groundwater • Widespread contamination
Soil and Geology	<ul style="list-style-type: none"> • Infiltration rates • Soil type and structure • Soil cover • Slope • Rate of erosion 	<ul style="list-style-type: none"> • Over-use of maneuver / sensitive areas • Demolition and munitions use • Range fires • Accumulation of waste elements • Construction/digging activities • Refueling operations 	<ul style="list-style-type: none"> • Soil contamination • Soil erosion • Damage to sensitive habitat
Ecology	<ul style="list-style-type: none"> • Ecosystem stability • Terrestrial and aquatic plant and animal life • Presence of endangered plant and animal species • Diversity of plant and animal communities 	<ul style="list-style-type: none"> • Maneuver in ecologically sensitive areas • Poor track discipline • Extensive use of ranges • Frequency of off-road vehicle use 	<ul style="list-style-type: none"> • Damage to sensitive habitat • Destruction of breeding areas • Species loss
Infrastructure	<ul style="list-style-type: none"> • Adequacy of road network • Capacity for congestion and frequency of use • Adequacy of utilities 	<ul style="list-style-type: none"> • Overloading of roads • Overloading of utilities, increased energy demands 	<ul style="list-style-type: none"> • Deterioration of roads • Depletion of energy reserves • Demand for alternative energy sources
Noise	<ul style="list-style-type: none"> • Frequency • Decibel levels • Time of occurrence 	<ul style="list-style-type: none"> • Artillery firing • Scheduling of operations • Demolition/munitions use • Vehicle convoys and maneuvers • Fixed/Rotary wing operations 	<ul style="list-style-type: none"> • High air shock levels • Damage to quality of life • Annoyance and discomfort for troops, local community, wildlife • Hearing loss
Cultural Resources	<ul style="list-style-type: none"> • Sacred site • Historic buildings • Archaeological sites • Protected (heritage) sites 	<ul style="list-style-type: none"> • Maneuvering in sensitive areas • Digging in sensitive areas • Demolition/munitions use • Hazardous material and waste spills 	<ul style="list-style-type: none"> • Disturbing, removing, damaging artifacts • Alienation of affected population
Aesthetics	<ul style="list-style-type: none"> • Visual landscape • Natural landscape diversity • Unique cultural or natural features 	<ul style="list-style-type: none"> • Excavation and digging • Excessive building • Slope ascending practice 	<ul style="list-style-type: none"> • Elimination of landscape diversity • Destruction of natural features
Land Use	<ul style="list-style-type: none"> • Compatibility 	<ul style="list-style-type: none"> • Land use practice • Poor operation damage control 	<ul style="list-style-type: none"> • Poor soil and vegetation cover • Brush encroachment

Note: Aspects included in this table serve only as examples and therefore do not present an all-inclusive list of attributes and potential effects.

It is important to emphasize that Table 1 *merely provides examples* and that proponents can apply these principles to their own proposals. Often one must go beyond the examples provided in this guidebook and Table 1.



Early and proper planning is essential to minimizing environmental impacts.

Understanding the EIA Process Using a Sample Project

To help clarify the relationship of functional areas, related activities, potential activities impacting the environment, potential environmental impacts, and possible mitigation measures, a sample project is provided in Table 2. The proponent would need to examine the breadth of these areas and tailor it to their specific proposal. In this example, the proponent intends to build a barracks. Therefore, the functional area is construction, and the related activities are those associated with building the barracks (for example - soil excavation, utilities) and then using the facility. There are many activities potentially affecting the environment that could result in the course of construction and ultimate use of the facility, both on-site and in obtaining materials from off-site locations. Those potential activities may in turn have environmental impacts. If there are negative environmental impacts resulting from the proposed action, the proponent must identify and develop possible mitigation measures, intended to avoid or lessen the severity of the impact.

While mitigation of all potential impacts is an admirable goal, a more realistic approach is to focus on those that are practicable. From a practical perspective, one must weigh the severity of impacts, and concentrate resources on those with the most significance. For example, it is not feasible to move soil by hand. Vehicles must be used and they will likely cause both air emission and dust impacts during the construction. More importantly, the proponent should focus efforts on controlling any soil erosion caused as a result of the construction, from both the direct and indirect perspectives. Therefore, it is important to understand both the degree of the impacts and the feasibility of mitigation measures.

Table 2. Sample Project: Building a Barracks at an Installation

Related Activity	Potential Effects (Grouped by Environmental Aspect)	Potential Environmental Impacts	Potential Mitigation Measures
<p>Construction phase</p> <ul style="list-style-type: none"> • Excavations • Obtain and store materials • Access roads • Rubble, hazardous waste disposal • Utilities <p>Ultimate use</p> <ul style="list-style-type: none"> • Roads • Utilities • Sanitation 	<p>Air</p> <ul style="list-style-type: none"> • Dust • Equipment exhaust <p>Surface Water</p> <ul style="list-style-type: none"> • Hazardous material and waste spills • Flooding <p>Ground Water</p> <ul style="list-style-type: none"> • Water runoff • Hazardous material and waste spills <p>Soil and Geology</p> <ul style="list-style-type: none"> • Digging activities • Accumulation of wastes <p>Ecology</p> <ul style="list-style-type: none"> • Selecting a site located in an ecologically sensitive area • Clearing of vegetation <p>Infrastructure</p> <ul style="list-style-type: none"> • Deterioration of roads • Overloading of utilities • Inadequate sanitation capacity <p>Noise Generation</p> <ul style="list-style-type: none"> • Demolition use • Construction during non-standard working hours (to reduce traffic congestion) <p>Cultural Resources</p> <ul style="list-style-type: none"> • Digging near cultural sites 	<p>Air pollution</p> <ul style="list-style-type: none"> • Increased levels of particulate matter <p>Water pollution</p> <ul style="list-style-type: none"> • Hazardous materials • Leaching <p>Soil pollution</p> <ul style="list-style-type: none"> • hazardous materials and wastes <p>Soil erosion</p> <p>Natural resource destruction and degradation</p> <ul style="list-style-type: none"> • Vegetation destruction • Organism habitat destruction • Altered migratory behavior of organisms <p>Hydrological regime changes</p> <p>Damage to cultural sites</p> <p>Visual impact (damage to aesthetics)</p> <p>Noise</p> <ul style="list-style-type: none"> • Annoyance for troops, local community • Decibel level exceeds local standard <p>Public health and safety issues</p> <ul style="list-style-type: none"> • Exposure to pollutants • Need for more sanitation capacity 	<p>Use environmentally preferable products</p> <p>Apply dust suppressants on site and roads</p> <p>Limit the degree of activities on the site</p> <p>Specify limits on clearing vegetation/habitat</p> <p>Alter location of the construction site</p> <ul style="list-style-type: none"> • Avoid sensitive natural environments • Avoid areas of cultural significance <p>Noise level restrictions</p> <ul style="list-style-type: none"> • Limiting time of day for noisiest construction • Using vehicles equipped with noise abatement <p>Ensure contractors remove all solid waste from the site</p> <p>Dispose of waste only at approved landfill</p> <p>Public outreach</p> <ul style="list-style-type: none"> • Periodic meetings with local community to exchange information • Development of public relations materials (various media) <p>Rehabilitate the site following construction (to address soil erosion, contamination, etc.)</p> <p>Reestablish sensitive habitats in surrounding areas</p> <p>Construction of new roads, utilities, and sanitation (to address overloading problems)</p>



Construction involves a whole host of related activities that can potentially impact the environment.

Data and Information Collection

Basic data and background information that relate to a particular site are required to properly prepare an EIA. The EIA package must clearly be able to relate the data associated with the various environmental aspects and attributes to the potential impacts. In short, environmental baseline data is comprised of two general categories: existing information, and information that must be gathered to complete the data required for the EIA. Collectively, this information constitutes the environmental baseline information.

Data and information for impact assessments can be collected utilizing two general methods. The first would review existing documents and resources available; the second is to collect any additional required data through fieldwork. Existing sources of data and information (e.g., reports, studies, personal interviews) should always be pursued first.

The specific proposed action and site will determine the type of information needed and methods to be used. Broad categories of methods, techniques and tools can be employed to collect data and information. The following data-gathering methods are examples and must be tailored to the specific requirements of the action and needs of the project proponent.

General information-gathering techniques and tools include:

- ◆ **Existing impact assessments reports and other reference documents** are a valuable source of existing information.

- ◆ **Reconnaissance** is the collection of information through direct observation by individuals or a group of people of a certain area.
- ◆ **Surveys** allow a person to gather information on specific issues by means of interviews, public meetings, questionnaires, checklists, etc.
 - **Interviews** involve personal discussion(s) with one or more respondents to gather information regarding environmental issues.
 - **Public meetings** provide a large amount of information on issues of common concern to the community.
 - **Questionnaires** obtain information by means of a purposeful, structured set of questions. They are used to obtain written views of a large number of respondents. Questionnaires have the advantage of being able to gather sensitive data from respondents who want to remain anonymous.
 - **Checklists** allow a person to create an inventory of necessary specific tasks, issues, etc.
- ◆ **Maps** allow a person to obtain spatial information regarding the environment on different areas like topography, vegetation, soils, geology, land use, climate, and infrastructure.
- ◆ **Geographic information systems (GIS)** consist of information and databases that allow a person to perform spatial analysis like ecosystems analysis, carrying capacity analysis, and identification of sensitive areas. GIS has an added advantage of being able to create maps according to a specific need.
- ◆ **Remote sensing products** like aerial photographs and satellite imagery allow a person to view and collect information of large areas and use the information together with reconnaissance, map interpretations and GIS, etc. These can be especially useful when trying to determine changes over time.

The existing data might be outdated or insufficient to meet the needs of the EIA package. Therefore, the proponent should determine whether any adjustment to the baseline data is needed during the EIA process.

Identification of Impacts

The proper identification of all the environmental impacts related to a proposed action is the essence of any EIA and therefore sufficient attention must be provided to this phase of the EIA process in particular. It is important to consider that an EIA constitutes two major components:

- ◆ Identification of typical potential environmental impacts
- ◆ Determination of significance of each impact identified.

Types of Environmental Impacts

The impact on the environment can be characterized in terms of several key environmental characteristics. The following list offers some examples of these characteristics:

- ◆ Biological characteristics (living organisms and associated processes)
- ◆ Current and future land use and landscape character (residential, open space planning)
- ◆ Cultural and historical resources (architectural and cultural sites)
- ◆ Socio-economic characteristics (demographic aspects)
- ◆ Infrastructure services (energy and water supply, waste management services)
- ◆ Social and community services and facilities (health services, recreation)
- ◆ The nature and level of environmental pollution (air, water, soil, noise)
- ◆ The rate of natural resource consumption (use of nonrenewable resources)
- ◆ Aesthetics (visual impairments)

It is important that any environmental impact resulting from a proposed action be analyzed for three types of impact: direct, indirect and cumulative, which are described below.

- ◆ **Direct impact:** These are impacts caused directly by the action and generally occur at the same time as the activities associated with the proposed action.
An example of a direct impact would be clearing of natural vegetation before construction.
- ◆ **Indirect impact:** These are impacts caused by the overall action, but which may only manifest themselves at either a later time or location than initial activities associated with the action.
An example of an indirect impact would be increased sedimentation of aquatic systems associated with the ground clearing of an area for construction.
- ◆ **Cumulative impact:** Cumulative impacts to the environment can vary. There can be an incremental impact of one proposed action, or, there can be an impact from several actions in the same location or site (past, present and future actions must be considered to determine cumulative impacts). Additionally, individual minor actions may collectively have a significant impact.
An example of a cumulative impact would be destruction of flora and habitat due to repetitive training in one location.

The proponent must also consider the duration of the various environmental impact types and identify them in terms of short- and long-term effect.

- ◆ **Short-term effect:** Caused by an action and the duration is limited to a short time period after the action.

- ◆ **Long-term effect:** Caused by an action and the effects occur over the full duration of the action's lifespan, or the action causes irretrievable impacts.

These impacts must be quantifiable so that the degree of their significance can be determined. Those issues and impacts that are most significant should be given higher priority for mitigation; negligible impacts should be addressed commensurate with their scope and nature and within available resources.

Determination of Significance of the Impact

The mere fact that an impact may occur does not mean that the proponent must immediately consider how to mitigate that impact. The key objective of an EIA is not just to *identify* impacts, but rather to *evaluate* those impacts so as to determine which should be considered significant and which should be considered insignificant. The significance of potential direct, indirect, and cumulative impacts must be determined through a systematic evaluation of the actions, alternatives and mitigation measures in terms of their effects on each of the individual components of the environmental resources. In determining the significance of the impacts, they must be assessed in the proper context. Factors to consider include:

- ◆ The *extent* of the actual impact to/on:
 - Society as a whole (national and international)
 - Affected region
 - Local community
 - Interested parties
- ◆ The *duration* of the impact:
 - Temporary
 - Short-term
 - Long-term
- ◆ The probability or *frequency* of occurrence, for example:
 - Annually
 - Weekly
 - Continually
- ◆ The *intensity* of the impact, considered in terms of magnitude as well as the severity of the impact, whether it is negative or beneficial. For example:
 - Degree to which public health and safety is affected
 - Controversial implications of the action
 - Cumulative impacts

- Extent and type of waste generated by the activity
- Degree to which cultural and/or historical sites are affected
- Degree to which endangered and threatened species and their habitat may be affected
- Potential for the violation of environmental laws and regulations.

The significance of the impact should be determined by evaluating each identified impact on the above factors and providing a weighted value to each impact. This will lead to a “significance ranking” of the environmental impacts associated with the proposed action. The ranking of environmental impacts serves three purposes:

- ◆ It focuses the proponent on a limited number of problems that should be addressed first.
- ◆ It gives interested parties brief information on impacts.
- ◆ It helps proponents to best use limited time and financial resources.

This does not mean that the impacts with a lower ranking score can be ignored; rather, they must also be incorporated in the mitigating measures as appropriate. All issues related to determining the significance of the identified impacts must be carefully considered and recorded.

Mitigation Measures

Mitigation strategies must be seen as an essential step in the EIA process to reduce the identified significant environmental impacts of the proposed action or alternatives. In evaluating the type and efficiency of a desired mitigation measure, it is important that the physical and social factors that may influence its successful implementation also be evaluated. Attention should be given to reviewing any documentation on previous mitigation measure’s failures and successes. General objectives commonly adopted for the minimization of adverse impacts and the maximization of beneficial impacts include the following:

- ◆ **Avoidance:**
 - Avoiding specific activities that could result in adverse impacts
 - Avoiding certain types of resources or areas considered ecologically sensitive
Example: Construction work on ecologically sensitive wetlands
- ◆ **Preservation:**
 - Preventing any future actions that may adversely affect an environmental resource or attribute
- ◆ **Minimization:**
 - Limiting the degree, extent, magnitude, or duration of adverse impacts
Examples: Reducing the amount of repeated troop exercises on a range; minimizing solid waste generated in the waste stream

◆ **Rehabilitation:**

- Rectifying adverse impacts by repairing or enhancing the affected resource
Example: Reseeding of disturbed/denuded range land

◆ **Restoration:**

- Rectifying adverse impacts by restoring the affected area to an earlier and possibly more stable, productive state
Example: Long-term rehabilitation and large-scale landscaping of burrow pits to restore to original or improved environmental state

◆ **Replacement:**

- Compensating for the loss of an environmental resource at one location with the creation or production of that same type of resource at another location
Example: Planting trees for a forest in another area if the site necessary for a military action will destroy the present forest

◆ **Improvement:**

- Enhancing the capability of an existing resource with respect to its environmental functions
Example: Use of lighting systems that reduce light pollution at night

◆ **Augmentation:**

- Increasing the area or size of an existing environmental resource
Example: Storm water management to restore dehydration of sensitive wetlands

◆ **Development:**

- Creating specific environmental resources in an area where they are currently absent
Example: Incorporating landscape architecture in a construction project

◆ **Diversification:**

- Increasing the mixture or diversity of habitats, species, or other environmental resources in a circumscribed area.

An **Adaptive Management Strategy** is very important to consider in selecting and implementing a mitigation measure. This implies that during the implementation phase, actions are modified as the environmental conditions change in order to keep the impacts within acceptable parameters. It is also very important that the mitigation measures are clearly defined and identified in the EIA package so that the decision maker can fully understand and approve them.

It should be emphasized that each proposed mitigation measure must be considered as an activity like any other undertaken in the course of the project development. In other words, a proposed mitigation measure should be assessed for all its potential impacts on the social and physical components and dynamics of the environment, just as any other project-related activity should be assessed. Therefore, forethought is vital when planning and implementing any mitigation measure within the life cycle of the project.

It is the proponent's responsibility to ensure that the mitigation plan is implemented and monitored for completion and effectiveness. Failure to fully implement the mitigation measure may lead to legal consequences, project delays and monetary ramifications.

Environmental Considerations During Deployment

The environmental ethic that defense organizations establish and instill within their own territories must be carried over into operational deployments as well, to include geographical sites and areas that extend beyond their control. Therefore, military organizations should develop a policy to integrate appropriate EIA processes (as part of an overall commitment to environmental stewardship) into deployment planning.

Special consideration must be given to military force deployments. A deployment is a major military operation composed of three principal phases: pre-deployment, deployment (or mobilization), and post-deployment (or demobilization). Early planning and incorporation of environmental considerations in the pre-deployment stage is critical to minimizing impacts, ensuring regulatory compliance, and ensuring necessary services and support throughout the operation.

- ◆ **Pre-Deployment:** Pre-deployment considerations must examine the nature of the mission, the environmental baseline of the area to which the unit deploys, whether there are any regulatory compliance requirements or needs for special equipment or contractual support, and ensure that there is clear guidance for consideration of environmental factors.
- ◆ **Deployment (Mobilization):** During the deployment stage, troops must be aware of the environmental requirements of the area where they will be located. Constant monitoring and attention to detail is required in order to maintain sound stewardship. Often times, commanders must pay personal attention to this to ensure continual integration of environmental considerations into the operation.
- ◆ **Post-Deployment (Demobilization):** Much of the planning for post-deployment should be done before having mobilized. However, providing for things such as removing and responsibly disposing of all wastes, restoring damaged land, cleaning vehicles and equipment (so as not to import foreign organisms or pests) are examples of important post-deployment activities.

Clearly, during all three stages of a deployment, opportunities abound for taking environmental factors into account. Nevertheless, in the case of deployment scenarios, meeting the objectives of the military mission must be paramount. Thus, while every attempt should be made to address

and improve environmental stewardship during a deployment, these efforts should not result in the failure to meet the necessary military objective.



Early planning and environmental consideration in the pre-deployment stage is critical.

The use of this guidebook on a day-to-day basis in determining the possible impacts that military related activities might have on the environment can largely assist military defense forces world wide in implementing a process easily understood and flexible for any activity, large or small. This guidebook can easily be used and applied by most professionally trained military and civilian defense personnel to help ensure that the planning and execution of their missions and tasks are accomplished in a more environmentally acceptable manner.

Additional Information Sources

Users of this guidebook must recognize that this is **not** an all-inclusive document or tool. There are many resource avenues that are available and should be pursued to facilitate the EIA process. Other sources that can be consulted include local environmental and regulatory agencies and local sources of information:

- ◆ Government (federal/national/provincial/state/local)
 - Departments of Agriculture, Water, Forestry, Land Affairs, Conservation
 - Environmental agencies

- Mapping and surveying agencies
- ◆ Associations and professional bodies, such as the International Association for Impact Assessment
- ◆ Non-Governmental Organizations
- ◆ Local Universities and Colleges that have programs dedicated to environmental research
- ◆ Internet sites
 - A number of organizations create websites from which valuable information can be retrieved. This Guidebook cannot include all existing sites but the user should use basic keywords to search for information, e.g., environmental impact, impact assessment, military impact, ISO 14001, mitigation.
 - A possible valuable Internet information source is the Defense Environmental Network and Information Exchange (DENIX) that allows for the posting and exchange of military-related environmental information. DENIX includes an international menu at **<http://www.denix.osd.mil>**.

Glossary

Deployments	Movement of forces together with their material for a protracted period within or outside their country or their area of operation.
EIA	An Environmental Impact Assessment is formal process used to predict the environmental consequences of a proposed development or activity, establishing which mitigation measures should be implemented remaining compliant to relevant regulatory policies and legislation.
Environmental Aspect	Environmental <i>aspects</i> can be regarded as broad categories, including both natural and man-made features (e.g., air, water, soil, and transportation).
Environmental Attributes	Environmental aspects can be divided into more specific environmental <i>attributes</i> . Attributes of an aspect such as air could include factors such as air quality, visibility, pollution level, and offensive odors.
Environmental Baseline Data	Existing data plus any data that need be collected to assess the existing environment. Generally, the information available to describe the affected existing environment.
GIS	A Geographic Information System is a computer database used for the storing, retrieving, manipulating, analyzing, and displaying of spatial data, such as for topography purposes.
Infrastructure	Man-made features not natural to the environment, part and parcel of human activities and ways of life such as transportation networks, buildings, utilities, and fences.
Installation (Base)	The land, facilities, and services provided at an established permanent location for the purpose of supporting the conduct of military missions.
Installation (Base) Operations	The activities and functions associated with operating a permanent military installation, including such things as administrative support, engineering, logistics, recreation, and utilities.
Maintenance and Repair (M&R)	Maintenance and Repair includes any activities to properly maintain existing equipment, infrastructure, and materiel.
Materiel	All military-unique equipment and supplies for both administrative and combat use.

Mitigation	The implementation of practical measures to reduce or negate adverse impacts as well as to enhance beneficial impacts of an action.
Monitoring	A method to ensure that the requirements for compliance to relevant legislation and management systems are met.
Operations	Military activities conducted by armed services.
Proponent	Organization or person principally responsible for the proposed action.
Research, Development and Testing (RDT)	Activities such as laboratory operations; weapons system testing; vehicle, aircraft, and ship testing; and instrumentation (conducted either indoor or outdoor) on the overall development, use, and ultimate disposal of military materiel.
Rehabilitation	Rectifying adverse impacts by repairing or enhancing the affected resource.

References

Numerous environmental policy and doctrine documents of both the US and RSA Defense Departments were utilized during the development of this guidebook. While they are too numerous to cite herein, it is important to note that key documents used as reference during this effort include (but are not limited to):

Army Environmental Manager's Handbook Series: Compliance with the National Environmental Policy Act, US Department of the Army, May 1993

Environmental Review Guide for US Army Europe, Volumes 1 – 3 (April 1988).

FM 3-100.4 US Army Field Manual for Environmental Considerations In Military Operations, June 2000.

Integrated Environmental Management Guideline Series: Guideline Documents 1 – 6, Department of Environmental Affairs, Pretoria, RSA, 1992.

NEPA Manual for Materiel Acquisition, US Department of the Army, November 2000

TR N-92 Guidelines for Review of EA/EIS Documents. August 1980.

Other Documents Developed under the auspices of the US-RSA DEFCON ESWG

The following are guidebooks previously developed for use by the international defense environmental community by joint US-RSA teams.

Publication ESWG/001 – Conversion of Military Bases in South Africa

Publication ESWG/002 – Military Integrated Training Range Management Guidebook

Publication ESWG/003 – Partnering to Build a South African Ministry of Defence Facilities Management Web Site

Publication ESWG/004 – Guidebook on the Development and Implementation of Environmental Education and Training in the Military

They are each available on the Internet in the US-South Africa section of:
<https://www.denix.osd.mil/denix/Public/Training/training.html#int>

Additional copies may be downloaded from the International Section (“US/South African Guidebooks”) of <https://www.denix.osd.mil/denix/Public/Intl/international.html>

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